# INTELLECTUAL PROPERTY RIGHTS FOR NANOTECHNOLOGY: A LEGAL STUDY FOR MALAYSIA

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## ABSTRACT

The purpose of this study is to examine intellectual property (IP) protection for nanotechnology, comparing the laws of Malaysia with those of the United Kingdom (as a member of the European Union and European Patent Convention). As well as analysing current primary and secondary legal sources, a small number of discrete interviews were conducted with key nanotechnology scientists in Malaysia and the United Kingdom to ascertain the nature and development of nanotechnology in the jurisdictions under study and to explore the experts' perceptions of IP laws, including the pattern of protection that might be expected as the technology matures.

This study argues that current intellectual property rights are appropriate to govern nanotechnology creations, so that there is no need to devise a new form of IP right for nanotechnology.

The emphasis in the IP literature to date has been on patent law, but this study argues that the law of breach of confidence is also very significant, despite difficulties presented by the technology. Furthermore, from qualitative empirical and doctrinal evidence, other forms of IP protection may be applicable to some extent.

This study also investigates the current term protection of different forms of IP which may be relevant to nanotechnology, including the possible application of Supplementary Protection Certificates to allow for the time taken by nanotechnology products to enter the market.

Finally, some recommendations are made for both Malaysia and the United Kingdom to protect nanotechnology appropriately.

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# LIST OF ABRREVIATIONS

| | | |
|---|---|---|
| AFM | : | Atomic Force Microscope |
| AON | : | Australian Office of Nanotechnology |
| APNF | : | Asia Pacific Nanotechnology Forum |
| BOA | : | Boards of Appeal |
| BSI | : | British Standard Institute |
| CA | : | Copyright Act |
| CDPA | : | Copyright, Design and Patents Act |
| CRD | : | Community Registered Design |
| CFI | : | Court of First Instance |
| COA | : | Court of Appeal |
| CP | : | Clarendon Press |
| CTM | : | Community Trade Mark |
| CUD | : | Community Unregistered Design |
| CUP | : | Cambridge University Press |
| DIUS | : | Department of Innovation, Universities and Skills |
| DTI | : | Department of Trade and Industry |
| EBL | : | Electron Beam Lithography |
| EBOA | : | Enlarged Board of Appeal |
| ECJ | : | European Court of Justice |
| EE | : | Edward Elgar |
| EIR | : | Environmental Information Regulation |
| EPC | : | European Patent Convention |
| EPO | : | European Patent Office |
| EPU | : | Economic Planning Unit |
| EU | : | European Union |
| FOI | : | Freedom of Information |
| HL | : | House of Lords |
| HP | : | Hart Publishing |
| HRA | : | Human Rights Act |
| HSE | : | Health, Safety and Environment |
| HUP | : | Harvard University Press |
| ICT | : | Information communication and technology |
| IDA | : | Industrial Design Act |
| IMEN | : | Institute of Microengineering and Nanoelectronics |
| INEX | : | Institute of Innovation in Nanotech Exploitation |
| INSAT | : | Institute of Nanoscale and Technology |
| IP | : | Intellectual Property |
| IPC | : | International Patent Classification |
| IPRs | : | Intellectual Property Rights |
| ISO | : | International Organization for Standardization |

| | | |
|---|---|---|
| JPL | : | Jordan Publishing Limited |
| JWS | : | John Wiley & Sons |
| KLI | : | Kluwer Law International |
| LN | : | Lexis Nexis |
| LXB | : | Lexis Nexis Butterworths |
| MEMs | : | Microelectromechanical Systems |
| MiGHT | : | Malaysian Industry-Government Group for High Technology |
| MIMOS | : | Malaysian Institute of Microelectronic Systems |
| MNNC | : | Malaysian National Nanotechnology Centre |
| MNNI | : | The Malaysian National Nanotechnology Initiative |
| MNOs | : | Mobile Network Operators |
| NanoKTN | : | Nanotechnology Knowledge Transfer Network |
| NC | : | Nice Classification |
| NDA | : | Non-Disclosure Agreement |
| NFCs | : | National Nanotechnology Fabrication Centres |
| NION | : | National Initiative on Nanotechnology |
| NMI | : | National Measurement Institute |
| NMP | : | New Production Technologies |
| NNI | : | National Nanotechnology Initiative |
| NNS | : | National Nanotechnology Strategy |
| NTWG | : | Nanotechnology Working Group |
| OECD | : | Organization for Economic Cooperation and Development |
| OHIM | : | Office for Harmonisation of the Internal Market |
| OUP | : | Oxford University Press |
| PASTAT | : | Patent Statistical Database |
| PMSEIC | : | Prime Minister's Science, Engineering and Innovation Council |
| R&D | : | Research and Development |
| RAE | : | The Royal Society and the Royal Academy of Engineering |
| S&M | : | Sweet & Maxwell |
| SC | : | Supreme Court |
| SIRIM | : | Standards and Industrial Research Institute of Malaysia |
| SPCs | : | Supplementary Protection Certificates |
| STM | : | Scanning Tunnelling Microscope |
| TBOA | : | Technical Board of Appeal |
| TMA | : | Trade Marks Act |
| TMD | : | Trade Marks Directive |
| UK | : | United Kingdom |
| UKIPO | : | United Kingdom Intellectual Property Office |
| US | : | United States of America |
| USPTO | : | United States of Patent and Trademark Office |

| | | |
|---|---|---|
| WIPO | : | World Intellectual Property Organization |
| WSP | : | World Scientific Publishing |
| WTO | : | World Trade Organization |
| RC | : | Routledge and Cavendish |

** For legal journal abbreviations, refer to Cardiff Index to Legal Abbreviations:
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** For non-legal journal abbreviations, refer to Journal of Economic Literature Abbreviation List:
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- Copyright Designs and Patents Act 1988
- Design Right (Semiconductor Topographies) Regulations 1989
- Environmental Information Regulation 2004
- Freedom of Information Act 2000
- Human Rights Act 1998
- Patent Act 1977 (as amended)
- Patent Fees Rules 2007 (as amended)
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- Registered Design Act 1949
- Trade Marks Act 1938
- Trade Marks Act 1994
- Trade Marks Rules 2000

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- Evidence Act 1950
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- Malaysian Copyright Act 1987
- Patent Regulations 1986
- Patents Act 1983
- Trade Marks Act 1976
- Trade Marks Regulations 1983

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- Commission Regulation (EC) No. 772/2004 of April 2004 on the Application of Article 81(3) of the Treaty of Categories of Technology Transfer Agreements
- Convention for the Protection of Human Rights and Fundamental Freedoms
- Council Directive 87/54/EEC of 16 December 1986 on the Legal Protection of Topographies of Semiconductor Products
- Council Regulation (EC) No.40/94 of 20 December 1993 on the Community Trade Mark
- Council Regulation (EEC) No 1768/92 of 18 June 1992, now replaced by codifying Regulation (EC) 469/2009 of 16 June 2009
- Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the Legal Protection of Biotechnological Inventions
- EU Regulation on Supplementary Protection Certificates for Medicinal Products

- European Patent Convention 1973 (amendment 2000)
- European Union's Communication on the Precautionary Principle 2000
- First Council Directive 89/104/EEC of 21 December 1988 to approximate the laws of the Member States relating to trade marks. Now replaced by consolidated version the Directive 2008/95/EC of 22 October 2008, OJ L 299/25
- Regulation (EC) No 1901/2006/ of the European Parliament and of the Council of 12 December 2006 on Medicinal Products for Pediatric Use, now incorporated into Regulation 469/2009
- Regulation (EC) NO. 1610/96 of the European Parliament and of the Council of 23 July 1996 Concerning the Creation of a Supplementary Protection Certificate for Plant Protection Products
- The Registered Designs Regulations 2003 SI 2003 No. 550 amended the Act in relation to Community Designs

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- Berne Convention for the Protection of Literary and Artistic Works 1886 (1971 revision with 1979 amendments)
- Convention on the Grants of European Patents, 1973
- Council Directive 87/54/EEC of 16 December 1986 on the Legal Protection of Topographies of Semiconductor Products
- Freedom of Information Act 1982
- Geneva Act of the Hague Agreement Concerning the International Registration of Industrial Designs 1999
- Paris Convention for the Protection of Industrial Property 1883 (1967 revision with 1979 Amendments)
- Semiconductor Chip Protection Act 1984 Pub L No 98-620, Title III, Stat 3347 (codified) at 17 USC 901-914, Supp II 1984).
- The World Intellectual Property Organization (WIPO) Model Provisions on Protection Against Unfair Competition, Geneva, 1996, WIPO Publication No. 832(E), ISBN 92-805-0642-0
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# CHAPTER 1
# INTRODUCTION TO THE THESIS

## 1.1 Introduction

In 1959, Nobel Laureate Richard Feynman predicted the ability to write the entire 24 volumes of the Encyclopaedia Britannica on the head of a pin in his famous talk entitled *"There's Plenty of Room at the Bottom"* in which he also posed a question:

> "I don't know how to do this on a small scale in a practical way, but I do know that computing machines are very large; they fill rooms. Why can't we make them very small, make them of little wires, little elements – and by little, I mean little. ... I am not afraid to consider the final question as to whether, ultimately – in the great future – we can arrange the atoms the way we want; the very atoms, all the way down! ... When we get to the very small, the small world – say circuits of seven atoms – we have a lot of new things that would happen that represent completely new opportunities for design. Atoms on a small scale behave like nothing on a large scale, for they satisfy the laws of quantum mechanics. So as we go down and fiddle around with the atoms down there, we are working with different laws, and we can expect to do different things. We can manufacture in different ways. We can use, not just circuit, but some system involving the quantised energy levels, or the interactions of quantised spins, etc".[1]

The answer to Feynman's question lies in nanotechnology. Nanotechnology involves characterisation and manipulation of structures at the atomic and molecular level from range of 1nm to 100nm.[2] To put this in context, the width of human hair is 80,000nm.[3] Nanotechnology is not only concerned with small scale *per se*. It is also concerned with the properties of materials that are developed at the nanoscale and exhibit unique behaviours that are dramatically different from macro-scale, for example strength, chemical reactivity, colours, melting point etc. Nanotechnology also signifies unique characteristics that cut across different disciplines of sciences and technologies including physics, biology, chemistry, engineering etc. For this reason, nanotechnology is different from most other technologies.

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[1] Talk given by Richard Feynman at the annual meeting of the American Physical Society at Caltech, transcript was published in Engineering and Science (Feb 1960) Vol XXIII, No.5, at pp.22-36. Available also at Feynman R *'There's Plenty of Room at the Bottom* (transcript) in Goddard W A (ed) *Handbook of Nanoscience, Nanoengineering and Technology* (London: CRC Press, 2003) at p.1-8; also available at http://nanoparticles.org/pdf/Feynman.pdf

[2] Nm or nanometre is one-billionth of a meter, $10^{-9}$m.

[3] See 2.2.1.

Nanotechnology is relatively new and has become an increasingly important aspect of technological development around the world. Nanotechnology is growing significantly and has the potential to create a revolution in life through the products and technologies we use. It is not surprising that countries nowadays have incorporated nanotechnology into products such as consumer products, medical applications, energy and power etc – to name just a few of them such as tennis racquets, golf sticks, tennis ball's[4] stain-resistant clothes, sunscreen and suntan lotion.

Due to its importance, countries worldwide have recognised and invested huge amounts of resources[5] to develop nanotechnological related matters. Thus, it is not surprising that nanotechnology has been identified as priority area for future investment. For example, the United States (US) has become one of the leading nations in nanotechnology research and development (R&D). The same trend focusing on the substantive R&D development for nanotechnology has also arisen in Europe and Japan. In Malaysia as well, nanotechnology is considered as a priority area to foster the research culture among researchers for innovative and competitive development of nanotechnology. As far as Malaysia is concerned, nanotechnology is relatively very new and the questions related to intellectual property (IP) are significant. Although the development of nanotechnology has received much attention within countries to foster its development, one aspect of nanotechnology, its associated intellectual property rights (IPRs) have been less developed.

## 1.2 Problem statement and research questions

The arrangement of structures at nanoscale creates a difficulty in defining nanotechnology. Generally, although there have been a number of attempts to define nanotechnology, the term has never been given a single definition and to date there is no universally accepted terminology for nanotechnology.[6] Whilst this is less likely to pose a difficulty for the science community, it can be problematic from a legal perspective, particularly in the context of IP.

[4] The Wilson Double Core™ which has been used in the Davis Cup in 2002; to make the ball bounce longer than usual, it has been incorporated with clay nanoparticles in the polymer lining in the inner wall, Kulinowski K *Nanotechnology: From 'Wow' to 'Yuck'?* in Hunt G and Mehta M (eds) *Nanotechnology: Risk, Ethics and Law* (London: Earthscan, 2006), at p.17; see also Ratner M and Ratner D *Nanotechnology* (New Jersey: Prentice Hall PTR, 2003), at p.3; see 2.4 example of application of nanotechnology.
[5] See 2.5, nanotechnology development.
[6] Defining nanotechnology, see 2.2.

Furthermore, rather than dealing with one discipline, there are many players involved in nanotechnology, which to some extent causes the problem of identification of the player, their role and their rights, including IPRs. The change of size from nanoscale to macro-scale produces different and new properties,[7] which is also significant to determine the appropriate IPRs regime.

Nanotechnology is new, complex and interdisciplinary. Although the development of IPRs and the legal regime surrounding nanotechnology has begun to be established elsewhere drawing upon the existing IPRs regime, particularly in countries like the United States (US) and the United Kingdom (UK), this is not the case in Malaysia. The technology is important for Malaysia in keeping with the pace of technological development, and therefore the legal development should be kept in parallel. Thus far, in Malaysia the law of IP governing nanotechnology is still to be developed and it is crucial to determine what types of IPRs are appropriate for nanotechnology. This study acknowledges that the problem of cross-disciplines, difficulty of defining and a complex technology of nanotechnology could potentially cause difficulties to the current IPRs system.

Given the potential issues that need to be taken into consideration, this study queries whether it would be adequate to define nanotechnology to form a sui generis right, and whether boundaries for new forms of IP can be set? This study also questions whether it would be appropriate to devise a new regime for nanotechnology and or whether the existing forms of IPRS are sufficient to protect nanotechnology.

In testing these questions, comparison between scientific and legal landscape of Malaysia and the UK/ Europe is employed, to answer the following questions:

(1) What is nanotechnology and how is it likely to develop?
(2) What are difficulties and challenges that nanotechnology could pose to the current form of IP law?
(3) What are the most appropriate forms of IP protection for nanotechnology? Can nanotechnology best be protected under the existing law? Can nanotechnology be protected under possible *sui generis* right?

[7] See 2.2.2.

(4) Does this new technology demand new or specific defences?
(5) Does this new technology pose special difficulties for ownership rights?
(6) Does this new technology require special form of duration for its protection?

As a result of examining these questions, this study argues that even with all the opportunities and challenges that nanotechnology could give, the current IPRs are the most appropriate to govern nanotechnology related creations and that to devise a new form of IPRs for nanotechnology is undesirable. This study also examines that nanotechnology cannot be usefully and precisely defined, which militates against *sui generis* right. This study also argues that the most appropriate forms of IPRs are not only patents which are generally assumed to be relevant IPRs, but the law of confidence is also an important method of protection. Furthermore, from the qualitative and doctrinal evidence set out in this study, other forms of IPRs protection may be applicable to some extent to nanotechnology. This study will make a number of critical observations which are necessary to evaluate and clarify some aspects of IP and nanotechnology, and aims to make important suggestions and recommendations on how nanotechnology should be regulated for Malaysia.

## 1.3 Objectives of the study

The objectives of this study are:

(1) to explore the scope and development of nanotechnology related-creations in the selected legal jurisdictions and how if at all this determines the IPRs regime for nanotechnology;
(2) to examine what are the most appropriate forms of IPRs protection for nanotechnology;
(3) to investigate the extent to which the current IPRs are challenged by nanotechnology;
(4) to propose any necessary changes to the existing legal framework on IPRs for nanotechnology related-creations for Malaysia.

## 1.4 Research methodology

In addition to doctrinal and comparative legal analysis, in this study four interviews were undertaken during the period from June 2008 until April 2009. **Appendix 1** of this thesis provides full discussion of the methodology employed along with the justification for the approach taken. However, it is worth noting at the outset the purpose of the interviews and the role they place in this thesis.

As regards the purpose of the interviews, the objectives were; (a) to assess the trend and development of nanotechnology both in Malaysia and UK; (b) to examine interviewees' attitudes to possible IP protection for the nanotechnology; (c) to explore the potential benefit and possible problems which nanotechnology might pose to the health, safety and environment (HSE) and how they could relate into the IPRs; (d) to investigate commercialisation aspects which nanotechnology could enjoy. The purpose of the interviews was also to check researcher understanding of the technology. Although the materials from the interviews were intended to be largely illustrative or anecdotal rather than substantive, they offer a comparative analysis and provide some insights for the current study, both under Malaysian and UK scientific and legal conditions.

The interviews were conducted among experts from the University of Newcastle - Institute of Nanoscale and Technology (INSAT) and Institute of Innovation in Nanotech Exploitation (INEX); National University of Malaysia - Institute of Microengineering and Nanoelectronics (IMEN) and Technology University of Malaysia – Department of Chemistry, Faculty of Science. From the initial study of the science and technology involved[8], it was evident that nanotechnology is well represented at Newcastle University and at Universities in Malaysia. In maintaining confidentiality of all interviewees' identities, their names will be kept anonymous and all the interviewees will be referred to in the male gender.

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[8] Based on a survey of the legal literature in international journals and key English-language periodicals in significant jurisdictions and standard scientific texts.

Normally, the potential interviewee in scientific and legal subject fields is identified on the basis of subject area.[9] The interviewees should possess the relevant experience and knowledge which require skill and time in finding appropriate interviewees.[10] In this research, the interviewees were identified based on their field of expertise, scientific and technology training in the subject areas relevant to nanotechnology. Potential interviewees were identified from biographical information of University web sites to represent various interdisciplinary scientific discipline in a hope to assist the researcher to familiarise herself with scientific understanding across the technology as well as focusing on her legal analysis. They were the persons who had expertise in the relevant fields and were able to explain scientific and legal regime in nanotechnology.

It is recognised that the interview sample for this research is small and for that reason these interviews will only provide anecdotal background and offer illustration rather than serve a substantive role in providing primary qualitative data.[11] Accordingly, the research method employed semi-structured interviews, which generally covered different sections; (a) the interviewee's background and qualifications; (b) the basic understanding of the technology; (c) the potential benefits and problems on HSE; (d) the knowledge and perception of IP regime for nanotechnology; and (e) the commercialisation aspects of nanotechnology.[12]

For further discussion of the methodology employed in undertaking the interviews see **Appendix 1.**

## 1.5 Limitation of study

Given that nanotechnology is new and emerging, the scarcity of materials in terms of academic discussion and case laws are expected. This was the main difficulty encountered by

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[9] See Stedward G *On the Record* in Burnham P (ed) *Surviving the Research Process in Politics* (London: Printer, 1997), at pp.152-153.

[10] Rubin H J and Rubin I S *Qualitative Interviewing* 2nd edn (London: Sage Publications, 2005), at pp.64-65.

[11] Kvale S and Brinkmann S *Interviews* 2nd edn (London: SAGE, 2009) explain that there are two metaphors of interviewer - as a miner or as a traveler. A miner approach regards interview as a site of data collection – that the knowledge is buried metal and interviewer digs out the valuable metal. Whereas, a traveler metaphor regards interview concept leads to data analysis as intertwined phases of knowledge construction – that he or she travels on a journey to a distant country, engaging in conversation with people that he or she met, at pp.48-49.

[12] See **Appendix 6**.

the researcher in finding the relevant materials especially in the Malaysian context. To date, to the knowledge of the researcher, there are no reflections which have taken place on the issue of nanotechnology and IPRs in Malaysia. One article[13] has discussed the overview of nanotechnology and legal analysis, but unfortunately it does not discuss anything about IPRs and nanotechnology. It was this lack of discussion which motivated the researcher to undertake the topic under study, and considering that IP and nanotechnology is undeveloped and non-existent, this study is timely. The scarcity of legal materials was not only evident in the Malaysian context, even in other countries materials specific to nanotechnology and IPRs are limited. For this reason, approaches from countries which have developed their own IPRs related to nanotechnology had to be examined.

Being new and emerging, it is inevitable for nanotechnology to learn from previous technologies. There are rich literatures on other technologies which may provide useful analogies to ascertain legal protection for nanotechnology. The precedents in the previous technologies draw a framework to exert their suitability and relevancy to the current stage of new technology. But as far as literatures are concerned, the researcher needed to be selective in the use of those materials to contemplate the parallel issues in which these technologies share.

### 1.6 Thesis structure

The aim of this study is to assess the scope and development of legal jurisdiction in relation to IPRs over nanotechnology related-creations and to propose a legal framework for Malaysia. Thus, in reaching the aim, this study is comprised of seven chapters.

**Chapter Two** focuses on the scientific development of nanotechnology in Malaysia, UK and other selected jurisdictions such as the US and Australia. This chapter examines the defining terminology for nanotechnology and examines the particular patterns of IP protection for nanotechnology. The major comparisons between the two countries include the technological development and historical background and how this can provide some guidelines for IP

[13] Munir A B and Mohd Yassin S H 'News and Views Nanotechnology in Healthcare' (2007) Eur. J. Health Law, 14, 261

aspects for nanotechnology. However, in certain parts of the discussion, special reference has been made to the US and Australia in order to support the argument that the nature and development of nanotechnology are worldwide. **Chapter Three** and **Chapter Four** examine which IPRs are the most appropriate protection for nanotechnology. Both chapters argue that the appropriate forms of IP protection are not only patents that are already assumed to be important form of protection, but also include the law of confidence. This conclusion was informed by the doctrinal evidence and qualitative interviews conducted in this study. **Chapter Three** examines and analyses types of information relevant to nanotechnology, what obligations arise in nanotechnology, how is the "right owner" of information determined in nanotechnology and the extent to which the public interest defence applicable to nanotechnology. **Chapter Four** examines the creations of nanotechnology and whether they can be characterised as "invention", why difficulty in defining nanotechnology pose problems to the current patent law, whether nanoscale creations challenge the patentability requirements, how ownership is determined in complex technology like nanotechnology, whether nanotechnology could potentially have damage or risks to the environment and whether patent defences are problematic for nanotechnology. **Chapter Five** analyses the other forms of IPRs, including copyright, trademarks and design law and to what extent they are applicable to nanotechnology. **Chapter Six** examines whether term of existing forms of IP protection are appropriate for nanotechnology or a more suitable term be identified. Lastly **Chapter Seven** draws the study to close by proving concluding remarks on the research findings concerning the issue of nanotechnology and IP. Proposals are also made for the legal framework for IP protection of nanotechnology in Malaysia.

# CHAPTER 2
# INTRODUCTION TO NANOTECHNOLOGY

## 2.1 Introduction

Nanotechnology involves the characterisation, control and manipulation of structures (either products or processes) at the atomic and molecular scale. Nanotechnology has been loosely used as an umbrella term[14] and is believed to be the next technological revolution in the 21$^{st}$ century.[15] The term used to define the meeting of the nanoscale and micro-scale from various fields such as physical, chemical, engineering, information technology and other important fields (Figure 2.1 below). Accordingly, all of these scientific disciplines converge to the same basic principles and potentially will have very far-reaching impact.[16] In the future, nanotechnology should be able to change every aspect of human life by offering solutions to variety of health and environmental problems,[17] to provide better opportunities in areas such as medicine, biotechnology, manufacturing, material sciences, space exploration, information technology, and telecommunications.[18]

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[14] Interviewee A stated that there is difficult to find any faculty programs in the university specifically refers to nanotechnology; see also Mehta M D 'Nanoscience and Nanotechnology' (2002) B. Sci. Tech. Soc. 22, 269, at p.269.

[15] Interviewee D; Mehta, n.14, states that this technology will soon revolutionize science and industry in the next future, at p.269; This advancement is likely to be as great as that of Industrial Revolution, Fiedler F A and Reynolds G H 'Legal Problems of Nanotechnology' (1993-1994) 3 S. Cal. Interdisc. L. J. 593, at p.595; The technological revolution of nanotechnology will be considered as a key technology in the twenty-first century for the economic advancement, Bowman D M 'Patently Obvious: Intellectual Property Rights and Nanotechnology' (2007) Technology in Society, 29, 302-315, at p.310; Nanotechnology is the largest government investment since the Space Race (larger than Human genome Project), the Nanotech Report: (2003) Vol. II, Lux Capital Group LLC, at p.11 at http://www.altassets.com/pdfs/nanotechreportluxcapital.pdf accessed 29 October 2009.

[16] Roco M C and Bainbridge W S *Societal Implications of Nanosciences and Nanotechnology* (Dordrecht: Kluwer Academic Publishers, 2001) at p.1; Mehta, n.14, at p.269; Silva G A 'Introduction to Nanotechnology and Its Applications to Medicine' (2004) 61 Surg Neurol, 216-220, at p.269. There is advancement of science through convergence of nanotechnology, biotechnology, information technology and cognitive science, acronym as NBIC by the National Science Foundation and Department of Commerce, 'Converging Technologies for Improving Human Performance' (2002) at http://www.tec.org/Converging_Technologies/1/NBIC_report.pdf. See an interesting discussion of the convergence in Bainbridge W S *Nanoconvergence* (Upper Saddle River, New Jersey: Prentice Hall, 2007). For a different responses of the EU and the US approaches of "converging technologies" see Cameron N M S *Ethics, Policy, and the Nanotechnology Initiative* in Cameron N M S and Mitchell M E *Nanoscale* (eds) (New Jersey: JWS, 2007), at Chapter 3.

[17] Hullmann A 'Who is Winning the Global Nanorace?' (2006) Nature Nanotechnology, Vol. 1, 81, at p.81.

[18] Drexler K E *Engines of Creation* (New York: Anchor, 1986), at pp.14-20.

The purpose of this chapter is to explore the nature of nanotechnology from selected jurisdictions. This chapter argues that unique and multidisciplinary technology like nanotechnology is difficult to define and argues that this would make the devising of new forms of IP difficult. This chapter demonstrates that nanotechnology has the potential as subject matter for different forms of existing IPRs as discussed in the subsequent chapters. To do this, this chapter identifies research priorities of the chosen legal jurisdictions and determines the subject matter that relates to the different forms of IPRs. This chapter argues that the development of nanotechnology within different jurisdictions is important to determine the significant IPRs applicable to nanotechnology generally. It also argues that as the technology matures, a pattern and enforcement of IP protection for nanotechnology can be expected in the future. The two main selected legal jurisdictions under study are surveyed, i.e. Malaysia and the UK.[19] Along the line, since the UK is the member of EU and the contracting states for the European Patent Convention (EPC), the survey also discusses the European position. Other important jurisdictions include the US, because it is at the forefront in the nanotechnology research development and because of the United States of Patent and Trademark Office (USPTO)'s international influence.[20] Similarly, because of the same Commonwealth legal family, Australia is also considered. Further, Australia is regionally linked with Malaysia under the same membership of the Asia Pacific Nanotechnology Forum (APNF).[21]

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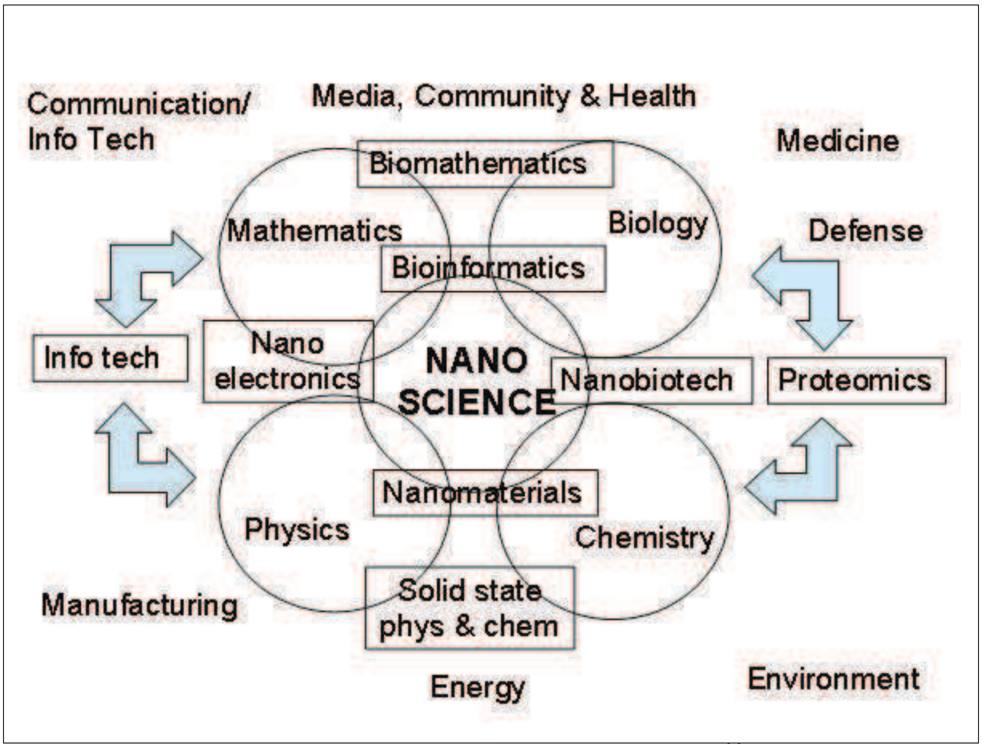
[19] See **Appendix 1**.

[20] The USPTO is a member of the Trilateral Offices that includes also the European Patent Office (EPO) and the Japanese Patent Office (JPO). This was set up in 1983, see http://www.trilateral.net/index.html; there is ongoing collaboration process of Trilateral Office and proposed collaboration project in nanotechnology, see Grubb P W 'The Trilateral Cooperation' (2007) J.I.P.L.P. Vol. 2, No. 6, 397, at p.399; they have strong collaboration in the technical field and continuing strengthening cooperation arrangements, see Smith P *Harmonisation, Regional Collaboration and Small Patent Offices* in Antons C et al., (eds) *Intellectual Property Harmonisation Within ASEAN and APEC* (The Netherlands: KLI, 2004), at p.230.

[21] It is non-profit organization which facilitates the coordination of nanotechnology development and program and cross regional collaboration among government, policy makers, industry, R&D institutions and researchers. Japanese is also members of this APNF, see generally at http://www.asia-anf.org/index.php , and this is justified for the Trilateral Offices referred above; informed also from interviewee C.

**Figure 2.1: Multidisciplinary fields of nanotechnologies**




Source: The Malaysian National Nanotechnology Initiative (MNNI)[22]

Figure 2.1 above shows nanotechnology is not concerned with one particular field, but rather the interdisciplinary/multidisciplinary combination of different fields. In particular, the technologies have the potential to affect of many different fields and this multidisciplinary aspect provides unique opportunities for the legal development. Thus, nanotechnology requires, not only people from scientific and technological backgrounds, but it also attracts other different fields including policy makers, legal, sociology, religious people etc[23] which is arguably significant when it comes to confidentiality.[24] Furthermore, new and complex interdisciplinary fields like nanotechnology, arguably spans different forms of IPRs subject matter. However, it is important to admit that there is dearth of penetrating legal literature.[25]

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[22]At http://www.nano.gov.my/?National_Nanotechnology_Initiative:Overview.
[23] Interviewee D.
[24] Large numbers of people in the same and different teams are likely to be involved in the project, see 3.3.1.2 and 3.3.3.1.
[25] In the context of IP and nanotechnology, only few discussions have been made, see for example Fiedler and Reynolds, n.15; Newberger B 'Intellectual Property and Nanotechnology' (2003) 11 Tex. Intell. Prop. L. J. 593; Troilo L M 'Patentability and Enforcement Issues Related to Nanotechnology Inventions' (2005) 2 Nanotech L & Bus. 36; Lemley M A 'Patenting Nanotechnology' (2005) 58 Stan. L. Rev. 601; Serrato R et al. 'The Nanotech Intellectual Property Landscape' (2005) 2 Nanotech Law & Bus. 150; Tullis T K 'Current Intellectual Property Issues in Nanotechnology' (2004) U.C.L.A.J.L. Tech and Notes 12; Schellekens M 'Patenting

Therefore, this chapter is significant to identify the scope and development of nanotechnology – where the technology comes from, and the direction that it might be going in the future to inform the discussion of IPRs in subsequent chapters. The discussion is drawn from the scientific literature as well as from the insight from the interviews undertaken by the researcher as part of the thesis research.

## 2.2 Defining Nanotechnology

The defining terminology of nanotechnology is very important for identifying appropriate IP protection. Currently, the development of this technology is still at the age of infancy. In order to appreciate the value of nanotechnology in the future, there is greatest need to understand the current technology as well as its scientific principles. There are numerous available examples of definition of nanotechnology in the literature. Though as we shall see in this section, some definitions of nanotechnology are broad, while others take a narrow construction, and it can also exist in subsets. Thus, not all definitions are consistent or in agreement. Nanotechnology is an emerging technology which has sometimes been referred to as an enabling[26] or disruptive[27] technology which needs to be further developed in the future. Disruptive technology refers to the technology that manages to produce new products in new ways which may result to the better opportunities to the society or it may also create new problems.[28] Nanotechnology is a kind of disruptive technology because of its different applications (nanoparticles alone can have the impact into a wide array of products and services); it manages to transform into radically new generations of existing products and processes (for example optical data storage for computing system, digital cameras based

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Nanotechnology in Europe' (2010) J.W.I.P Vol 13, 47; To the knowledge of the researcher, none of the discussion has been made from Malaysian's perspectives on the IPRs and nanotechnology.

[26] For example, Lemley, n.25 refers enabling as *"not merely to important new ideas or even ideas that create a new market, but only to technological breakthroughs that facilitate a wide range of different exploitations. Obviously, the term is not capable of precise definition",* at n.24.

[27] This term was coined by Clayton M Christensen in his famous book Christensen C M *The Innovator's Dilemma* (Harvard: Harvard Business School Press, 1997); however, see great view of creative destruction by Schumpeter which states that the opening up a new market and the creation of new technology although they revolutionise the economic structure, nevertheless, they also destroying the old technology, Schumpeter J A *Capitalism, Socialism and Democracy*, Introduction by Richard Swedberg (London: Routledge, 2003) published before in Taylor and Francis e-Library, and first published in the UK 1943, Chapter VII, at p.83.

[28] Roco and Bainbridge, n. 16, at p.53.

solid-state memory) and enables whole new classes of products and markets which are not previously feasible (for example portable computer, mobile phones and digital imaging).[29]

Generally, nanotechnology involves the arrangement and manipulation of a matter or structure at molecular and atomic scale. Molecules and atoms are the smallest component to form a basic material. Interestingly, this technology is defined by its scale; that is one nanometre (nm) is one billionth of a meter, used in the metric measurement to mean $10^{-9}$. The visualisation, characterisation and manipulation of the structures or matters at the basic form of atomic and molecular level have attracted attention and discussions from different legal and academic perspectives. Nanotechnology has become a popular description and it can be very tricky to have an exact sense of the definition, because nanotechnology is not only that concerned with the size scale but it is a new way of making technology.[30] One view put forward is that the defining terminology of nanotechnology may not be a problem among the scientists[31] but it may pose difficulties for lawyers. However, one may argue that to provide a precise definition of nanotechnology is an impossible task.[32] This is because so far, there is no single, or universally accepted, definition of nanotechnology which could either refer to the fields itself and its scale, products, materials, or applications.[33] The various definitions of nanotechnology are discussed below.

### 2.2.1 Defining by size dimension

It would seem difficult to predict and understand how small nanotechnology is. This is because nanotechnology is not just small from the bulk materials, but it is a very special kind

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[29] The New Dimensions of Manufacturing: A UK Strategy for Nanotechnology, Report of the UK Advisory Group on Nanotechnology Applications, submitted to Lord Sainsbury, Minister for Science and Innovation, (June 2002), at http://www.innovateuk.org/_assets/pdf/taylor%20report.pdf accessed 25 October 2009, at p.17 (Advisory Group).

[30] Bawa R et al. 'Protecting New Ideas and Inventions in Nanomedicine with Patents' (2005) Nanomedicine: Nanotechnology, Biology and Medicine 1, 150-158 (2005) at p.151.

[31] Interviewee A; See also *"there is no disagreement about oversimplifying and misleading character of that term'*, Wei V *Ethical Issues in Nanotechnology* in Roco M C and Bainbridge W S (eds) n.16, at p.245.

[32] This is because some may define as it refers to less than a micron (1000nm) and some may refers as between 1 to 100nm, Miller J C et al. *The Handbook of Nanotechnology* (New Jersey: JWS, 2005) at p.13.

[33] Burger J A et al. *Nanotechnology and the Intellectual Property Landscape* in Cameron and Mitchell n.16, at p.248.

of small, but nevertheless it is possible to make.[34] Therefore, to put the scale in a context at least provides assistance to understand nanotechnology more clearly. This is important to note that fragmented definition of nanotechnology may cause problem not only for the application of IPRs but also for all other legal regulations.

As a comparison, the world is one hundred million times larger than a soccer ball (approximately 22cm), and a soccer ball is one hundred million times larger than a size of Carbon 60 ($C_{60}$) or Buckyballs;[35] the width of human hair is 80 000nm; red blood cell is about 7000nm, water molecule is 0.3nm across;[36] and a sheet of paper is approximately 100 000nm thick.[37] Hunt and Mehta list a good example of nanotechnology objects including, the diameter of a hydrogen atom is 0.1nm; ten hydrogen atoms in a row is 1nm; amino acid is 0.8nm; diameter of DNA alpha helix is 2nm; globular protein is 4nm; microfilaments is 6nm; thickness of cell membranes is 10nm; ribosome is 11nm; microtubule is 25nm; nuclear pore is 50nm; large virus is 100nm; ebola virus is 200nm; small bacterium is 500nm; wavelength of visible light is approximately between 400-900nm.[38]

There are examples of well-known biological objects which are bigger than nanoscale such as the sizes for prokaryotes[39] is about 1-10micro-meter (µm); diameter of human nerve cells is 1µm; a large bacterium like Escherichia coli is 2µm; mitochondrion is 3µm; length of chloroplast is 5µm; cell nucleus is 6µm; red blood cell is 9µm; eukaryotic animal cells is 10-30µm; ragweed pollen is 20µm; amoeba is 90µm; human egg is 100µm; dust-mite is 200µm

[34] Ratner and Ratner, n.4, at p.7; this is because nanotechnology is not only involved miniaturisation but it is qualitatively new scale, Roco and Bainbridge, n.16, at p.1.

[35] It is carbon atoms assembled in a soccer ball-shaped structured, and applied to everyday products such windshields and health care for example medicine, in energy and fuel cell component, see Miller et al., n.32, at p. 17.

[36] The Royal Society and the Royal Academy of Engineering, 'Nanoscience and Nanotechnologies: July 2004 available at http://www.nanotech.org.uk/FinalReport.htm accessed on 10 October 2009 (RAE) at p.vi; the smallest things that are etched on a microchip are about 130nm and the smallest things seeable with unaided human eye are approximately 10 000nm across; white blood cell is about 10µ or 10 000nm, Ratner and Ratner, n.4, at p.6.

[37] The National Nanotechnology, (2009) available at http://www.nano.gov/NNI_2010_budget_supplement.pdf accessed 30 Oct 2009.

[38] Hunt and Mehta, n.4 Appendix at p.282-283; while blood cell is approximately 10µ or 10 000nm, capillary is 8000nm in diameter, mitochondria is about 500-1000nm, semiconductor chip features is from 90nm and above, ribosome is 25nm, carbon nanotubes can have about 2nm, quantum dot can be manufactured about 2nm, Buckminsterfullerene is 0.7nm, Edwards S A *The Nanotech Pioneers* (Weinheim: Wiley-VCH, 2006), at pp.2-3; a DNA molecule is approximately 2.5nm long and sodium atom is about 0.2nm, Silva, n.16, at p.216.

[39] Molecules that encircled by a membrane and cell wall.

and ant is 2000µm or equivalent to 2mm.[40] Another example is the wavelength of visible light ranges from about 400nm at the violet end of spectrum to approximately 700 nm at the red.[41]

The examples for objects smaller than nanometre are atoms and water molecules.[42] Although size spectrum description may prove that certain things are nanotechnology, however, it is not always true. Many experts do not consider mature technology to be called nanotechnology although it may perfectly fall under the nanotechnology characterisation. This is because the technology has popularly been used. For example, zeolite although its diameter between 0.3nm to 0.9 nm range, probably because it is synthesised and widely used in industrial since 1950s generally was not labelled as nanotechnology although the position would be different if it were developed today.[43]

The examples above demonstrate the small size of nanotechnology and there are attempts to define nanotechnology by size dimension. For example the EPO define nanotechnology to cover equipments, methods and processes at the length below the 100 nm scale which states:

> "the term nanotechnology covers entities with a controlled geometrical size of at least functional component below 100 nanometres in one or more dimensions susceptible of making physical, chemical or biological effects available which are intrinsic to that size. It covers equipment and methods for controlled analysis, manipulation, processing, fabrication and measurement with a precision below 100 nanometres".[44]

Whilst Masciangioli and Zhang, and Ratner and Ratner demonstrate a specified range of nanoscale when they state that nanotechnology refers to the use of material and structure at the dimension that is usually ranging from 1 to 100nm.[45] In emphasising size dimension, similarly, Borisenko and Ossicini observe that nanotechnology is applied to physical,

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[40] Hunt and Mehta, n.4, at p.283.
[41] Bainbridge, n.16, at p.2.
[42] Ibid, at p.2.
[43] Scheu M et al. 'Mapping Nanotechnology Patents' (2006) 28 World Patent Information 204 -211, at p.205.
[44] See generally at http://www.epo.org/focus/issues/nanotechnology.html.
[45] Masciangioli T and Zhang W X 'Environmental Technologies at the Nanoscale' (2003) Envl. Sci. & Tech. 1 at p. 103A; Ratner and Ratner, n.4, at p.7.

chemical and biological systems to explore the novel properties arising from the scale under 100nm.[46]

In defining nanotechnology at molecular level, Peterson refers to *"the projected ability to use positional control of chemical reactions to build complex materials and devices (including molecular machinery) resulting in precise control of the structure of matter at the molecular level."*[47] Wolsfon states nanotechnology involves the manipulation of the structures at the molecular level to create molecular size machines and other devices.[48]

From the size dimension definition, it shows defining nanotechnology is fragmented because some of the definitions refer to the size range and some of the others refer to the controlling of structure at molecular level. This significantly shows that defining nanotechnology is difficult and non-satisfactory, and it strongly supports the contention made earlier in this study that it would be impossible to devise new forms of IPRs for nanotechnology.

### 2.2.2 Defining by dimensional change of properties

Nanotechnology represents a bridge between the classical world of physics and the world of quantum mechanics.[49] The classical law of science to which traditional rules of Newtonian physics and chemistry apply is essentially modified according to the rules of quantum mechanics at the nanometre scale, normally at the range of 100nm. Nanoparticles, nanostructures or nanomaterials that are developed at nanoscale possess special properties as well as exhibit unique behaviour that impacts on the physical, chemical, electrical, biological, mechanical and functional qualities of the substances.[50] There are two factors why the properties behave differently at nanoscale; firstly, when compared to the same mass of

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[46] Borisenko V E and Ossicini S *What is What in the Nanoworld* (Weinhim: Wiley-Vch Verlag GmbH & Co. KGaA,) at p.197.
[47] Peterson C L *Nanotechnology* in Krummenacker M and Lewis J (eds) *Prospects in Nanotechnology* (eds) (New York: Wiley, 1995), at p.173. This chapter appeared originally in the Journal of the British Interplanetary Society (1992), 395-400.
[48] Wolfson J R 'Social and Ethical Issues in Nanotechnology' (2003) 22 Biotechnology L. Rep. 376, at p.376.
[49] Casey P *Nanoparticle Technologies and Applications* in Hannink R H J and Hill A J (eds) *Nanostructure Control of Materials* (England: Woodhead Publishing, 2006) at p.2.
[50] Theodore L and Kunz R G *Nanotechnology* (New Jersey: JWS, 2005) at pp.1-2; Casey, n.49, at p.3; and also gives effect to the optical, magnetic properties, RAE, n.36, at p.5.

material products at a larger scale, nanomaterials exhibit a relatively larger surface area.[51] The smaller the properties, its surface areas become larger, and that is why a small ant manages to carry things similar to its weight which may not always be possible for human beings to do so.[52] Secondly, quantum effects start to dominate the behaviour of materials at the nanoscale.[53] Interestingly, in this nanoworld the interaction between individual atoms dramatically gives new attributes to the properties such as, but not limited to, change in its sizes, colours, strength, shapes and surface. For example, the gold only shows a smaller size if it is cutting down the size into a micron scale, nevertheless not until the size is reduced at nanolevel where its colour, melting point and chemical properties will change dramatically;[54] carbon in the form of graphite is soft but changes to become stronger than steel and six times lighter; and zinc oxide with white colour and opaque, turns transparent at nanoscale.[55] The changes of behaviour are important for instance in making nanomaterials useful as catalysts to improve the efficiency of fuel cells and batteries.[56]

The size range may prove not to be effective definition for nanotechnology because the unique effect exhibits by structures are different at nano-range. This unique effect by the change of nanostructure properties may have the most significant impact to the legal aspects in term of creation and innovation, instead of, by the use of the size dimensional definition.

### 2.2.3 Defining by functions or effects

The definition has been referred to cover a controlled geometrical size of functional component below 100nm[57] or the ability to manufacture and control structure at the molecular level.[58] A more general meaning has been adopted by Newberger where he states that *"in particular, it is the application of science at the nanoscale that exploits the*

[51] For example, a particle of size 30nm is having 5% of atoms on its surface area, of 10nm is 20% and 3nm is increasing to 50% of its atom on the surface, RAE, n.36, at p.7.
[52] Interviewee D.
[53] RAE, n.36, at p.vi.
[54] Ratner and Ratner , n.4, at p.12; when the gold at the nanoscale level measuring 1nm across the particles appear to be red in color and this redness can be measured only with the help spectrophotometer, Kulinowski, n. 4, at, p.17 and n.2.
[55] The ETC Group, 'A Tiny Primer on Nanoscale Technologies and "Little Bang Theory" (June 2005) Otawa available at http://etcgroup.org/upload/publication/55/01/tinyprimer_english.pdf accessed 3 Nov 2009.
[56] RAE, n.36, at p.5.
[57] EPO, n. 44.
[58] Miller et al., n.32, at. p.14.

*characteristics of materials that only just manifest themselves or become apparent at the nanoscale."*[59] In approaching the meaning on the basis of discipline breakthrough and a broad view, Hunt and Mehta define nanotechnology as "*the contemporary result of a natural 'downsizing' progression in nearly all the sciences and their techniques, whether chemistry, materials science, physics, biology, industrial processes, pharmacology, genetic engineering, electronic engineering, neuropsychology and so on*."[60]

This definition discusses the different functions and effects of things at nanoscale. This definition also places the emphasis on the "downsizing" of scientific and technological breakthrough. Although this definition may seem a better one it is still considered as non-satisfactory for legal definition, for example it may cause a problem to the patent office to make such categorisation. Furthermore, as discussed above, the structures behave differently at nanoscale which could give different effect of their function.

### 2.2.4 Other kinds of definition

The fragmented definition of nanotechnology above lies in the unique characteristics and illustrates that the defining nanotechnology is not very successful. There are other attempts to define nanotechnology by combinations of the above definitions. The definition covers tools, techniques, processes and the application of nanotechnology at the nanoscale size. This is adopted by the Royal Society and the Royal Academy of Engineering (RAE) which defines both nanoscience[61] and nanotechnology as:

> "nanoscience is the study of phenomena and manipulation of materials at atomic, and molecular and macro-molecular scale, where properties differ significantly from those at a larger scale; whereas nanotechnology is the design, characterisation, production and application of structures, devices, and systems by controlling shape and size at nanometre scale".[62]

A similar definition also has been adopted by the Report of the UK Advisory Group on Nanotechnology Applications (Advisory Group) which defines nanotechnology as a

[59] Newberger, n.25, at p.650
[60] Hunt and Mehta, n.4, at p.2.
[61] Ratner and Ratner, n.4, refer nanoscience as *"the study of fundamental principles of molecules and structures between 1 to 100 nanometre. This structures which form a basis in nanotechnology at nanoscale level",* at p.7.
[62] RAE, n.36, at p.5, nanoscale level is defined between 0.2nm to 100nm, at p.vii.

collective set of technology and application of science in developing new materials and processes by manipulating molecules and atoms.[63] The EPO refers to the size dimensional, functional and application of structures at nanoscale.[64] The US National Nanotechnology Initiative refers nanotechnology to the scale dimension between 1nm to 100nm and the manipulating matter at this scale.[65] The USPTO definition is mirrored to the National Nanotechnology Initiative (NNI) definition of nanotechnology in classifying a cross-reference digest, Class 977 for the purpose of determining prior art. In relation to nanotechnology, this Class 977 provides for disclosure for nanotechnology related patents that:

> "relates to the research and technology development at the atomic, molecular or macromolecular levels, in the length of scale of approximately 1-100 nanometre range in at least one dimension, and that provide a fundamental understanding of phenomena and materials at the nanoscale and to create and use structures, devices and systems that have novel properties and functions because of their size".[66]

This definition indicates the size dimensional range, unique phenomena and application of nano-structures. Commenting on this, Bawa states the size range between 1nm to 100nm potentially excludes various devices and materials of micro size, a scale that is included within the realm of nanotechnology by many scientists; and recommends that the phrase 'small technology' should be replaced for the term 'nanotechnology' and further suggests that this should include devices and materials at the nanoscale as well as micro scale.[67] However, following this view will enable to include anything as nanotechnology, even for mere devices and materials at the micro scale which is unlikely to be considered as nanotechnology. Based on this definition, it is clear that there is still no proper definition for nanotechnology.

For the purpose of standardisation and measurement, the International Patent Classification Subclass B82B of the WIPO refers to nanostructures thus:

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[63] The lower limit is referred to 0.1nm, Advisory group, n.29, at p.16.
[64] EPO, n.44.
[65] National Nanotechnology Initiative, 'What is Nanotechnology' available at http://www.nano.gov/html/facts/whatIsNano.html accessed 10 Oct 2009.
[66] USPTO 'Class 977, Nanotechnology Cross-Reference Art Collection' available www.uspto.gov/web/patents/biochempharm/crossref.htm accessed 10 October 2009.
[67] Bawa R 'Nanotechnology Patenting in the US' (2004) Nanotech. Law & Bus, Vol. 1, at p.31.

"(1) consists solely of an atom, a molecule, or an atomically precise limited collection of either atoms or molecules (i.e., the collection in its entirety would be undetectable by any optical microscope) and
(2) is formed by having its atoms, molecules, or limited collections individually manipulated as discrete units during the manufacture of its arrangement.".[68]

This definition seems closer to what has been referred by Bawa[69] above because there is no size range referred only refers to the limited collection of atoms or molecules that cannot be detected by the microscope and the manipulation of its discrete units. The International Organisation for Standardization (ISO) has illustrated that:

"standardisation in the field of nanotechnologies that includes either or both of the following: (1) understanding and control of matter and processes at the nanoscale, typically, but not exclusively, below 100 nanometres in one or more dimensions where the onset of size-dependent phenomena usually enables novel applications; (2) utilising the properties of nanoscale materials that differ from the properties of individual atoms, molecules, and bulk matter, to create improved materials, devices, and systems that exploit these new properties.".[70]

This definition although refers to the size dimensional range under 100nm, but it does not make as exclusivity since it also taking into account on the size depended phenomena. This definition also includes the utilising of nanoscale materials to create an improved material. This definition may give significant impact to the legal effect because the standardisation is not only useful for the characterisation of the technology, but could also be useful for safety purposes. Furthermore, it is argued that the terminology and standards definition of nanotechnology is important to scientific and public debate, but also to avoid the ill-treatment of the word "nano".[71]

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[68] The International Patent Classification IPC/008, Annex 13, Subclass B82B available at http://www.wipo.int/ief-projects/d008-a13_usrp.pdf accessed on 10 Oct 2009.
[69] See n.67.
[70] Hatto P ISO/TC 229 – Nanotechnologies, ISO Committee Chairs Conference, Geneva, 5 June 2008, available at http://www.iso.org/iso/search.htm?qt=ISO%2FTC+229&searchSubmit=Search&sort=rele&type=simple&published=on accessed 10 October 2009.
[71] For example, nanosized particles which are mixed together with products, whether these mixed products are still considered nano-products; or whether they should be declared as such; or whether they are just ordinary mixed chemicals remains uncertain, Meili C Report on Nano-Regulation' The Innovation Society, March 2006, available at http://www.innovationsgesellschaft.ch/images/publikationen/Nano_Regulation_final3.pdf accessed 3 Nov 2009 at p.6 and p.25. Although the word "nano" has become popular used for the marketing purposes, it widespread use does not help to define a technology that already embedded in wide range of scientific and technological fields, Cameron in Cameron and Mitchell n.16, at p.249; also similar view from interviewees C and D that nowadays people tend to misuse the word 'nano'.

In order to meet the ISO international standards, the British Standard Institute (BSI) has been working on the common language for nanoparticles of nanotechnologies where it has established a Publicly Available Specification (PAS 71:2005).[72] In 2006, the European Committee for Standardization also established a new technical committee for nanotechnology CEN/TC 352. This working group is responsible for developing a standard for classification, terminology and nomenclature; metrology and instrumentation; science-based health; safety and environmental practices; and nanotechnology products and processes.[73] CENT/TC 352 will work closely with the ISO/TC 229 on nanotechnologies, which will be implemented in Vienna Agreement for the mutual interest between ISO and CEN.[74] The standards for nanotechnology are important because of its multidisciplinarity of fields and could be practicable for risk assessment, as a foundation for research and commercial applications and for securing the public confidence.[75] Furthermore, standards and measurement are potentially important in labelling and marking purposes under trademarks law.[76]

The MNNI has adopted the size dependent meaning of nanotechnology, that is *"the science of materials and systems with structures and components which display improved novel physical, chemical and biological properties; phenomena that exist in the nano size scale (1-100 nm)"*.[77] The linguistic definition above could be suitable basis to confer legal

[72] The British Standard Institute, Publicly Available Specification PAS 71:2005, 'Vocabulary – Nanoparticles' available at http://www.bsigroup.com/upload/Standards%20%20Publications/Nanotechnologies/PAS71.pdf accessed 25 October 2009. PAS is a consultative process across many fields of industries, rather than a full consensus of technical committee; once full documents of ISO TC/229 is completed, then PAS will be withdrawn.

[73] The European Committee for Standardization, CEN/TC 352 available at http://www.cen.eu/CENORM/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittees/CENTechnicalCommittees.as?param-508478&title=CEN%FTC+352. Interviewee C suspected that in the future, the Information Services and Centres Patent Information-Standard Information (formerly known as the Standards and Industrial Research Institute of Malaysia) (SIRIM) will likely to adopt the international standards for nanotechnology in Malaysia.

[74] For an executive summary about this see Business Plan, CEN/TC 352 Nanotechnologies, 2006 available at http://www.cen.eu/cen/Sectors/TechnicalCommitteesWorkshops/CENTechnicalCommittee, accessed 22 September 2010.

[75] Phelps T A *The European Approach to Nanoregulation* in Cameron and Mitchell, n.16 at p.195.

[76] For example the letters IBM were formed by 35 xenom atoms, Browne M W '2 Researchers Spell 'I.B.M.' Atom by Atom, New York Times, 1990 accessible via http://www.nytimes.com/1990/04/05us/2-researchers-spell-ibm-atom-by-atom.html accessed 21 February 2010. Another example is that the scientists from Monash University, Australia is developing high capacity Electron Beam Lithography (EBL) tools to write or mark or etch data on particles less than 10 nm, Press Release 'A Giant Step for Nanotechnology', 15 Sept 2009 available at http://www.monash.edu.au/news/newsline/story/1504, accessed 30 Sept 2009. For this, new standards are desirable because nanotechnology combine several technologies in new forms, Phelps, n.75, at p.195.

[77] N.22 above.

distinctiveness. To some extent, this is a better definition, but it is still not unique because of the inclusion of the nanoscale range from 1 to 100nm, as different areas of nanotechnology takes effect differently as discussed above.

From the selected literature given above, the general tendency of definitions of nanotechnology can be summarised as follows: (1) they define nanotechnology in general terms on developing and manipulating materials at nanoscale; (2) they define nanotechnology based on the application across different technologies at nanoscale; (3) they define nanotechnology based on the size defining criteria either from lower 1nm to the upper limit 100nm, or anything less than 100 nanometre and (4) they define nanotechnology based upon size dependent property that behave differently at nanoscale. Although one may find that size defining features could be regarded as the best working definition of nanotechnology, nevertheless, it has been argued that the size range for nanotechnology should not be specified because nanomaterials or enhanced properties are determined by more than just of their size, while structure, surface and shape are of particularly important too.[78] In arguing for the size dimensional alone, different properties at nanoscale take effect differently. For example, in electronics the nanoscale takes effect at less than 30nm, whilst in material sciences, the effect of nanoscale starts at length approximately 300nm.[79] Other than the size itself, the definitions of nanotechnology are also unusual compared to the other types of technology because the latter tend to be defined based on a key technology or breakthrough.[80]

### 2.2.5 Types of definition and discussion

Nanotechnology is effectively a new way of making things; rather than specific areas of technology, it refers to set of technologies, devices, techniques and processes. Some scholars

[78] The UK Defra Consultation on a Voluntary Reporting Scheme for Engineered Nanoscale Materials, Summary of Findings and Government's Response, August 2006, at http://www.defra.gov.uk/corporate/consult/nanotech-vrs/index.htm, at pp.5-6. It has been argued that there was no need to adopt common unique definition for nanotechnology, sufficient if the technology is breaking down into sub-disciplines, Hullman A and Frycek (eds) IPR in Nanotechnology, Lessons from Experiences Worldwide, available at ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/ipworkshop_proceedings_02052007en.pdf at p.2.

[79] Meyer M *Socio-Economic Research on Nanoscale Science and Technology* in Roco and Bainbridge, n.16 at p.279.

[80] Zhou W 'Ethics of Nanobiotechnology at the Frontline' (2002-2003) 19 Santa Clara Computer & High Tech. L. J. 481, at p.482.

have opted for a very wide and some of them have adopted a narrow view of the meaning. In fact, there arises confusion and disagreements among the experts of what might be considered as nanotechnology.[81] Almeling, for instance views that any technology at the nanometre scale would be treated as nanotechnology, even if the technology is larger than 100 nm.[82] Since nanotechnology represents a variety collection of technologies which have different characteristics and applications, this broadness in scope may represent difficulty in understanding technical, legal[83] and ethical implications.[84] Nevertheless, there is opinion that how nanotechnology is intellectually constructed and defined is heavily based on the scientific disciplinary background and the working environment of the technology itself.[85]

Thus, the definition above demonstrates that attempts have been made to define nanotechnology based on size dimensional, the size dependent property, the functional and effect and the combination of all these definition, nonetheless none of them provide the satisfactory or sufficiently promise definition for nanotechnology. Thus, the precise and useful definition cannot be reached because its effect and the scope are uncertain, which therefore suggest that sui generis right is impossible to be introduced for nanotechnology. Hence, how the existing forms of IP in principle could be applied and the details of this will be discussed in subsequent chapters of this research.

## 2.3 Historical background and trajectory of nanotechnology

Historically, the word nanotechnology is originated from Greek word *"nano"* which means *"dwarf"* or small. The arrangement of materials at the nanoscale has been with us for many centuries ago, nonetheless only recently has been debated and appreciated. To this effect,

[81] Bawa, n.30, at p.150. This is because no common understanding of what might nanotechnology comprises, and scientist and technologists have a common basis on the meaning of "nano" in their own particular area, Meyer, n.79, at p.279.

[82] Adds that the size defining feature could be regarded as the best definition, Almeling D S 'Patenting Nanotechnology (2004) Stan. Tech. L. Rev. N1, at N.1. However, scale above 100nm of magnitude would be micro-scale rather than nanoscale.

[83] Troilo, n.25, at p.36.

[84] Zhou, n.80, at p.482. Due to rapid development and interdisciplinary nature of nanotechnology, a truly comprehensive coverage does not seem feasible, Poole Jr. C P and Owens F J *Introduction to Nanotechnology* (New Jersey: JWS, 2003) at p. xii.

[85] Nicolau D 'Challenges and Opportunities for Nanotechnology Policies' (2004) 1 Nanotech L. & Bus. 446, at p.447. This definition also reinforces by the nanotechnologists' interviews conducted in this study.

*"nanotechnology is not new, only new in the sense that the way we understand it"*.[86] To illustrate that this technology has been with us for many years, for example the using of carbon as nanoscale particles especially as reinforcing additives in tires, protein vaccines, peptides which are similar to quantum dots size (less than 10nm), and some viruses are the same as drug delivery nanoparticle (less than 100nm).[87] Appreciation of history is relevant to any attempt to project into future for nanotechnology. Furthermore, it shows that nanotechnology has developed without a special IP regime. This reinforces the conclusion that a sui generis system of protection for nanotechnology is undesirable.

During the middle ages, one of the earliest applications of nanotechnology was in stained glass windows made of small gold nanoparticles in order to create red pigments;[88] which has been useful for ink, paints and finishes products.[89] Chemists have been working with polymers for many decades and scientists used the tiny features in computer chips for over 20 years.[90] However, not until 1959, when the Nobel Prize winner Richard Feynman predicted the control of individual atom with great complexity to form a product in his famous talk entitled "*There's Plenty of Room at the Bottom*".[91] His speech alerted chemists and physicists to decrease the size of the objects at the nanoscale precision. Undoubtedly, his vision, futuristic in 1959, has the enormous advantages for a variety scope of application and has been applied in today's technology.[92] For example he pointed out how to make the power of electron microscope 100 times better, and in fact this prediction led to the existence of Electron Beam Lithography (EBL) which is used today to make silicon chips.[93] The speculation of manipulating individual atoms to decrease the size of the objects has now been accomplished using a sophisticated microscope called a Scanning Tunnelling Microscope (STM) and Atomic Force Microscope (AFM).[94] The key milestones of historical background and trajectory of nanotechnology is shown in the Table 2.1 below. The table shows the

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[86] Interviewee D; *"in some senses, nanoscience and nanotechnologies are not new"*, RAE, n.36, at p.vi; *"nanotechnology is a collective term for a set of* technologies, *techniques and processes – effectively a new way of thinking – rather than a specific area of science and engineering"*, Advisory Group, n.29, at p.6.
[87] Bawa et al. n.30, at p.151.
[88] Ratner and Ratner, n.4, p.13.
[89] Edwards, n.38, at p.5.
[90] RAE, n.36, at p.vi.
[91] Feynman, quoted above at n.1.
[92] For an interesting note how influential and inspirational of Feynman's futuristic view for the research today, see Ball P 'Feynman's Fancy' (Jan 2009) Chemistry Today, 58.
[93] Poole and Owens, n.84, at p.2.
[94] Ibid, at p.2.

nanotechnology development pre-1974 and post 1974 and demonstrates its significance to the IP regime.

**Table 2.1: The key milestones for nanotechnology development**

| Year | Development | Significant to IP |
|---|---|---|
| **Pre-1974** | | |
| 1959 | Nobel Prize winning physicist Richard Feynman gives his famous talk entitled *"There's Plenty of Room at the Bottom"* describing the possibility of manufacturing of atomic engineering. | Nobel Prize and possibility of manufacturing atom significant to the public awareness and spark its importance. |
| **1974** | Norio Taniguchi of Tokyo Science University first coined the word 'nanotechnology'.[95] | Popular used of the word "nano" relevant to trade mark. |
| **Post-1974** | | |
| 1981 | 1. Gerd K Binnig and Heinrich Rohrer from the IBM's Zurich Research Laboratory create a STM in order to make researchers to see and manipulate atoms for the first time. This invention led them to receive Nobel Prize in Physics in 1986.[96]<br>2. Eric Drexler publishes a first technical paper on molecular nanotechnology and appeared in the Proceedings of the National Academy of Sciences.[97] | See and manipulate atoms relevant to trade mark. |
| 1985 | Robert F Curl Jr., Harold W Kroto and Richard E Smalley discover the soccer ball shaped of carbon atoms, as known as Buckminsterfullerenes (Buckyballs) approximately of 1nm in diameter. They were granted Nobel Prize for this discovery in 1996.[98] | Product and design entity. |

[95] Taniguchi N 'On the Basic Concept of 'Nanotechnology' (1974) Proceedings of the International Conference Production Engineering' Tokyo, Part 11, Japan Society of Precision Engineering.
[96] Binnig G and Rohrer H *Scanning Tunneling Microscopy* in Tore Frängsmyr and Gösta Ekspång (eds) *Nobel Lectures, Physics 1981-1990* (Singapore: World Scientific Publishing, 1993), at p.392.
[97] See also his famous book Drexler K E *Engines of Creation* (New York: Anchor Press, 1986), at pp.4-5.
[98] Smalley R and Curl Jr. R F 'Fullerenes' (1991) 265 Sci. Am 54; Curl Jr. R F *Dawn of the Fullerenes* in Grenthe I (ed.) *Nobel Lectures, Chemistry 1996-2000* (Singapore: WSP, 2003) at pp.11-32; Kroto H *Symmetry, Space, Stars and C60* in Grenthe I (ed.) *Nobel Lectures, Chemistry 1996-2000* (Singapore: WSP, 2003) at pp.44-79; Smalley R E *Discovering the Fullerenes* in Grenthe I (ed.) *Nobel Lectures, Chemistry 1996-2000* (Singapore: WSP, 2003) at pp.89-103.

| | | |
|---|---|---|
| 1986 | AFM was invented offering similar resolution of STM.[99] | Research tools of visualisation. |
| 1988 | William degrade of Dupont create a new protein from scratch. | Biotechnology analogous. |
| 1989 | Physicists at IBM research centre manage to manipulate 35 xenom atoms and form a letter of IBM.[100] | Marking and labelling for trade mark. |
| 1991 | Somio Iijima from NEC Research Labs in Japan discovers multi-wall carbon nanotubes.[101] | Nanotubes available commercially and widely used relevant to patent. |
| 1993 | 1. Warren Robinett from the University of North Carolina and R Stanley Williams from the University of California invent a virtual reality system connected to a STM to equip researchers to see and manipulate the atoms.<br>2. The first nanotechnology laboratory was established at Rice University. | Virtual reality system for information and communication technology (ICT) and computing technology.<br>Coming together with discipline in one lab. |
| 1996 | Robert Curl, Harold Kroto and Richard Smalley discover buckyballs and win the Nobel Prize in chemistry for their discovery of Buckyballs in 1985.[102] | Public awareness. |
| 1997 | Nandrian C Seeman of the New York University demonstrates how to use DNA as a building block for nanoscale mechanical devices. | The DNA as a building block refers to research manufacturing and constructing tools. |
| 1998 | Researchers of Delft University of Technology, Netherlands create a transistor from carbon nanotubes. | The transistor relates to semiconductor chips. |
| 1999 | Mark Reed and James M Tour from Yale University create an organic switch in a single molecule. | Organic with single molecule relates to ICT. |
| 2000 | Lucent and Bell Labs together with Oxford University create the first DNA motors of the convergence biotechnology and nanotechnology. | The DNA motors for research tools and convergence relates to biotechnology analogous. |
| 2001 | 1. Researchers from IBM working with Delft University develop nanometre sized logic circuit | Nanometre sized logic circuit for semiconductor nanoscale. |

[99] See for example Thompson V 'Veeco Came, Saw, Acquired of AFM Market' Small Times, 8 Oct 2002 available at http://www.smalltimes.com/document_display.cfm?document_id=4759 accessed 4 Nov 2009.
[100] See n.76 above.
[101] Iijima S 'Helical Microtubules of Graphitic Carbon' (Nov 1991) 354 Nature, 56, at pp.56-57.
[102] Smalley and Curl Jr. n.98, at pp.11-32; Kroto H *Symmetry, Space, Stars and C60* in Grenthe I (ed.) Nobel Lectures, Chemistry 1996-2000 (Singapore: WSP, 2003) at pp.44-79; Smalley, n.98, at pp.89-103.

| | | |
|---|---|---|
| | using carbon nanotubes.<br>2. Mitsui & Co of Japan announces the mass manufacture of carbon nanotubes. | From 1991 to 2001, it took ten years to manufacture nanotubes, and this demonstrates the delay to market the product which relates to Supplementary Protection Certificates.[103] |
| 2002 | Researchers at IBM illustrate data-storage density of 1 trillion bits per square inch, equal to a 100 gigabyte hard drive, which is sufficient to store 25 million printed textbook pages on a surface of a postage stamp<br>IBM announces the development of a new electron microscope enhanced resolving power less than the radius of a single hydrogen atom. | Data storage density relates to copying. The new electron microscope relates to the visualising tools. |
| 2003 | The use of fluorescent semiconductor nanoparticles or quantum dots for imaging and as markers for biological processes.[104] | Semiconductor nanoparticles relates to the protection of nano-layers under Semiconductor Chip design right. |
| 2004 | A team of scientists from the Newcastle University and Liverpool University use nano-porous material to trap and store hydrogen gas that can be used in fuel cell car engine.[105] | Nano-porous material relate to product under patent. |
| 2005 | Quantum dots for imaging, labelling and sensing purposes.[106] | For labelling and marking purposes under trade mark. |
| 2006 | The use of nanoparticles containing zero-valent iron for remediation of contaminated groundwater.[107] | Nanoparticles product for patent. |
| 2007 | The Envirox™ Fuel Borne Catalyst produced by Oxonica Ltd to improve fuel combustion and reduce fuel consumption using additive 10nm particles of cerium oxide.[108] | Nanoparticles product for patent. |

[103] See 6.3.1.
[104] Roco M C 'Nanotechnology' (2003) Current Opinion in Biotechnology, 14, 337, at p.338.
[105] At http://www.ncl.ac.uk/press.office/newslink/item/1097846725, 15 Oct 2004, accessed 20 April 2011.
[106] See for example Medintz I L et al. 'Quantum Dot Bioconjugates for Imaging, Labelling and Sensing' (2005) Nature Materials Vol. 4, 435, at p.442.
[107] Tratnyek P G and Johnson R L 'Nanotechnologies for Environmental Cleanup' (2006) Nanotoday, Vol. 1, 44, at p.44.
[108] See for example at Elcock D Potential Impacts of Nanotechnology on Energy Transmission Applications and Needs, Nov 2007, accessed on 20 May 2012, available at http://corridoreis.anl.gov/documents/docs/technical/APT_60861_EVS_TM_08_3.pdf , at p.6.

| | | |
|---|---|---|
| 2008 | Food packaging enhanced with nanoparticles with stronger mechanical and thermal performance to prevent invasion by micro-organisms.[109] | Enhanced nano-particle of food packaging relates to trade mark. |
| 2009 | 1. Researchers at the Universiti Sains Malaysia have invented High Performance Varistors which can be produced at the nanoscale.[110]<br>2. The use of label-free nano-sensors technique to enable biomarkers detection from whole blood for certain disease such as cancer.[111] | Product relates to patent.<br>Process relates to patent. |
| 2010 | The application of nanotechnology in cancer therapy to achieve the desired concentration of therapeutic agent in tumour sites and minimizing damage to normal cells.[112] | Process relates to patent. |
| 2011 | Designing and engineering of a plethora of nanoparticulate entities with high specificity for Alzheimer's disease diagnosis and treatment.[113] | Product design entity. |
| 2012 | A silicon based single atom transistor has been made by positioning a phosphorus atom between metallic electrodes.[114] | Single atom transistor relates to semiconductor chip. |

Source: Adapted from Nanotech: The Tiny Revolution[115] and The Big Down – From Genomes to Atoms[116]

Table 2.1 above shows key milestones representing the time frame of nanotechnology.[117] For example, in 1991 nanotube was discovered, and in 2001 ten years duration for manufacture

[109] Siegrist M et al., 'Perceived Risks and Perceived Benefits of Different Nanotechnology Foods and Nanotechnology Food Packaging' (2008) Appetite Vol. 51, 283, at 283.
[110] Sue-Chern L, ' Lecturer's Lightning Breakthrough,' The News Straits Times, 13 Nov 2009, available at http://www.nst.com.my/Current_News/NST/articles/20xhi/Article/index_html; also USM Researcher Uses Nanotechnology to Invent High Quality Varistor, available at http://www.innovations-report.com/html/reports/physics_astronomy/usm_researcher_nanotechnology_invent_high_quality_143408.html accessed 27 Dec 2009.
[111] Stern E et al. 'Label-free Biomarkers Detection from Whole Blood' (2009) Nature Nanotechnology, 1 at p.4.
[112] Misra R et al., 'Cancer Nanotechnology' (2010) Drug Discovery Today, Vol 15, 842, at p.842.
[113] Brambilla D et al., 'Nanotechnologies for Alzheimer's Disease' (2011) Nanomedicine: Nanotechnology, Biology and Medicine, Vol 7, 521, at p.521.
[114] Lansbergen G P 'Nanoelectronics' (2012) Nature Nanotechnology 7, 209, at p.209.
[115] The Cientifica, 'Nanotech: The Tiny Revolution, CMP, (July 2002) at http://www.cientifica.eu/attachments/061_nanotech_WP.pdf accessed on 27 Oct 2009
[116] The ETC Group, The Big Down – From Genomes to Atoms Ottawa (2003) at http://etcgroup.org/upload/publication/171/01/thebigdown.pdf accessed on 27 Oct 2009.
[117] See Chapter 6.

and product entering the market. The delay of ten years provides a good argument for adopting Supplementary Protection Certificates (SPCs, Chapter 6).

## 2.4 Application of nanotechnology

Nanotechnology holds many possibilities to affect every aspect of human life which have resulted in development and expansion in the research, commercialisation at national and international level.[118] The development however, is still at the speculative stage and so far only a few inventions have been commercialised.[119] This situation has been described as "bulk nanotechnology" for example the production of ultra-thin films and nano-sized particles such as metal oxides and clay.[120] It has been argued that the development of nanotechnology now mirrors the stage of development in information technology in the early 1960s and biotechnology at the beginning of the 1980s; and now the emphasis of nanotechnology is shifting towards the development of the underlying technologies as well as their development.[121] In cases where certain technology has reached the optimal of its development, another new technology will take place;[122] and now it is likely that every technology is moving towards nanotechnology.[123] IP law coped with the introduction of new technologies like information technology and biotechnology, and the technologies are developed without a special IP regime. The same statement could be made that the existing forms of IP law are flexible enough to cope with any difficulties that new technology could bring, particularly nanotechnology.[124]

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[118] Seear K et al. 'The Social and Economic Impacts of Nanotechnologies' Final Report (Feb 2009), prepared for the Department of Innovation, Industry, Science and Research, at http://www.innovation.gov.au/Section/Innovatio/Documents/Literature_Review.pdf accessed 14 October 2009, at 9.

[119] Lemley, n.25, at p.602; because of the young field, nanotechnology focuses on two categories i.e. basic research and material science products, Tullis, n.25, at 2; interviewee C confirmed that this technology is still young in Malaysia.

[120] The European Commission, 'Setting the Nanotechnology Research Agenda – Nanotechnologies' European Industrial Research, Dec 2003, at p.8, at http://ec.europa.eu/research/industrial_technologies/pdf/eir_magazine_3.pdf accessed 30 Oct 2009.

[121] Advisory Group, n.29, at p.23.

[122] Interviewee D.

[123] Interviewee C.

[124] interviewee C and D also mentioned that existing forms of IP are sufficient to cater a new technology like nanotechnology.

The huge potential of nanotechnology has given opportunities for all countries to enhance further their research and development. Lux Research has reported that the worldwide funding for nanotechnology research and development increased 13 per cent from 2005 to reach $11.8 billion in 2006. [125] In terms of basic and applied research, Japan and the US are the most innovative and the biggest producers of products related IP, and in certain key areas such as materials, Japan leads the US.[126] Japan now is second to the US in terms of government investment for global player of nanotechnology development. For instance, in the year 2003, Japan invested nearly $900 million a figure believed to have increased by 20% in 2004.[127] Recently, the amount of USD 1.66 billion has been invested for the US NNI in the 2010 budget.[128] Other countries have been supported financially for their nanotechnology initiatives such as Singapore, Taiwan, China, India and Korea.

There are considerable examples of products which are already available in the market, for example at August 21, 2008, the Woodrow Wilson International Centre for Scholars released figures that there were 1015 nanotechnology consumer products on the market.[129] It has been estimated that by the year 2015, the worldwide market products enhanced with nanotechnology will be worth US$1 trillion.[130] The categorisation of nanotechnology application is shown in the Table 2.2 below.

**Table 2.2: Nanotechnology applications**

| No | Stages | Types of product |
|---|---|---|
| 1. | Available in the market | Hard disks; magnetoresistance in nanostructures magnetic multilayers; sun-block cream incorporated with nanoparticles for UV light absorption; lasers, |

[125] Lux Research, The Nanotechnology Report (5th ed) 2007, at p.iii.
[126] Ross L 'A Cursory Look at Commercializing Nanotechnology in Japan' (2004) 1 Nanotech. L. & Bus. 213, at p.213.
[127] Liu L 'Asia Pacific Nanotechnology R&D and Commercialisation Efforts' (2004) 1 Nanotech L. & Bus. 104, at 106.
[128] The National Nanotechnology Initiative (2009) at http://www.nano.gov/NNI_2010_budget_supplement.pdf accessed 30 Oct 2009.
[129] The Woodrow Wilson International Centre for Scholars, The Project on Emerging Nanotechnologies, available at http://www.nanotechproject.org/inventories/consumer/analysis_draft, accessed 20 Feb 2009. This Centre has developed online inventory of nanotechnology-based consumer products.
[130] The National Science Foundation, available at http://www.nsf.giv/crssprgm/reports/nni031210ro@euro-nanforum.pdf, accessed 30 Oct 2009; see also Lux Research 'Sizing Nanotechnology's Value Chain' (2004), New York.

| | | |
|---|---|---|
| | | modulators and amplifiers for telecommunications; computer peripherals for example Vertical Cavity Surface Emitting Lasers |
| 2. | Nearly close to the market | Photovoltaic techniques for energy sources; electronic display technologies; scratch resistance coating glasses; harder, lighter and stronger material, lab-on-chip diagnostic devices; quantum structure electronic devices; self-cleaning surfaces; advanced photonics devices in telecommunications |
| 3. | Expected in the future | Drug delivery systems with lower dosage and reduced side effects; anti-corrosion coatings; tougher and harder cutting tools; longer lasting medical implants; artificially created organs; retina implants; medical sensors to monitor patients |

Source: Advisory Group[131]

From numbers 1 until 3 above, the types of nanotechnology products which have been widely applied in areas of electronics, medical, information communication and technology (ICT) and biotechnology. The most applied area is the medical one, a point made in the thesis's qualitative interviews. The types of products also show some analogy with previous technology such as ICT and biotechnology which strongly suggest that the existing forms of IPRs are sufficient for nanotechnology.

**Table 2.3: The phases of nanotechnology development**

| Timeline | Products |
|---|---|
| First Generation – passive nanostructures ~2001 onwards | in coatings, nanoparticles, bulk materials (nanostructured metals, polymers, ceramics) |
| Second Generation – active nanostructures ~2005 onwards | As transistors, amplifiers, actuators, adaptive structures |
| Third Generation – 3D nanosystems ~2010 onwards | With heterogeneous nanocomponents and various assembling techniques |
| Fourth Generation – molecular nanosystems ~2020 onwards | With heterogeneous molecules, based on biomimetics and new design |

Source: Roco M C 'The Future of National Nanotechnology Initiative'[132]

[131] N. 29, at pp.23-24.

The timeline for nanotechnology development is important to determine the IPRs and the pattern for IP duration can be expected. As informed from the interviews conducted, technology needs certain duration of development before companies exercising their IPRs.[133] The first generation of the passive nanostructures would be a process that may be suitable for confidentiality and patent. The active nanostructures under the second generation demonstrate applicability in electronics products, and it can be expected that this requires from ten to fifteen years to develop which strongly favours unregistered design by semiconductor chip model. For third generation, it shows methods or techniques which are suitable for patent protection for 20 years of protection and confidentiality. Patent is also important to protect inventions that can be easily configured by reverse engineering. Bowman and Hodge list second and third generations of nanotechnology application as follows; (1) scientific tools: AFM and STM; (2) electronics: Semiconductor Chip, memory storage, photonics and optoelectronics; (3) military and security: bio-sensors weapons, sensory enhancement; (4) environment and energy: water, and air purification filters[134], fuel cells,[135] photovoltaics; (5) food science: processing, 'nutraceutical' foods, nanocapsules foods; (6) materials: nanoparticles carbon nanotubes, biopolymers, paints and coatings; (7) chemicals and cosmetics: nanoscale chemicals and compounds, paints, coatings; (8) nano-medicines: nano-drugs, medical devices, tissue engineering; (9) agriculture: pesticides, food production.[136] The fourth generation shows some of the products strength that requires for patent protection. For the third and fourth generation phases, the pattern of IP enforcement such as the protection for methods or processes with licensing opportunities for people to fabricate the methods or process or the possibility of applying research exemption would be typically expected.

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132 Roco M C 'The Future of National Nanotechnology Initiative' (Nov 5, 2002) presented at the Annual meeting of AIChE, Indianapolis, available at http://www.nano.gov/html/res/roco_aiche_48slides.pdf accessed 5 Oct 2009.

133 Interviewee A.

134 This is very important for developing countries, interviewee C.

135 The Oxonica company produces Envirox™ fuel combustion catalysts used as a diesel fuel additive to reduce fuel consumption and costs, and emission of greenhouse gases, and currently been used by Stagecoach; see n. 108 above.

136 Bowman D and Hodge G 'Nanotechnology' (2006) Future, 1060-1073, at p.1062.

## 2.5 Nanotechnology development

This next part of this chapter discusses research, development and strategic planning of nanotechnology from different selected jurisdictions including Malaysia, UK, Europe, Australia and US. As mentioned earlier in this chapter, UK is chosen as a comparative study employed in this research. Moreover, the prioritised areas of nanotechnology development in the UK are slightly different from Malaysia. Furthermore, as part of the comparative analysis, this would directly relate to the European level. Australian jurisdiction is also important because as one of the chosen examples from the Commonwealth countries. In the context of other chapters in this research, the selections have been made to discuss Australian IPRs whenever it is appropriate. This research does not make any comparative legal analysis with the US, however, to date the US has already advanced with the nanotechnology investment, therefore the scientific discussion has also provided rich literatures for this research. The nanotechnology development in different selected jurisdictions is vital to see if there are any distinctions or commonalities that can be identified for IPRs and nanotechnology.

### 2.5.1 Nanotechnology development in Malaysia

The Malaysian government takes the strategic initiatives in promoting nanotechnology development by strengthening the roles of the policy makers and by formulating policy guidelines, strategies for human resources development, facilitating the establishment of infrastructure and allocating funding scheme in nanotechnology research fields.[137]

The areas of potential impact of nanotechnology have been identified under the Ninth Malaysian Plan (2006-2010) and are related to research and development on nanoparticles, micro-machining and fabrication, sensors in electronics, communications, automotive and

[137] The Final Report, Research Survey for Implementing Nedo's International Cooperative Research Project for Development Support Projects in Asian Countries (Malaysia) Environmental and Bioprocess Technology Centre, (2006) ETC237/16/586 (R045/06) SIRIM Berhad available http://www.tech.nedo.go.jp/PDF/100008942.pdf, accessed 20 Oct 2009, at Chapter 8.1 (SIRIM Report).

chemicals industries.[138] The research and development have also identified the focused areas with high potential on the local industries such as nanostructured catalysts for environmental-friendly hydrocarbon fuels, nanostructured membranes for waste water treatment and MEMS for medical diagnostic devices.[139]

The official programmes of nanotechnology started when the Minister of Defence[140] launched the APNF, on 4th July 2005. From this forum, the Minister emphasised that Malaysia should have more effective control over the nanotechnology development and the government was committed to support the establishment of the MNNI. In terms of coordinating research and development, investment, commercialisation aspects, industrial collaboration, the establishment of a Malaysian Nanotechnology Centre should be proposed. The government gave full support for promoting nanotechnology as one of the top priority areas in science and technology.[141]

It was recommended to establish the Malaysian National Nanotechnology Centre (MNNC) with the aim to administer and plan the National Nanotechnology Initiative. The proposed functions of the MNNC are to:[142] to (1) form the structure of MNNC; (2) draft a National Nanotechnology Policy; (3) to formulate the financial strategies for R&D, education and national nanotechnology management; (4) establish the national nanotechnology niche areas; (5) to manage the activities of nanotechnology R&D; (5) provide and facilitate the national nanotechnology infrastructure and research facilities; (6) train people for the human resource development;[143] (7) update the national nanotechnology databases; (8) create and organise the nanotechnology educational programme; (9) provide assistance for the commercialisation activities; (10) enhance national and international collaboration; (11) supervise the potential impact health, environmental and societal impacts of nanotechnology; (12) formulate the standards and specifications for nanotechnology; (13) manage intellectual property rights and

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[138] The Ninth Malaysia Plan 2006-2007, The Economic Planning Unit, Prime Minister's Department, Putrajaya, (2006) (9MP), Thrust 2, Chapter 12.18 of the 9MP; The total amount which has been allocated under this Ninth Plan is RM2.5 billion.
[139] Thrust 2, Chapter 12.58 of the 9MP.
[140] Now the Prime Minister, Dato' Sri Mohd Najib bin Tun Abdul Razak.
[141] At http://web.utm.my/today/index.php?option=content&task=view&id=198&Itemid=2. This is because Malaysia should identify areas which others countries are still under development too, interviewee C.
[142] See n. 22.
[143] They could involve scientists or technologists with Ph.D holder that can assist the patent office, see 4.3.3.1.

other legal matters;[144] (14) engage with commercialisation and collaboration activities. Under the MNNC, the centres of excellence for nanotechnology have been identified as shown in **Appendix 2.**

In 2007, there was a study conducted by MiGHT[145] for the Economic Planning Unit (EPU) of the Prime Minister's Department entitled *"Identification of Business and R&D Opportunities in the Application of Nanotechnology in Malaysia"* which identified the roadmap for Malaysian nanotechnology development. The study has shown that there were six major target products that could bring the most potential impact to the industries. The target products and applications are shown in the table below.

**Table 2.4: Areas of application of nanotechnology in Malaysia**

| Target Products | Identified Applications | IP Significant |
|---|---|---|
| Biosensors | • Clinical diagnostic<br>• Home diagnostic<br>• Real-time alert sensor and detection for pathogen infection caused by bacteria, fungi and viruses<br>• Real-time detection of contamination<br>• Food production and agricultural diagnostic kit | • Process and product patent. |
| Biochips | • Whole genome arrays<br>• Pathogen (HIV, bacteria, fungus) detection chips<br>• Real-time monitoring<br>• Portable lab-on-chip devices | • Product and process patent. |
| Molecular Farming | • Mass producible therapeutic medical proteins<br>• Low cost enzymes for industrial use<br>• Mass producible vaccines<br>• Plant/animal vaccines for agriculture/livestock<br>• Biosensor/biochip for agricultural diagnostics | • Process patent.<br>• Plant variety rights. |
| Drug Delivery System | • Clinical treatment<br>• Topical and cosmetics<br>• Nutritional applications<br>• Veterinary and agricultural application | • Process patent. |

[144] This is also emphasized under the National Nanotechnology Statement that embark on the initiative to protect IPR on effective and efficient policy, National Nanotechnology Statement, Ministry of Science, Technology and Innovation Malaysia, July 2010, at http://www.nano.gov.my/?Home accessed 20 Oct 2011.
[145] The Malaysian Industry-Government Group for High Technology.

| | | |
|---|---|---|
| Solar | • Higher efficiency and lower cost solar panels<br>• Flexible/robust solar panels for outdoor applications<br>• Dye-sensitised solar panels | • Product patent. |
| Lithium-ion | • Li-ion batteries for hybrid electric vehicle (HEV)<br>• Li-polymer batteries<br>• Industrial application (i.e. robotic system) | • Product and process patent. |

Source: adapted from the MiGHT Report[146]

Subsequent to this study, the Malaysian Institute of Microelectronic Systems (MIMOS) has undertaken a study on the *"Nanoelectronics Technology Roadmap for Malaysia"*[147] which is a complement to the earlier study by MiGHT. This study provides the directions and frameworks for nanoelectronics in the areas identified in Table 2.4. This study also highlights to develop fundamental and applied technologies in various nanotechnology application as well those areas that have been identified by the MNNI.

### 2.5.2 UK nanotechnology development

In Europe, UK is among the earliest countries which developed its nanoscience and nanotechnology. However, obstacles existed to slow the nanotechnological industrial developments such as the fragmented nature of the UK's effort, the multidisciplinary nature of the technology, the variability of mechanisms which were unable to facilitate the commercialisation in order to transfer the science from the academia spectrum into the industrial world.[148] The National Initiative on Nanotechnology (NION) was launched in 1986 and UK was the earliest country which had a national initiative for nanotechnology. The initiative was announced by the Department of Trade and Industry (DTI),[149] and was subsequently followed by the nanotechnology programs under the four-year LINK nanotechnology programme in 1988. However, the programme has not been continued

[146] The Nanoelectronics Technology Roadmap for Malaysia – R&D Opportunities, MIMOS Berhad, (2008) at http://www.mosti.gov.my/mosti/images/stories/DICT/policy/NanoRoadmap-MIMOS-2008-publicversion.pdf accessed 15 Oct 2009 (Nanoelectronics Roadmap).
[147] Ibid.
[148] Advisory Group, n.29, at p.7.
[149] Now the Department of Innovation, Universities and Skills (DIUS).

because of fragmented support for nanotechnology.[150] The research and development strategy is now being coordinated together with the Nanotechnology Knowledge Transfer Network (NanoKTN)[151] for one of the primary knowledge based networks for micro and nanotechnologies.

In 2002, the Advisory Group identified six main specific applications for nanotechnology which have strength in the UK[152] in the Table 2.5 below.

**Table 2.5: Areas of application of nanotechnology in UK**

| Target Product | Identified Application | IP Significant |
|---|---|---|
| Electronics and communications | quantum structure electronic devices for memory and data storage, displays, optoelectronics, photonic crystal structures, quantum information technology | Semiconductor chip.<br>Process patent. |
| Drug delivery systems | polymer-drug conjugates, nanoparticles, liposome and polymer micelles and dendrimers | Process patent. |
| Tissue engineering, medical implants and devices | external tissue implants, in-vivo testing devices, medical devices | Product patent. |
| Nanomaterial | particularly at the bio/medical/functional interface: nanostructured materials, smart composites, catalysis, biosensors | Process and product patent. |
| Instrumentation, tooling and metrology | tools for top down manufacture for example high resolution and soft lithography, nanometrology | Product patent. |
| Sensors and actuators | medical diagnostics and implants; systems integration | Product patent. |

Source: adapted from the Advisory Group

150 Advisory Group, n.29, at p.4.
151 NanoKTN was established by the Technology Strategy Board and managed by the Centre of Process Innovation Limited. Four main areas of focus are: (1) promoting and facilitating knowledge; (2) support the growth of the UK capabilities; (3) encourage awareness of nanotechnology; (4) provide leadership and input for policy and strategy consideration.
152 This report identified specific application of the technology rather than specific subdivision of the technology, Advisory Group, n.29, at p.13. This group has provided assistance in terms of advice for the improvement of UK's capabilities in nanotechnology and related technology.

The Advisory Group also analysed that the UK had strength in nanoelectronics, nanophotonics and molecular nanotechnology which were mainly related to develop research in semiconductor physics, photonics, molecular biology and pharmacy.[153] This Advisory Group recommended the establishment of the National Nanotechnology Fabrication Centres (NNFCs) with the aim of developing and operating world class facilities for nanotechnology research activities.

The RAE report in 2004 identified areas of application such as (1) nanomaterials; (2) metrology; (3) electronics, optoelectronics and ICT; (4) bionanotechnology and nanomedicine; and (5) industrial applications.[154]

In analysing patent data of UK innovation in the fields of nanotechnology, the UKIPO[155] has observed that in all of the areas of the technology such as nanomaterials/nanostructure, nanometrology, electronic applications, nanofiltration/nanoseparation, applications of nanotechnology and nanotoxicity, the UK has overall strong capabilities in bionanotechnology. In a specific technology breakdown, medical preparations such as targeted drug delivery and antibody directed enzyme therapy is seen to fall since its prolific activity in 1990s, whereas cyclodextrins and medicinal preparations involving nanoparticles and/or nanocapsules is seen to have increased recently. Recent university research activities have contributed to the activity in nanostructures and physics/electrical field. Among the universities listed, University of Cambridge has the most prolific activity for its strength in chemical and physical fields including applications and medical nanotechnology, followed by University of Oxford in medical and cosmetic application of nanotechnology. Other university specialism includes the University of Glasgow in semiconductors, lasers and light guides; the University of Bristol in nanometrology and the University of Liverpool in nanofiltration and separation. Commercial organisations are more productive in medical and cosmetic applications whereas the universities are strong on fundamental science base research related to nanostructures, physics and electrical including scanning probes, light guides, semiconductors and magnets. The UKIPO report also indentified key patents on the

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[153] Advisory Group, n.29, at p.26.
[154] RAE, n.36, at p.viii.
[155] UKIPO, 'IPO Patent Informatics Project Report' (April 2009) available at http://webdb4.patent.gov.uk/informatic-nanotech.pdf , accessed 24 Feb 2010.

basis of citation and evidence where it was found that UK had strengths in nanowires,[156] nanotubes, nanoparticle composition and nanoprobes.

### 2.5.3 EU nanotechnology development

In the development of nanosciences and nanotechnologies at the EU level, the Commission of the European Communities plays two important roles as policy maker and as a funding body for research and innovation. In the EU, nanoscience and nanotechnology had been given priority on the research activities. The European Commission has been committed to strong research activities of nanotechnology.

At EU level the nanotechnology programmes have been funded under the Fourth Framework Programmes (FP4) and the Fifth Programmes (FP5). However it was not until the Sixth Framework Programmes (FP6) from 2002-2006, that the EU provided strong funding and promotion of research on nanotechnologies with nearly €1.3million and classified nanotechnology as one of the thematic priority areas.[157] The thematic priority includes nanotechnologies and nanosciences, knowledge-based multifunctional materials and new production processes and devices with almost 550 projects of nanosciences and nanotechnologies research activities. This was subsequently continued to receive an increase investment under the Seventh Framework Programmes (FP7) from 2007-2013. For the years to come, nanotechnology has been seen as leading-edge technologies for knowledge based products, services and manufacturing processes. The budget has been increased in the FP7 to approximately €3.5 billion over the FP7 duration for nanosciences, nanotechnologies, materials and New Production Technologies (NMP). Under FP7 nanotechnology has continued as a priority area identified under NMP theme with additional cross cutting activities shared with other themes and programmes such as health, food, information technologies and societal aspects and infrastructures.[158]

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[156] Also known as nanorods or nanowhiskers, which are solid wires made from silicon, zinc oxide, and various metals, having a diameter range with a lengths in the tens of micrometers with optical, electrical characteristics, Miller et al, n.32, at p.18.
[157] For more information see http://fp6.cordis.lu/fp6/home.cfm.
[158] For more information see http://cordie.europa.eu/fp7.

The Commission has also adopted a Strategy[159] for nanoscience and nanotechnology in which is proposed a safe, integrated and responsible strategy for nanotechnology. Subsequent to this Strategy the Commission published another Action Plan[160] in which it set out and emphasised a priority for safe, integrated, responsible of nanoscience and nanotechnology that directly adding to the existing communication. The Commission proposes to reinforce nanoscience and nanotechnology research activities[161] and to double the funding under the European Union's seventh framework programme. The Commission proposes to support for the strength areas of nanoelectronics which has been identified under the ICT priority areas of the FP7 and the research strategy under the European Technology Platform on Nanoelectronics.[162]

Both Malaysian and the UK (and EU) demonstrate overlapping areas, particularly on the medical or health and nanoelectronics products and application. The medical or health indicates especially suitable for patent protection. The areas also suggest the pattern of duration that could be identified under SPCs for nanotechnology. Nanoelectronics have been identified areas under Malaysia, UK and EU that demonstrate significant protection under unregistered design for semiconductor chip model, which could be adopted by Malaysia.[163] One of the identified areas particularly different from Malaysia and the UK is molecular farming which may be suitable to be protected under plant variety rights.[164] The variety areas for nanotechnology under both Malaysian and the UK jurisdictions may indicate that

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[159] The European Commission, Communication from the Commission: Towards A European Strategy for Nanotechnology COM (May 12 2004) 338 Final at ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nano_com_en_new.pdf, accessed 20 Oct 2009.

[160] The European Commission, Communication from the Commission to the Council, the European Parliament and the Economic and Social Committee, 'Nanosciences and Nanotechnologies: An Action Plan for Europe 2005-2009' COM (June 7 2005) 243 Final, at ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/nano_action_plan2005_en.pdf, accessed on 25 Oct 2009. For a summary of progression of activities within 2005-2007 in relation to the key areas of nanotechnology Action Plan of 2005-2009, see the European Commission, Communication from the Commission to the Council, the European Parliament and the European Economic and Social Committee, Nanosciences and Nanotechnology: An Action Plan for Europe 2005-2009, First Implementation Report 2005-2007, Commission of the European Communities, Brussels COM (2007) 505 Final, at ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/com_2007_0505_f_en.pdf, accessed 30 Oct 2009.

[161] For example by (a) increasing the investment and coordination of R&D in collaborative, interdisciplinary and competitive in nanoscience and nanotechnology with industries; (b) developing world-class competitive R&D for industry and R&D organizations; (c) promoting the ethical principle and integrating societal considerations into the R&D process to encourage a dialogue with citizens.

[162] The Vision 2020: Nanoelectronics at the Centre of Change, Report of the High-Level Group EUR 21149 (June 2004) at http://www.cordis.lu/ist/eniac, accessed 25 Oct 2009.

[163] See 5.4.5.3.

[164] However, plant variety rights are not within the discussion under this study because the main purpose of this study is to examine the overlap products and application between the two jurisdictions.

nanotechnology cannot be a discrete area and it is unwise for both countries to adopt for a new IP system for nanotechnology protection. Furthermore, none of these two jurisdictions has adopted a different IP system for nanotechnology. Thus, it is a common conclusion that sui generis system is out for both jurisdictions. Furthermore, a broadly similar conclusion could also be made, that all IP forms are meant to be surveyed for all areas of nanotechnology. The different focused areas adopted in both jurisdictions however, do not mean that different system of IP forms will be introduced, and this contention of the legal analysis for nanotechnology is predicted to continue to be valid in the future.

### 2.5.4 Nanotechnology development in Australia

In Australia, nanotechnology has been identified as a key technology under its National Research Priority goals. In 2007, the Australia National Nanotechnology Strategy (NNS) launched approximately AUS$21 million for a four year programmes with the objectives to help Australia to harness the potential of nanotechnology and at the same time to address the social, ethical and safety issues; as well as to overcome any impediments of nanotechnology through regulatory frameworks, public confidence and metrology.[165] The aim of NNS is to establish the environment for Australia to benefit from nanotechnology and address the issues of nanotechnology development. The initiatives taken by NNS are; (1) to address the regulation and standards issues concerning health, safety and environment impacts of nanotechnology; (2) to promote the public awareness and engagement programs on nanotechnology; (3) to establish nano-particle metrology at the National Measurement Institute (NMI) and (4) to assist the approach of nanotechnology development through the establishment of the Australian Office of Nanotechnology.[166] The main agency which coordinates the NNS is the Australian Office of Nanotechnology (AON) based on the Department of Innovation, Industry, Science and Research.[167] The AON is acting on advice

[165] The National Nanotechnology Strategy Annual Report 2007-2008, Australian Office of Nanotechnology, at p. 19 available at http://www.innovation.gov.au/Section/Innovation/Documents/NNS%20Annual%20report.pdf (NNS Report).
[166] Ibid, at p.1.
[167] National Nanotechnology Strategy, Jan 2008 http://www.innovation.gov.au/Industry/Nanotechnology/Documents/NNSFeb08.pdf, accessed 26 Oct 2009

on the implementation of the NNS and nanotechnology development to the Australian Government.[168]

The working group for the Prime Minister's Science, Engineering and Innovation Council (PMSEIC)[169] has identified specific consolidation and clustering needs for the Australian nanotechnology initiatives. This group has also recognised that although there is a difference between nanotechnology and biotechnology (such as the breadth of technologies and product applications), the process adopted for the formulation and implementation of biotechnology strategy (Australian National Biotechnology Strategy) may be useful as a lesson on the experience, strategic planning and business systems in the context of formulating and implementing the national nanotechnology strategy.[170] This group has also recognised that Australia's nanotechnology research base is strong and globally competitive but comparatively small, and focused upon particular areas such as diagnostic devices, nanomaterials, quantum computing and energy storage.

In response to the PMSEIC report, the Nanotechnology Strategy Taskforce was formed. This group agreed that there was correlation between ICT and nanotechnology because (1) these two are overlapping in many disciplines such as nano-ICT for instance in photonics, micro-electronics, quantum computing; (2) nanotechnology is being enhanced in the ICT products and services; (3) many applications incorporate both nanotechnology and ICT such as nano-biotechnology, monitoring system and sensory systems for clean environment; (4) that ICT is a tool to develop and manipulate nanotechnology materials.[171] This Taskforce promotes research strength in the Australian industry and it should be made more apparently at the

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[168] For a review in considering whether NNS was still considered the best responsible for nanotechnology management see Cutler T, Venturous Australia – Building Strength in Innovation, Report of the Review of the National Innovation System, Department of Innovation, Industry, Science and Research, Canberra, (2008) available at http://www.innovation.gov.au/innovationreview/Pages/home.aspx.

[169] The Independent Working Group for the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) 'Enabling Technologies for Australian Innovative Industries' (11 March 2005) available at http://www.innovation.gov.au/Industry/Nanotechnology/Documents/nanotechnology-pmseic110305.pdf accessed 26 October 2009.

[170] Recommended the same view that the model of Biotechnology Australia should be adopted taking into consideration of the unique characteristics and broader applications of nanotechnology, The Options for a National Nanotechnology Strategy' Report to Minister Industry, Tourism and Resources, the National Nanotechnology Strategy Taskforce, at p.10 http://www.innovation.gov.au/Industry/Nanotechnology/Documents/taskforcereport20070215100254.pdf accessed 26 Oct 2009 (Nanotechnology Taskforce).

[171] Ibid, at p.19.

international level especially in areas of Australian's scientific strength in photonics, opto-electronics, biomedical, quantum-based technologies and materials.[172]

### 2.5.5 US nanotechnology development

Since the space race, nanotechnology has become the largest US government science initiative.[173] The US NNI was established in 2000 to build, characterise and understand devices at nanoscale. The potential areas of applications have been identified including medicine, manufacturing, material sciences, information technology, energy and environmental sciences. The NNI has allocated funding in different agencies to continue research activities for nanotechnology programmes, where $464 million has been spent in 2001 and has increased to approximately $1 billion in fiscal year 2005.[174]

The implementation plan of NNI includes the long term goal of fundamental research of nanoscience and engineering specifically focusing upon understanding and synthesis of nanometre size building blocks in potential areas of materials and manufacturing, nanoelectronics, medicine and health care, environment and energy, the chemical and pharmaceuticals industries, biotechnology and agriculture, computation and information technology, and national security.[175] For future investments in nanotechnology, importance areas have been identified to include (1) nanomaterials; (2) interface of nanoscale technology with biology; (3) integration of nanosystems; (4) infrastructure and instrumentation.

The introduction of the 21st Century Nanotechnology Research and Development Act (also known as Nanotechnology Act) has authorised the nanotechnology research and development programmes in different agencies. By passing of the Nanotechnology Act, the legislation has unauthorised USD 3.7 billion in nanoscience and nanotechnology between fiscal year 2005 to 2008.[176] This Act has authorised the formation of the National Nanotechnology Program

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172 Nanotechnology Taskforce, n.170, at p.20.
173 Bawa et al., n.30, at p.151.
174 Roco M C and Bainbridge W 'Converging Technologies for Improving Human Performance' National Science Foundation and Department of Commerce Report, 2002.
175 The Committee for the Review of the National Nanotechnology Initiative "Small Wonders, Endless Frontiers Nanotechnology Academy Press, Washington (2002) at http://www.nano.gov/html/res/small_wonder_pdf/smallwonder.pdf accessed 20 October 2009, at p.23.
176 Miller et al., n.32, at p.116.

with the aim to establish research centres and advanced technology user facilities, encourage coordination between agencies; support the research on ethical, legal, education implications of nanotechnology.[177]

There are similar areas of interest of nanotechnology between Australia and Malaysia and UK, particularly the emphasised on the medical and health areas as well as electronics. The different area show different is mining and agri-business. This may also provide similar argument to Australia that different areas of nanotechnology requires different subject matter of IPRs such as patents, design and plant variety rights. The existing forms are sufficient to protect the areas and they are meant to be examined in this thesis, except as in plant variety rights. In the US, it demonstrates active funding activities from different organisations for the development of nanotechnology. The introduction of the Nanotechnology Act marked the importance and how serious nanotechnology in the US, however none of new IPRs are mentioned under this Act. This strongly supports the argument that new forms of IPRs are insufficient.

## 2.6 Conclusion

This chapter has explored the technical and scientific principle underpinning nanotechnology which relevant to the legal analysis in the selected jurisdiction. This chapter argues that being new, emerging, complex and multidisciplinary like nanotechnology, it is difficult to define precisely and usefully. To date, there is no single or universally accepted definition for nanotechnology. Furthermore, as revealed in the interviews conducted under this study, it is a common understanding that nanotechnology cannot be a discrete area. The difficulty in defining nanotechnology therefore militates against sui generis protection. Thus, this thesis strongly argues that the current IPRs are sufficient to govern the issues related to nanotechnology and all forms of IP are meant to be surveyed in this thesis. From the literature and informed by the interviews conducted in this study, nanotechnology shows some characteristics with previous technologies such as Semiconductor Chip, biotechnology and ICT. These previous technologies have been sufficiently protected under the existing

177 More discussion see Honda M ‘Nanotechnology Legislation in the 108$^{th}$ Congress’ (2004) 1 Nanotech Law & Bus. 63.

forms of IP. Thus, the same contention may be made to nanotechnology without the need to have separate forms of IP. Appreciation of historical background and trajectory of nanotechnology also provide some significant illustration to the legal analysis in determining the different IP subject matter as well as the magnitude of duration for IP enforcement. The development suggests that nanotechnology has developed without a separate IP regime. The focused areas of interest for nanotechnology in Malaysia, UK, and EU demonstrate that there are some overlapping areas such as health and medical and electronics. All of these areas are potentially applicable to the existing forms of IP, and these forms of IP will be examined in this study. Furthermore, it reveals that none of these jurisdictions have protected nanotechnology through sui generis rights. Similar legal analysis can also be made to the Australian which has overlapping areas with Malaysia and UK, particularly in health and medical, except on mining and agriculture. This indicates that various IP subject matters are applicable for nanotechnology without the need to introduce a new form of IP. Furthermore, the US Nanotechnology Act is silent on the new form of IP, which reinforces that sui generis right for nanotechnology is impossible.

# CHAPTER 3
# BREACH OF CONFIDENCE AND NANOTECHNOLOGY

## 3.1 Introduction

The small scale and multidisciplinary nature of nanotechnology information would be relevant to be protected under the law of confidence. The point became evident in the interviews conducted in this study, where it was emphasised that the law of confidence is important for nanotechnology.[178] Examples provided in the interviews were manufacturing processes at nanoscale and customer lists. Beyond the company level, it was also emphasised the importance of having a Non-Disclosure Agreement (NDA) between a university and a graduate student who is conducting research on nanotechnology in order to expressly prohibit such disclosure of the information. Furthermore, as compared to other IPRs, law of confidence does not differentiate between products, processes, goods or services because it protects the information as such, as long as all the requirements for confidentiality are fulfilled. It is to be emphasised too that due to complexity and multidisciplinary nature of nanotechnology where the research is still at the basic stage and lots of technological investment has to be made, the confidentiality agreement would be very significant to protect valuable information. As currently drawn, the law of confidence is neither complicated nor controversial, save on the issue of proprietary interest in the information.

Similar to the approach taken in the UK, Malaysia has also adopted the common law and rules of equity protecting confidential information.[179] The action for breach of confidence protects information in various forms ranging from personal information, government secrets to information of a highly technical and commercial significance.[180]

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[178] Interviewees B, D and A. A survey of economics literatures illustrates firms using secrecy as the most effective mechanism rather than other IP, Lopez A with comments by Dominique Foray and Kevin Urama 'Innovation and Appropriability chapter 1, at pp.9-10 available at http://www.wipo.int/ip-development/en/economics accessed 25 May 2012.

[179] Reception of common law rules and equity to Malaysia has been made through section 3 and 5 of the Civil Law Act 1956; see a copy of this in n.77, **Appendix 1**.

[180] Gurry has categorised the information into trade secrets, personal confidences, government information and artistic and literary confidences, Gurry F *Breach of Confidence* (Oxford: Clarendon Press, 1984) at pp.7-21. Gurry's first text of breach of confidence is still very useful and highly relevant to the current study because it

John Hull[181] discusses a number of the policy concerns which underlie the protection of technical, commercial and other confidential information. He first considers a property rights approach, including the notion of personal autonomy put forward by Sisella Bok.[182] Hull opines that Bok's arguments are more compelling in the field of personal secrets than of commercial secrets. However, they arguably apply with some force to scientists working at the forefront of nanosciences; for these individuals and teams of individuals who wish to publish their research results[183] or move from one organisation to another.[184]

Another problem with a property right approach is that the courts of Malaysia and the UK have rejected a proprietary analysis. The idea of treating information as having proprietary rights has attracted consideration[185] and has been a long standing debate.[186] There have been fairly voluminous judicial decisions which have rejected the notion of proprietary rights of the information, for example secret processes of mechanical conception[187] or information in wedding photographs[188] or in examination papers.[189] The court held that contract or equity would play their role for the action of breach of confidence, for example in Boardman v Phipps,[190] Seager v Copydex Ltd,[191] and in AG v Guardian Newspaper;[192] and also similar stance in Malaysia in Schmidt Scientific Sdn Bhd v Ong Han Suan & Ors,[193] Yeohata Industries Sdn Bhd & Anor v Coil Master Sdn Bhd & Ors[194] and Electrocad Australia Pte Ltd

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provides groundwork study of the law of confidence. Although new edition has now been prepared, Gurry's extensive discussion provides useful source for the nanotechnological context. On account of Gurry's original work, Aplin T et al., *Gurry on Breach of Confidence* 2nd ed (Oxford: OUP, 2011) produce an updated development of the law of confidence.

[181] Hull J *Commercial Secrecy: Law and Practice* (London: S&M, 1998), at pp.1-2 ('Hull, 1998').

[182] According to Bok *"Someone who cherishes a secret recipe or who is working in secret on a scientific formula or a new design for a machine may see its secrecy of the highest personal importance."* Bok S *Secrets* (Oxford: OUP, 1984), at p.141.

[183] For concerns whether their research result might be against public interest, see 3.4.

[184] Interviewee D.

[185] Barrett M 'The "Law of Ideas" Reconsidered' (1989) J. Pat. & Trademark Off. Soc'y 691, at p.695.

[186] See for example, Toulson R G and Phipps C M *Confidentiality* (2nd edn) (London: S&M, 2006), at p.29. See also Ricketson S 'Confidential Information – A New Proprietary Interest? Part I and Part II (1977-1978) 11 Melb. U. L. Rev. 223; Stuckey J E 'The Liability of Innocent Third Parties Implicated in Another's Breach of Confidence' (1981) 4 U.N.S.W.L.J. 73; Weinrib A S 'Information and Property' (1988) 38 U. Toronto L. J. 117; Wei G 'Surreptitious Takings of Confidential Information' (1992) 12 Legal Stu. 302.

[187] Nichrotherm Electric Co. Ltd v Percy [1957] R.P.C. 207, at 209.

[188] Douglas v Hello! Ltd (No.3) [2005] EWCA Civ 595; [2006] Q.B 125, at 119 and 127.

[189] Oxford v Moss (1978) 68 Cr App Rep 183.

[190] [1967] 2 A.C 46 (HL) 127.

[191] [1967] 1 W.L.R 923, at 931.

[192] [1990] A.C 109, at 281.

[193] [1998] 1 C.L.J 685.

[194] [2001] 6 C.L.J 418.

v Mejati RCS Sdn Bhd.[195] Against this background, many of Honore's incidents of ownership may be identified in relation to nanotechnology information and that an approach based on property may have a sound theoretical basis. Although this researcher has considered it,[196] nevertheless in view of strong judicial statements against property characterisation in Malaysia and UK, the approach is unlikely to be accepted in the near future.

Next, Hull discusses the economic considerations that are used to justify IP.[197] He notes that breach of confidence lies behind and complements rights such as patents, designs and copyright. Many of these justifications for IP apply with equal force to confidential information, even regarding patents as an incentive to disclose novel inventions – there would be no incentive to disclose if inventions could not otherwise be kept secret, nor would novelty be possible to preserve.[198]

Especially significant for nanotechnology is Hull's next point – that protection of secrecy is essential to encourage and protect exchanges of ideas and information, citing the US case of Kewanee Oil v Bicron.[199] In this case, the US Supreme Court recognised trade secrets law as alternative protection to patents. The court emphasised that the patent policy of encouraging invention was not disturbed by the existence of another form of incentive to invent, i.e. trade secret. In fact, both systems co-exist and each has its own role. The court concluded that the extension of trade secret protection to patentable inventions does not conflict with the patent policy of disclosure. For a multi-disciplinary topic like nanotechnology, the ability to exchange ideas and information in confidence is especially important.

As a tool in the armoury of commercial ethics, breach of confidence can be useful to discourage industrial espionage and cyber-appropriation of information,[200] alongside specific

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195 [1998] 3 M.L.J 422.
196 See **Appendix 3**.
197 Hull 1998, n.181, at pp.3-4.
198 See 3.3.1.2.
199 416 US 470 (1974).
200 For example, Torremans P *Holyoak & Torremans Intellectual Property Law* 5th edn (Oxford: OUP, 2008) states that use of the internet has increased the cross-border flow of confidential information, at p.525; Sir Nicholas-Browne Wilkinson V.-C in AG v Guardian Newspapers Ltd and Two Others [1989] 2 F.S.R. 81, stated that *"the truth of the matter is that in the contemporary world of electronics and jumbo jets news*

legislative measures. Enactment of measures such as the US Federal Economic Espionage Act of 1996 (18 U.S.C. §§ 1831–1839) and the UK's Computer Misuse Act 1990[201] suggest that these are perceived to be problem areas.

The need for protection of trade secrets has developed alongside other aspects such as personal privacy[202] official secrecy and its counterpart, freedom of information. The exceptions to the UK's Freedom of Information Act[203] suggest that its potential to undermine confidentiality in nano research is limited, even where carried out in public universities or government laboratories. However, the question arises whether or not the changes to UK breach of confidence in personal information caused by the introduction of the Article 10 of the Human Rights Act 1998 (HRA 1998) affects trade secrets? It is said that the passage of HRA 1998 is less likely to affect commercial confidences.[204] Aplin explains that although *"it no longer makes sense to speak of a defence of public interest"* post-HRA 1998 and that injunctive relief may be governed by the decision in Cream Holdings v Banerjee,[205] nonetheless she is clear that other ingredients should remain relatively unchanged for commercial confidences.[206] In a recent decision, Slade J in WXY v Gewanter[207] has adopted the traditional approach to private information and she even has a heading 'public interest defence' where she refers to this as a part of proportionality under European Convention of Human Rights (ECHR). As well, she uses the cause of action under Coco v AN Clark (Engineering) Ltd.[208] Likewise, the same approach of applying Coco v Clark has been made by Arnold J in Force India Formula One Team Ltd v 1 Malaysia Racing Team Sdn Bhd[209] for technical information. This shows that the law relating to commercial confidences has not changed significantly and therefore remains in line with Malaysia and other Commonwealth jurisdictions where ECHR does not apply.

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*anywhere is news everywhere",* at 105; see also the international and European protection of the cross border flow of information in 3.2.

201 Malaysia's Computer Misuse Act 1997 was modeled on the UK law.

202 Campbell v MGN [2004] UKHL 22; [2004] 2 AC 457, is arguably less relevant for nanotechnology.

203 http://www.ico.gov.uk/for_organisations/environmental_information/information_request/exceptions.aspx

204 Aplin T 'Commercial Confidences After the Human Rights Act' (2007) E.I.P.R 411, at p.419.

205 [2004] UKHL 44.

206 Aplin, n.204, at p.419; in *"a commercial context it continues unscathed"*, Moosavian R 'Charting the Journey from Confidence to the New Methodology' (2012) E.I.P.R. 324, at pp.334-335.

207 [2012] EWHC 496 (QB).

208 [1968] F.S.R. 415 at 419.

209 [2012] EWHC 616 (Ch).

Furthermore, the court's approach for breach of confidence has been tailored by flexibility and pragmatism approach.[210] This flexibility approach was emphasised by Bently and Sherman *"that the courts would not be hidebound by particular conventions or models. As such, they could tailor rules to the circumstances as and when they present themselves."*[211] This suggests that this cause of action may be well suited to new fields such as nanotechnology. As noted by Keene LJ in Douglas v Hello![212] *"breach of confidence is a developing area of the law, the boundaries of which are not immutable but may change to reflect changes in society, technology and business practice."*[213] Similarly, Burger CJ stated that trade secrets *"still have an important part to play in the technological and scientific advancement of the Nation"*.[214] The dynamic nature of breach of confidence is especially suitable for nanotechnology because the technology moves rapidly. The policy considerations discussed above justify as appropriate the protection under the law of confidence for nanotechnology.

The information is to be secret or confidential and it can be in any form, either oral, written or any other tangible forms. The obligation of confidential information is based on contractual agreement, equitable principle and possibly proprietary rights in the information. The requirement for an action for breach of confidence was set out in Coco v Clark where Megarry J held that:[215]

> "In my judgment, three elements are normally required if, apart from contract, a case of breach of confidence is to succeed. First, the information itself … must 'have the necessary quality of confidence about it.'[216] Secondly, that information must have been imparted in circumstances importing an obligation of confidence. Thirdly, there must be an unauthorised use of that information to the detriment of the party communicating it".

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[210] Gurry, n.180, at p.58.
[211] Bently L and Sherman B *Intellectual Property Law* 3rd ed (Oxford: OUP, 2009), at p.1005.
[212] [2001] Q.B 967 CA); [2001] E.M.L.R 199.
[213] Ibid, at 1011 and at 251.
[214] Kewanee Oil Co Bicron Corp (1974) 416 US 470.
[215] [1968] F.S.R. 415 at 419.
[216] This is the word of Lord Greene MR in Saltman (Engineering) Co. Ltd v Campbell (Engineering) Co. Ltd (1948) 65 R.P.C. 203. But the court has held that to establish the action for breach of confidence, the information needs to be identified; see John Zink Co. Ltd v Wilkinson [1973] RPC 717; see also Ocular Sciences Ltd. & Anor v Aspect Vision Care Ltd & Ors, Geoffrey Harrison Galley v Ocular Sciences Ltd [1997] RPC 289 at 360; and CMI – Centers for Medical Innovation GmbH and Another v Phytopharm Plc [1999] FSR 235, at 252.

As an equitable creature of case law in UK, Malaysia and other commonwealth countries, law on breach of confidence is well established and executed in judicial decision.[217] The protection under the law of confidence has the potential to be valuable right because it does not need to resort to expensive applications to register, nor is term of protection limited by statute as in patent and trade mark protection.[218] The following discussion uses Megarry's characteristics of the cause of action to explore its application to nanotechnology. Next, however, is to discuss the international protection of undisclosed information under the WTO TRIPS Agreement, the treatment of secret information under the WIPO Model Law Provisions on Protection Against Unfair Competition[219] (WIPO Model Law) and the European recognition of 'know-how'.

### 3.2 International and European attitudes to protection of undisclosed information

TRIPS recognises a requirement for the Member States to protect undisclosed information. Article 39 states that in order to ensure effective protection against unfair competition as provided under Article 10bis of the Paris Convention 1967 (Paris), a natural or legal persons shall have a right to control information from being disclosed, acquired or used without their consent in a manner contrary to the honest commercial practices, provided the information is secret, having commercial value and a reasonable steps have been taken to keep the information secret.

This provision provides a flexible framework to Member States to protect confidential information and enjoy certain freedom to implement it.[220] The protection of "undisclosed

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[217] The approach has given the courts more flexibility, although the flexibility would allow the court to judicially accommodate to a new situation, however, legal uncertainty until the courts give a legal decision could be a problem, see also in Colston C and Galloway J *Modern Intellectual Property Law* 3rd edn (London: Routledge, 2010), at p.234.
[218] Torremans, n.200, at p.526.
[219] The World Intellectual Property Organization (WIPO) Model Provisions on Protection Against Unfair Competition, Geneva, 1996, WIPO Publication No. 832(E), ISBN 92-805-0642-0, ('WIPO Model Law'); The earliest Model Law was in 1967, Model Law for Developing Countries on Marks, Trade Names and Acts of Unfair Competition, United International Bureaux for the Protection of Intellectual Property (BIRPI), Geneva, 1967.
[220] De Werra J 'What Legal Framework for Promoting the Cross-Border Flow of Intellectual Assets (Trade Secrets and Music)? A View from Europe Towards Asia (China and Japan) (2009) I.P.Q. 27, at pp.32-33.

information" includes know-how and trade secrets which have commercial value.[221] The rationale for TRIPS to choose the words "undisclosed information" is to avoid being connected to any given legal system and the information mentioned under TRIPS should be given a wide meaning to include all types of data such as formulas and test data, subject to that the information is identifiable.[222] "Contrary to honest commercial practices" includes breach of contract, breach of confidence and inducement to breach, and acquisition of undisclosed information by the third party.[223] The words "lawfully within the control" is to be associated with reasonable steps taken by the right holder to keep the information secret in the sense that he has the possession of the information, he has knowledge of the information and that the information must be under his physical control either in documents form or other materials form which embody the secret information.[224]

The concept of *"commercial value"* under TRIPS requires that a trade secret will have to do within the business sphere[225], is not easily accessible[226], must confer competitive advantage[227] and involve a difficulty in obtaining the techniques and the information in question.[228] Thus, commercial value is set as a threshold for the protection of trade secrets i.e. below the threshold, no protection will be granted.[229] The secrecy of the information is all dependant on the extent to which the information is generally known as well as the owner's

[221] The line to draw on 'confidential information', 'trade secret' and 'know-how' can be traced in many cases involving employer and ex-employee; albeit likely to be confusing, Hull J 'Trade Secret Licensing' (2009) J.I.P.L.P. Vol. 4, No.3, 203, at pp.205-206. Information having technical and commercial value is protected under TRIPS, Dessemontet F *Protection of Trade Secrets and Confidential Information* in Correa C M and Yusuf A A (ed) *Intellectual Property and International Trade: TRIPS Agreement* (The Netherlands: KLI, 2008), at p.281.

[222] Gervais D *The TRIPS Agreement* (London: S&M, 2008) at p.424.

[223] Footnote Article 39(2) TRIPS.

[224] De Carvalho N P *The TRIPS Regime of Antitrust and Undisclosed Information* (The Netherlands: KLI, 2008), at p.226. For example as mentioned in the interview a reasonable step taken to keep the information through the NDA.

[225] The enforcement of rights of trade secret does not necessarily means that it should occurs in a trade-related environment only, but what is important is economic competition of any relevant sort, Ibid, at pp.225-226.

[226] Accessible refers only to the information, not to the physical support embodying the secret information, Ibid, at p.231.

[227] It is sufficient to confer competitive advantage if competitors or consumers perceive information to have value, Gervais, n.222, at p.425.

[228] Dessemontet, n.221, at p.280.

[229] Ibid, at p.280 who stresses that rather than to define precisely what 'commercial value' is, it is more convenient to relate to the usefulness of the information; De Carvalho, n.224 states that *"commercial value means competitive value"*, and the information is having commercial value because it is secret must be ascertained in terms of objective test, at pp.235-236; commercial value may include technical information and business information, Correa C M *Trade Related Aspects of Intellectual Property Rights* (Oxford: OUP, 2007), at p.373; that the information should give some competitive advantage, where it is sufficient for the information to be seen as having some value, does not need to be put in practical valuable way, Gervais, n. 222, at p.425.

effort to keep the information secret.[230] Relative secrecy is sufficient for protection and if it involves a complex body of information; what matters is it lies in the body of information and not in the individual elements of the information.[231]

The WIPO Model law has shown a similar approach to unfair competition in respect of secret information. Article 6(3) 1996 WIPO Model law defines "secret information" as not generally known or readily accessible to the persons within the circles that normally deal with the kinds of information; having commercial values for its secrecy and where the rightful holder has taken reasonable steps to keep the information secret. The consideration to determine the reasonable steps taken by the rightful owner includes the effort and money spent in developing the secrecy of the information; how valuable the information is to himself and his competitors; the extent of the measures taken and the ease or difficulty of acquisition of the information by others; that the information has to be identified and the intention on the part of rightful holder to treat the information as secret.[232]

Article 6(1) WIPO Model law provides:

> "Any act or practice, in the course of industrial or commercial activities, that results in the disclosure, acquisition or use by others of secret information without the consent of the person lawfully in control of that information and in a manner contrary to honest commercial practices shall constitute an act of unfair competition".

When information becomes public, it loses its economic value, both its licensing value and competitive values.[233] Competitive value depends on innovative techniques and know-how in the industrial and commercial fields, therefore unauthorised acquisition of the secret information by others although the rightful owner has taken reasonable steps to keep information secret will be considered as an act of unfair competition.[234] It is a matter of

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[230] Nimmer R T and Krauthaus P A 'Information as Property' (1993) I.J.L.&T Vol. 1, No. 1, 3 at p.27. The person who has lawful control must take reasonable steps to ensure that the information in question is confidential in nature, reasonably proportionate to the means available and the value of the information, De Carvalho, n.224 at pp.236-237; the reasonable steps depend on the types of information and conditions of its used, for example keys to get access the computerized information or encryption, Correa, n.229, at p.373; this may also include a cost or benefit analysis, Gervais, n.222 at p.425.

[231] De Carvalho, n.224, at pp.231-232.

[232] WIPO Model Law 6.20.

[233] Ibid, 6.04.

[234] Ibid, 6.05 states an exception that employee's acquisition of confidential information of their employer's commercial and industrial activities will not be caught under this paragraph.

concern of the rightful "owner" to maintain the secrecy of the information, for example through express contractual agreement or indirect circumstances that reasonable measures are taken to keep the information secret so that others may be aware of the confidential nature of the information.[235]

Article 6(2) of the WIPO Model Law lists non-exhaustive acts of unfair competition which are similar to the examples provides under TRIPS, and reads as follow:

> Disclosure, acquisition or use of secret information by others without the consent of the rightful holder may, in particular, result from;
>
> (i) industrial or commercial espionage;
>
> (ii) breach of contract;
>
> (iii) breach of confidence;
>
> (iv) inducement to commit any of the acts referred to in items (i) to (iii);
>
> (v) acquisition of secret information by a third party who knew, or grossly negligent in failing to know, that an act referred to in items (i) to (iv) was involved in acquisition.

In the EU, there is no harmonised law of unfair competition but competition law is adapted to deal with confidential information. Technology transfer agreements refers to patent licensing agreements, know-how licensing agreement, a software copyright licensing agreement or a mixed patent, know-how or software licensing agreement.[236] Article 1 (i) of the Technology Transfer Block Exemption Regulation defines 'know-how' as:

> a package of non-patented practical information, resulting from experience and testing, which is:
>
> (i) secret, that is to say, not generally known or easily accessible,
>
> (ii) substantial, that is to say, significant and useful for the production of the contract products, and
>
> (iii) identified, that is to say, described in a sufficiently comprehensive manner so as to make it possible to verify that it fulfils the criteria of secrecy and substantiality.[237]

[235] WIPO Model Law 6.07.

[236] Article 1 of the Commission Regulation (EC) No. 772/2004 of April 2004 on the Application of Article 81(3) of the Treaty of Categories of Technology Transfer Agreements.

[237] The Block Exemption on Technology Transfer Agreements Regulation 772/2004 OJ [2004] 123/11. For a working definition of "know-how" in different jurisdiction from Japanese law and Australia law with a comparative analyses of other common law countries see Tarr J 'A Comparative Overview of "Know-How" Protection in Japan and Australia' (1993) J. B. L. 596. See also discussion on the protection of undisclosed information from Indian perspective in Pandey S 'Legal Regime of Undisclosed Information' paper downloadable link at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=965049 visited on 22 July 2009. 'Know-how' is clearly not regarded as having proprietary interest in EEC, Corones S G 'The European Commission's Approach to Know-How Licensing' (1984) I. C. L. Q. 181, at p.189. More frequently 'know-how' is considered as "Cinderella's right" added to the patent licence, or mixed patent and know-how licence, and also becomes part of the learning curve of the licensee, without having determine whether it has any

Know-how licensing is as important as patent licensing and the protection will be very important for industrial development.[238] In 'know-how' licensing the licensee has to be shown how to make an effective use of the information by proper practicality as well as its operation rather than simply disclosing the information only.[239] The requirement of "secret, substantial and identifiable" are likely similar to the requirements for establishing breach of confidence. However, the requirement for establishing know-how is rather more stringent than the requirement for breach of confidence; in that "experiencing and testing" seem rather problematic in application because it needs to show some practicality before establishing know-how, and is more relevant to the manufacturing of products – the sphere of Reg 772/2004. Furthermore, the information resulting from "experiencing and testing" may not always be considered as confidential because it is likely difficult to maintain its secrecy.

Based on the provisions discussed above, there seems to be a common understanding of the law of confidence although TRIPS is the only instrument obliging protection at the international level. The international and European attitudes are important towards the protection of cross-border flow of information as mentioned by Hull. It is also evident from the Commonwealth jurisdictions that the protection for breach of confidence has been developed successfully, for example Australia and Malaysia; Scotland has no rules of equity, but it recognises breach of confidence.[240] The position under EU competition law reflects a common understanding of valuable know-how, albeit rather strictly defined.

## 3.3 Requirements for protecting confidential information

Using Megarry J's cause of action[241] to provide a structure for nanotechnology confidential information, this section examines what is considered as necessary quality of confidence; including what types of nanotechnology information might be protected by breach of

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substantial value, see further discussion in Castro-Edwards K 'Know Your Know-How' (2009) J.I.P.L.P, Vol 4. 81.

[238] Whish R *Competition Law* 6th edn (Oxford, OUP, 2008) at p.766. Corones, argues that licensing agreement in 'know-how' should be given considerably a greater detail from the economic perspective rather than purely legalistic analysis, n. 237, at p.189.

[239] Hull 2009, n, 221, at p.206.

[240] See for example Colston and Galloway, n.217, at p.233.

[241] Extensively cited by Lord Griffiths in Spycatcher [1990] 1 A.C. 109, at 268; Lord Nicholls of Birkenhead in Campbell v MGN Ltd [2004] UKHL 22; [2004] A.C. 457, at 13; Lord Hoffmann in Douglas v Hello! Ltd (No.3) [2007] UKHL 21; [2008] 1 A.C.1, at 14.

confidence; what is considered an obligation of confidence for nanotechnology information; how might unauthorised use be considered in the context of nanotechnology information especially since it involves collaborative research.

### 3.3.1 Necessary quality of confidence

The information *"must have the necessary quality of confidence*".[242] In other words, the information *"must not be something which is public property and public knowledge."*[243] Thus, types of confidential information, the confidentiality level and when the confidentiality is lost are important in determining the necessary quality of confidence.

#### 3.3.1.1 Types of confidential information

There are varying types of information which are protected under the law for breach of confidence. Trade secret protection is normally given to the information which has industrial and commercial value[244] such as chemical formulae;[245] technical formulae;[246] manufacturing processes;[247] encrypted programmes;[248] price lists;[249] customer lists,[250] customers' identities

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[242] Lord Greene MR in Saltman Engineering (1948) 65 RPC 203, at 215.
[243] Ibid.
[244] Notes from the WIPO Model Law secret information includes manufacturing and commercial secrets information such as production methods, chemical formulae, drawings, prototypes, sales methods, distribution methods, contract forms, business schedules, details of price agreements, consumer profiles, advertising strategies, lists of suppliers or clients, computer software and databases, at 6.16.
[245] For example medicinal formulae in Morison v Moat (1851) 9 Hare 241, 68 ER 492; Schering Chemicals Ltd v Falkman [1981] 2 All ER 320. In nanotechnology, an example is a chemical formulae of fuel-borne catalyst based on cerium oxide which able to save fuel and to reduce the emission of the gas. This example has been developed by Oxonica Company; a nanotechnology company spins out from the University of Oxford, see n.108. Another example is where a team of scientists from the Newcastle University and Liverpool University use nanoporous material to trap and store hydrogen gas that can be used in fuel cell car engine, see http://www.ncl.ac.uk/press.office/newslink/item/1097846725, 15 Oct 2004, accessed 20 April 2011.
[246] For example technical formulae relating to heating machinery in Industrial Furnaces Ltd v Reaves [1970] R.P.C. 605; technical formulae for anti-theft car device in Electro Cad Australia Pty Ltd & 2 Ors v Mejati RCS Sdn Bhd & Ors [1998] 3 A.M.R. 2555; [1998] 3 C.L.J. Supp 196 (HC). The example of nanostructure manufacturing process of metal alloy, interviewee A; and using small devices like dendrites in the drug delivery system in human body, interviewee C.
[247] For example manufacturing process of copper foil for printed circuits in Yates Circuit Foil Company and Another v Electro foils Ltd and Another [1976] F.S.R 345; manufacturing process for making plastic coated metal pipes in InTechnology B.V and Others v Unicorn GmbH Plastmaschinen and Others [1995] F.S.R. 765; manufacturing process for mosquito coil machine in Yeohata Industries Sdn Bhd & Anor v Coil Master Sdn Bhd & Ors [2001] 6 C.L.J. 418 see also Australian case for example Mense and Ampere Manufacturing Co Pty Ltd v Milenkovic [1973] V. R. 784 concerning the process of making a die for wall plugs. Nanotechnology example is the new technique of developing microchips using diamond, interviewee B.

and preference, traders' identities and business consultancy techniques,[251] and other information of a technical character such as the design of moped engine.[252] Equally the court does not treat less significantly other information, for example government secrecy[253] or personal information.[254] The varying nature of "confidential information" according to Howe et al. *"embraces a wide spectrum of types of valuable information, whose relative value, duration of value or shelf-life, character and importance vary enormously."*[255]

The wide spectrum of information protected suggests that there is no strict rule for the information to be treated as confidential as long as it is not "trivial tittle-tattle"[256] or immoral information.[257] Therefore, the law of confidence can easily fit in to protect nanotechnology. There are different types of nanotechnology information which might be protected under the law of confidence including devices or the design, manufacturing processes, methods of application of the materials as indicated above. Other examples include using quantum dots as markers for labelling purposes.[258] Further examples of nanotechnology information can be traced from the interviews conducted in this research such as the manufacturing process of

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248 Mars UK Limited v Teknowledge Limited [2000] FSR 138. Under the Seventh Framework Programme (FP7) for example the Alternative Routes Towards Information Storage and Transport at the Atomic and Molecular Scale (ARTIST) is a completely new nanoscale technology project for information processing and storage for efficient inter-molecular communication and compatible data storage, available at http://cordis.europa.eu/fetch?CALLER=FP7_PROJ_EN&ACTION=D&DOC=2&CAT=PROJ&QUERY=0126f694df5a:1dbd:32ca2052&RCN=93599, accessed 20 April 2011.

249 For example Certact Pte Ltd v Tang Siew Choy & Ors [1991] 3 C.L.J. 2269 (HC).

250 For example Robb v Green [1895] 2 QB 315; Schmidt Scientific Sdn Bhd v Ong Han Suan & Ors [1998] 1 C.L.J. 685. Nanotechnology example given by interviewee B.

251 Stephenson, Jordan & Harrison Ltd v MacDonald & Evans (1951) 68 R.P.C. 190. Nanotechnology example is the information about manufacturing contract in microsystem and electronic devices, interviewee B.

252 Coco v Clark [1969] RPC 41. Nanotechnology example is the technical character on the design of biocompatible dendrimers for cancer diagnosis and therapy, see for example Cheng Y et al. 'Design of Biocompatible Dendrimers for Cancer Diagnosis and Therapy' (2011) 40 Chem. Soc. Rev. 2673 at p.2676.

253 For example concerning state secrecy in AG v The Observer Ltd [1989] A.C. 109.

254 Prince Albert v Strange [1849) EWHC Ch J20; (1849) 2 De Gex & Sim 652; Campbell v MGN [2004] 2 A.C. 457; [2003] QB 633; Murray v Big Pictures (UK) Ltd [2008] EWCA 446; WXY v Gewanter [2012] EWHC 496 (QB).

255 Howe R et al. *Confidential Information and the Database Right* in Goulding P (ed*) Employee Competition* (Oxford: OUP, 2007), at p.93.

256 Coco v Clark [1969] R.P.C. 41 at 48, Per Megarry J *"equity ought not to be invoked merely to protect tittle-tattle, however confidential"*; Spycatcher [1990] 1 A.C. 109 (HL) at 282 Per Lord Goff *"the duty of confidence applies neither to useless information, nor to trivia"*; Douglas v Hello [2007] UKHL 21 Per Lord Walker *"the law of confidence does not protect trivia"*, at 83.

257 Stephens v Avery [1988] Ch. 449, at 453.

258 Quantum dots or semiconductor nano-crystals have been introduced for bio-labelling purposes, see for example Parak W J 'Labelling of Cells with Quantum Dots' (2005) Nanotechnology R9 – R25, at p.R.10; see also the use of quantum dots for imaging, labelling and sensing, Medintz et al., n.106, at p.442.

making aerogels from rice husk, the methods of application of zeolite materials[259] new techniques of developing microchips using diamonds,[260] identification of research information related to Microelectromechanical Systems (MEMs) on nano-wires, making devices mimicking the nature known as "bio-mimetic", NDA for students doing research in the university concerning nanotechnology;[261] and nano-structure techniques for making orthopaedic devices for arms and joint replacement.[262]

Case law on breach of confidence suggests that the cause of action will protect similar range of secrets as in macro-world and the dynamic nature of breach of confidence is flexible enough to serve nanotechnology and is especially suitable for nanotechnology because it moves fast. In particular and unlike patents or (until recently) trademarks, the law of confidence does not distinguish between products, goods, materials, processes and services.

### 3.3.1.2 Confidentiality or secrecy

To establish the action for breach of confidence, the party has to prove that the information must have a "confidential" or "secret" quality (or "private" in the case of personal information in the UK). The determination of this is decided on a case by case basis. The courts are not willing to rely on any accepted general meaning of the terms, because confidential or secrecy are chameleonic.[263] The interpretation may cover any information which has been transmitted in confidence and, not necessarily absolute confidence, it is sufficient to treat for relative secrecy.[264]

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[259] Interviewee C.
[260] Interviewee B.
[261] Interviewee D.
[262] Interviewee A.
[263] Finn P D *Fiduciary Obligations* (Sydney: Law Book Company, 1977), at p.148; *"the courts have not fleshed-out the meaning of "confidential"*, Aplin T 'The Development of the Action for Breach of Confidence in a Post-HRA Era' (2007) I.P.Q. 19, at p.21, *"the source of definition is difficult to find"*, Hull, 2009, n. 221, at p.205.
[264] For relative confidentiality see Franchi v Franchi [1967] R.P.C. 149, at 153; Schering Chemicals Ltd v Falkman [1982] Q.B. 1 at 28 and 37; Stephens v Avery [1988] Ch 449, at 454, Spycather [1990] 1 A.C. 109 (HL) at 282.

The court has established that the quality of confidence should involve *"some product of the human brain which suffices to confer a confidential nature upon the information"*.[265] In nanotechnology, it may be potentially easy to establish the quality of confidence and secrecy of the information. This is because the scientists and engineers are engaging towards a new creation of research as well as building on existing research and looking for improvement. Undoubtedly, this involves considerable product of human brain as well as money and their laborious effort in reaching for the research's result. This type of nanotechnology information has the quality of confidentiality or secrecy. Therefore, while engaging with all of the research a lot of confidential and secret information may have been identified.

Furthermore, nano-material acts differently from material at macro-scale, and the properties change dramatically.[266] So long as information of this scientific discovery is being kept secret, nanoscale information will be treated confidential. In nanotechnology, because of the significant amount of money that has been invested, it is especially important to keep the scientific discovery confidential prior to scientific publication or patent application.

The test for confidentiality is that the information is not public property and public knowledge.[267] The effect of the information being imparted to the public domain and being a common knowledge of the public was confirmed in Spycatcher.[268] In this case, the confidential character was lost when the information was disclosed to the public, but essentially the court opined that the information will not be considered to have entered the public domain if accessible only by some members of the public. Lord Keith noted that:

> "all possible damage to the interest of the Crown has already been done by the publication of Spycatcher abroad and the ready availability of copies in this country".[269]

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[265] Per Megarry J in Coco v Clark [1969] R.P.C. 41.
[266] See 2.2.2.
[267] Saltman Engineering Co. Ltd v Campbell Engineering Co. Ltd, Lord Green MR (1948) 65 R.P.C. 203, at 215; Woodward v Hutchin [1977] 2 All E.R. 751; Seager v Copydex [1967] 1 W.L.R. 923, at 932.
[268] [1990] 1 A.C. 109; see also in Exchange Telegraph Co Ltd v Central News Ltd (1897) 2 Ch. 48, Stirling J stated that *"but the information was not made known to the whole world; it was no doubt known to a large number of persons, but a greater many more were ignorant of it"*, at 53.
[269] [1990] 1 A.C. 109 per Lord Keith at 260; the information is confidential if it is available to one person or group of people, and not generally available to others, provided that the information should not be available to others, Douglas v Hello (No.3) [2005] EWCA Civ 595; [2006] Q.B. 125, at 151; this point was not affected by appeal to the HL in OBG v Allan [2007] UKHL 21; [2008] 1 A.C. 1.

Lord Brightman refused to grant injunctions to the plaintiff on the basis that wide dissemination of the information had definitely caused it to enter into public domain and stated:

> "that as a result of that publication and the ensuing worldwide dissemination of the facts and surmises therein contained, the initial confidential quality of the contents of the book has been totally destroyed".[270]

Lord Goff added that:

> "in particular, once it has entered what is usually called the public domain ... the principle of confidentiality can have no application to it".[271]

In this regard, Lindsay J in Douglas v Hello (No.5) stated what is important is whether the information has the "basis of attributes of inaccessibility".[272]

The confidentiality remains as the section of the public have difficulty in obtaining the information, except under improper means.[273] Thus, in Coco v Clark [274], the court stated that *"there can be no breach of confidence in revealing to others something which is already common knowledge."*[275]

In O Mustad & Son v Dosen and Another,[276] the court refused to grant a permanent injunction to protect information, which had been confidential, after the purchaser of the originating company's assets had filed a patent which had been published. No evidence was adduced as to any other information which might have remained confidential.[277] Lord Buckmaster stated:

> "after the disclosure had been made by the appellants to the world, it was impossible for them to get an injunction restraining the respondents from disclosing what was common knowledge. The secret, as a secret, had ceased to exist".[278]

Similarly in Franchi v Franchi[279] once the information had been published in the foreign patent specification in Belgium, the confidentiality of information was lost.

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[270] [1990] 1 A.C. 109 per Lord Brightman at 265.
[271] Ibid, per Lord Goff, at 282.
[272] [2003] E.M.L.R. 31, at 701-702.
[273] Hull 1998, n.181, at p.50.
[274] [1968] F.S.R. 415.
[275] Ibid, per Megarry J at 419-420.
[276] [1964] 1 W.L.R. 109 but decided in 1928.
[277] Ibid; see also Stanelco Fibre Optics Ltd's Applications [2004] EWHC 2263; [2005] RPC 15.
[278] [1964] 1 W.L.R. 109.
[279] (1967) R.P.C. 149.

On the other hand secret information which is not in the public domain, but intended to be published in the near future may not have the necessary quality of confidence to be protected by an interlocutory injunction. In Times Newspaper plc v MGN Ltd[280] the second plaintiff was the publisher of Lady Thatcher's memoirs which was expected to be published on 10 October. The first plaintiff had been licensed to publish extracts of the book in the *Sunday Times* on the 10 October. However, on 5 and 6 October substantial extracts from the books appeared in the *Daily Mirror*. The plaintiffs claimed for copyright infringement, breach of confidence and an interlocutory injunction restraining further publication of the contents of the book. The court held that:

> "It is certainly not information which is confidential in the sense that the public is not intended to learn of it, because this is material which is intended to be published eventually, no doubt, as widely as an efficient publisher can procure.... whether that commercial interest in the exclusive right to publish this material is such as to confer on the material what has in law been described as the quality of confidentiality, seems to me doubtful".[281]

If the decision in Times v MGN is correct (which Hull doubts[282]) it could be problematic for research information which is intended for publication in scientific journals. However, it has probably been overtaken by the Court of Appeal's decision in Douglas v Hello[283] where the details of the wedding photos were intended to be published commercially have been recognised to have a quality of confidence.

However, access by others does not always mean that confidentiality is lost. Arguably, the proposition on the basis that once the information has been disclosed it loses its confidential character may not always be true because this is a question of degree.[284] There are factors which determine whether publication of the information destroys confidentiality such as facts of the case, the types of publication made and the nature of industry in which publication is made.[285] The court emphasised the question of degree in Franchi v Franchi,[286] where Cross J stated that:

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[280] [1993] E.M.L.R. 443.
[281] Ibid, at 446-447, per Sir Thomas Bingham MR.
[282] Hull 1998, n.181, at p.52
[283] N.272 above.
[284] Spycatcher [1990] 1 A.C. 109 at 177; Douglas v Hello! (No.6) [2005] EWCA Civ 595, at 105.
[285] Lavery P 'Secrecy, Springboards and the Public Domain' (1998) E.I.P.R. 93, at p.95.
[286] [1967] R.P.C.149.

> "It must be a question of degree depending on the particular case, but if relative secrecy remains, the plaintiff can still succeed".[287]

Thus, widely known information does not necessarily means that it is in the public domain as Shaw LJ observed in Schering Chemicals Ltd v Falkman Ltd[288] that:

> "though facts maybe widely known, they are not ever-present in the minds of the public. To extend the knowledge or to revive the recollection of matters which may be detrimental or prejudicial to the interests of some person or organisation is not to be condoned because the facts are already known to some and linger in the memories of others".[289]

The possibility that information may be known by a considerable number of people but still be protected by confidentiality is helpful in nanotechnology, because it is often devised by teams of researchers. Therefore as Hull has argued, the accessibility and availability of the information to the public does not simply mean the information has lost its confidentiality.[290] Although the information is accessible if it may be ascertained by reverse engineering,[291] or through product analysis,[292] it does not simply mean by purchasing the brochure of portable building enable them to build a building without constructing a prototype and relevant test on it.[293] Therefore, this is important in nanotechnology because it is not simply that the scientist would be able to reverse engineer (it is not easy to reverse engineer in nanotechnology) of the nanoscale product, or obtain information of certain nanoscale process, but he has to undergo a very complicated experiment over the process.[294] Therefore, the mere availability of nanotechnology information, to some extent will not make it lose its confidentiality, especially where important nanotechnology exhibits different properties from its macro-scale counterparts.

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[287] [1967] R.P.C. 149, at 152-153; see also Lord Keith in Spycatcher [1990] 1 A.C. 109, at 260; see also Hull 1998, n.181, at p.53.
[288] [1982] Q.B. 1.
[289] Ibid, at 28
[290] Information is still confidential if it could only be obtained by expenditure of times and effort to discover, Hull 1998, n.181, at p.53.
[291] Yates Circuits Foil Co. Ltd v Electrofoils Ltd [1976] F.S.R. 345; Mars UK Ltd v Teknowledge Ltd [1999] EWHC 226 (Pt) at 29-37.
[292] Ackroyds (London) Ltd v Islington Plastics [1962] .R.P.C 97.
[293] Terrapin v Builders Supply (Hayes) Limited [1967] R.P.C. 375; see discussion in Hull 1998, n.181, at p.53.
[294] As compared to other technology, it was viewed that to reverse engineer in nanotechnology is radically more difficult, Zekos 'Patenting Abstract Ideas in Nanotechnology' (2006) the J.W.I.P. Vol 9, No.1 113, at p.115. Even it can be obtained by reverse engineering as in Franchi v Franchi [1967] RPC 149 it does not necessarily means that the information is accessible to the public. But the court stated that the information of coin-receiving machine was not confidential since anyone could buy the machine and re-calibrate the machine to see how it worked in Mars UK Ltd v Teknowledge Ltd 1999] EWHC 226 (Pat) at 29-37.

However, if the information is disclosed to a large group so that too many people know about the information, it is very unlikely to maintain its quality of confidence.[295] This view was emphasised by Lord Denning in Dunford and Elliott Ltd v Johnson and Firth Brown Ltd[296] where he stated that:

> "this widespread use of the information drives a hole into the blanket of confidence: especially when the information is being used - or, shall I say misused – for the benefit of some potential shareholders, and not for the benefit of the others. So much so that it would not be reasonable that the stipulation for confidences should be enforced".[297]

The confidence is only lost after it has been transmitted into a relevant group of people who have some interest in knowing the information.[298] This situation, according to Lavery does not include "men on the street" because they do not have interest in knowing the information.[299] In that case, less extensive publication of the information is sufficient to destroy confidentiality if the information is having some interest to the group of specialised people such as foreign intelligence agencies or trade competitors who by all means can be expected to obtain the information even the information has been placed in an obscure place.[300]

In nanotechnology, there are analogies with the submission of scientific papers to a journal. The important question here is when the information loses its confidence; either when the article has been published in the scientific journal or when the article is sent to the editor? Applying Douglas v Hello!, albeit a case on personal confidence, the information is confidential if it is only available to one person or group, so long that this person or group[301] does not intend to disclose it to others. Similarly, applying the rules in Spycatcher the confidentiality is not lost when only a section of the public has access to the information. Thus, if for example the paper is merely sent to the editorial board, it does not necessarily mean that the confidential is lost. However, applying Dunford v Johnson, it is very difficult

[295] Especially relevant in the internet age, see n.200 above.
[296] [1978] F.S.R 143.
[297] Ibid, at 148-149; see also from Lord Goff in Spycatcher [1990] 1 A.C. 109 which argued that when too many people know, it is impossible to maintain its confidentiality *"means no more than that the information in question is so generally accessible that in all the circumstances, it cannot be regarded as confidential"*, at 282.
[298] Lavery, n.285, at p.93.
[299] Ibid, at p.93.
[300] Stanley P *The Law of Confidentiality: A Restatement* (Oxford: HP, 2008) at p.39.
[301] The readership of the journal sometimes may comprise a group of people, for example editor-in-chief, managing editors, editorial boards.

to maintain the confidentiality when too many people know about the information, which may be relevant to nanotechnology when several teams of individuals are involved. Nevertheless, as pointed in Franchi v Franchi, what is important is the question of degree, depending on the particular case. Based on these, it is clear that confidentiality is lost when the article has been published in the scientific journal, and not when it was sent to the editor, so long as the editor does not intend to disclose to the other person, for example if not accepted for publication. However, it is difficult to maintain the confidentiality if there are too many editors or scientists which have a particular interest in the information. But if the decision in Times v MGN is correct it could be problematic for research information which is intended for publication in scientific journals.

The 'quality of confidence' requirement need not be the same as in proving novelty for patentability. In Saltman Engineering Co. Ltd. v Campbell Engineering Co. Ltd,[302] the court stated that novelty is not a requirement for breach of confidence. In Coco v Clark,[303] Megarry J observed that *"novelty depends on the thing itself, and not upon the quality of its constituent parts. Indeed, often the more striking the novelty, the more commonplace its components"*.[304] However, in different situation the court requires that the information should have qualities of novelty and originality.[305] In De Maudsley v Palumbo and Others,[306] the plaintiff communicated his idea to the defendant of the features of a night club which were; (a) it would be legally open all night long; (b) large size of a "high tech industrial" warehouse style; (c) it would have separate areas for dancing, resting, socialising and VIP lounge; (4) enclosed dance area to ensure a good sound quality, light and excellent atmosphere; (5) it would employ top disc jockey from the UK and around the world. Knox J stated that all the features, except the first for it to be legally open all night long, lacked novelty and or were too vague for the information to constitute it being confidential.

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302 (1948) 65 R.P.C. 203; see also Under Water Welders v Street & Longthorns [1968] R.P.C. 498.
303 [1969] R.P.C. 41.
304 Ibid, at 47.
305 See, for example in Maudsley v Palumbo [1996] F.S.R. 447; Gupta v Dasgupta [2003] F.S.R. 18 Vijeder Jain J observed that *"the very concept of matchmaking by the plaintiff's concept of giving the choice to the bride was novel and original in thought and capable of being protected."*, at 352; see also in Coulthard v Disco Mix [1999] 2 All E.R. 457.
306 [1996] F.S.R. 447.

In relation to the patent protection, the law of confidence is very significant because the obligation that arises in confidence will secure against disclosure of the invention, without which it can be novelty destroying.[307] Thus, the action for breach of confidence is able to secure "novelty" for the new product, process and plays a pre-requisite part for patent protection.[308] Sir John Donaldson has considered breach of confidence as an "ice-cube" where he stated that:

> "confidential information is like an ice-cube: unless the other party agrees to keep it in his refrigerator by the time of trial it will be just a pool of water which neither party wants. It is the inherently perishable mature of confidential information which gives rise to its unique problems".[309]

There should be provided certain limit to the access of confidential information before the application for patents. This can be done in the form of express covenant, NDA which prevented the disclosure of confidential information before applying patents. The relation of confidentiality and patent law in the context of novelty of an invention has been considered by the court in <u>Lux Traffic Controls Limited v Pike Signals Ltd</u>,[310] on the issue whether prior disclosure had made the invention available to the public. In this case Aldous LJ examined that the minutes of a meeting did not clearly describe a system of the patent and did not make the invention known to the public. Furthermore, there was an obligation of confidence in a letter to the Department of Transport and the defendant had not established that the information in the letter was made available to the public. In <u>Miliken Denmark As v Walk Off Mats Ltd</u>[311] the Patent Court considered whether prior use would invalidate the patent, and held that a prior use does not invalidate the patent if it is merely a use which is "secret and uninformative". But it is not uninformative use if the use which enabled the invention to be performed.

Breach of confidence is thus useful on its own right, for example as mentioned above for secret manufacturing process like nanotechnology, and as "provisional protection" for

[307] Cornish W and Llewelyn D *Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights* (London: S&M, 2007), at p.308, n.19; see Sampson T 'Strategy Legal Thinking for IPR Dependent Enterprise – the "Five Rings" Method' (2009) E.I.P.R. 411, at p.415.
[308] Carty H 'An Analysis of the Modern Action for Breach of Commercial Confidence: When is Protection Merited?' (2008) I.P.Q. 416, at p.434.
[309] In <u>Spycather</u> [1988] Ch. 333, at 358.
[310] [1993] R.P.C. 107.
[311] [1996] F.S.R. 292.

patentable nanotechnology invention.[312] This is very important for the nature of new technology like nanotechnology, secrecy is the best protection before disclose of their new invention in patent.[313] Furthermore, breach of confidence can act as supplement to patent protection in terms of developing the ideas and protecting know-how surrounding the patent.[314] At early stages of the formulation of the project, as pointed out by Torremans that *"when a formal intellectual property right is a target, but one that has yet to achieved – that rights in confidential information may have their most valuable role to play"*.[315] This is extremely important for nanotechnology context in particular where the information involves processes.[316]

### 3.3.1.3 Protection of ideas or concept

The law of confidence protects ideas or concepts.[317] The question here is, does simplicity of an idea mean that it is not protected under the law of confidence? The court held that the simplicity of the idea does not mean that it is not protected.[318] In nanotechnology simple or extra piece of information can be protected, for example the information related to the development of building up multi-walled nanotubes; nanotechnology applications for food

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[312] Breach of confidence is alternative protection to patent protection particularly when secrecy is maintainable and short term protection is critical, Carty H 'The Common Law and the Quest for the IP Effect' (2007) I.P.Q. 237, at p.265; Binnie J noted that in the food industry recipe secrets were an area where trade secrets law rather than patent protection may be sought, such secrets potentially surviving longer than patent protection with its disclosure requirement in Cadbury Schweppes Inc v FBI Foods Ltd [2000] F.S.R. 491; United Nations Conference on Trade and Development, World Investment Report (2005) Transnational Corporations and the Internationalization of R&D, United Nations, New York and Geneva (2005) has also emphasised the importance of trade secret by stating that *"For R&D – and innovation in general – the most relevant types are patents and trade secrets. Trade secrets may in fact be even more important than patents for a country to be able to attract FDI in R&D. To the extent that R&D involves sensitive information, TNSc [transnational corporations] will always seek to protect trade secrets against disclosure"* at http://www.unctad.org/en/dosc/wir2005_en.pdf accessed on 7 January 2011, at p.209. Selection has to be made for new innovation either to be protected under breach of confidence or patent law, but not under both, Beckerman-Rodau A 'The Choice Between Patent Protection and Trade Secret Protection: A Legal and Business Decision' (2002) 84 J. Pat. & Trademark Off. Soc'y 371, at p.376. Trade secret will be opted over patent protected for small companies and start-up firms, Grusd J E 'Internet Business Methods: What Role Does and Should Patent Law Play? (1999) 4 VA. J. L. & Tech. 9, at p.49.

[313] This is because the function of patent as incentives to induce inventors to disclose their new invention rather than keeping them secret, Machlup F and Penrose E 'The Patent Controversy' (1950) 10 Journal of Economic History 1, at p.25.

[314] Carty, n.312, at p.246.

[315] Torremans, n.200, at p.256.

[316] Traditionally, the law of confidence has been used to protect secret processes used to manufacture products, Whaley S S 'The Inevitable Disaster of Inevitable Disclosure' (1999) 67 U. Cin. L. Rev. 809, at p.838; also pointed out in the interviews conducted in this study.

[317] But the court held that there is significant difference between concept and aspiration, Knox J in De Maudsley v Palumbo [1996] F.S.R. 447, at 456.

[318] Cranleigh Precision Engineering Ltd v Bryant and Another [1965] 1 W.L.R. 1293, Roskill J at 1309.

packaging;[319] or nanotechnology process in cosmetics for examples anti-ageing creams, make-up and moisturisers.[320] The simplicity or not of the idea is totally dependent on the case and the circumstances in which the claimant wishes to protect the idea. Megarry J in Coco v Clark[321] noted that *"the simpler an idea the more likely to be protected"*.[322] Helsham CJ stated that *"the more simple an idea, and more novel, given a high potential for profit, then the greater the risk, unless there is confidentiality when attempts are being made to find purchaser of the system"*.[323]

The ideas should not be vague[324] because *"vagueness and simplicity are not the same"*.[325] Therefore, to be capable of protection the idea must be sufficiently well developed to put into practice, therefore the general idea of a triple spiral device is not protected under the law, whereas the idea of the actual design is protected.[326]

The claimant needs to show that the idea is not common knowledge, and the idea needs to be realised because if the law is to protect in very general ideas, this would rather impose unjustifiable obligations onto those who receive the information.[327] In Fraser v Thames Television Ltd,[328] Hirst J said that *"to be capable of protection the idea must be sufficiently developed, so that it would be seen to be a concept that has at least some attractiveness for a television programme and which is capable of being realised to actuality"*.[329] Similarly, the court granted the action for breach of confidence for an idea of a new concept for a TV series in Talbot v General TV Corp Pty Ltd[330] because it was capable of being realised in actuality.

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[319] Chaudry Q 'Safety and Regulatory Implications of Nano (Health) Foods' presented at Nanotechnology and the Law: The Legal Nitty-Gritty for Nano Foods, Nanocosmetics and Nanomedicines, Leuven 8-9 Dec 2008, available at http://www.law.kuleuven.be/imer/IX%20Cahudry.PDF accessed on 5 January 2009.
[320] Bowman D and Van Calster G V 'Flawless or Fallible? A Review of the Applicability of the EU's Cosmetics Directive in Relation to Nano-Cosmetics' presented at Nanotechnology and the Law: The Legal Nitty-Gritty for Nano Foods, Nanocosmetics and Nanomedicines, Leuven 8-9 Dec 2008, available at http://www.law.kuleuven.be/imer/V%20Bowman%20&%20van%20Calster.PDF accessed on 5 January 2009.
[321] [1968] F.S.R. 415.
[322] Ibid, at 420
[323] Wheatley v Bell [1984] F.S.R. 16, at 18.
[324] De Maudsley v Palumbo [1996] F.S.R. 447, at 456 (except that the club would be legally open all night, all the ideas were vague and not original); Intelsec Systems v Grenchi-Cini [1999] 4 All E.R. 11, at 31 (the ideas for the flame detection and smoke detection were too vague).
[325] Knox J in De Maudsley v Palumbo [1996] F.S.R. 447, at 456.
[326] Sales v Stromberg [2005] EWHC 1624 (Ch); [2006] F.S.R. 7.
[327] Bently and Sherman, n.211, at p.1012.
[328] [1984] 1 Q.B. 44.
[329] [1983] 2 All E.R. 101, at 121.
[330] [1981] R.P.C. 1, at 9.

Capable of being realised in actuality means that the idea must be capable to be put into *"a finished product in the relevant medium"*.[331]

Apart from that, the court will also consider the usage or practices of particular trade or industry concerned, to determine whether the information is confidential or not.[332] In Fraser v Thames TV[333] Hirst J considered that trade usage *"is the factor of considerable force in deciding whether a legal obligation exists"*.[334]

The cases above highlighted that the idea should not be vague, but does not mean that it should not be simple. Therefore, in nanoscale example of idea the simple idea of transforming the tweezers in medical application at nanoscale may be protected[335] or the idea of the light detection at nanoscale[336] potentially attracts confidentiality. These ideas of nanoscale would be sufficiently developed, and capable to realise in actuality, and at least have some attractiveness. The trade usage or practices of nanotechnology will also be considered in determining whether the information is confidential or not.

#### 3.3.1.4 Springboard doctrine

The disclosure of information to the public will not make the other party liable for breach of confidence to use it. However, there is an exception to this rule called the "springboard doctrine." This springboard doctrine imposes an obligation on the person to maintain confidentiality for a certain period of time even after transmission of the information to the public by the wrongdoer. The rule was derived from Terrapin Ltd v Builders Supply,[337] which concerned a new type of portable building of manufacture developed by plaintiffs and defendants. The plaintiffs alleged that the defendants had breached confidence by using the information to develop new products and therefore sought to claim for an interlocutory

[331] De Maudsley v Palumbo [1996] F.S.R. 447, at 456.
[332] Per Sir Robert Megarry V.-C in Thomas Marshall (Exports) Ltd v Guinle [1979] Ch. 227 stated that *"the information must be judged in the light of the usage and practices of the particular industry or trade concerned"*, at 428.
[333] [1984] Q.B. 44.
[334] Ibid, at 65.
[335] Interviewee A.
[336] Interviewee D.
[337] [1967] R.P.C. 375.

injunction to restrain the defendants from selling the product. In this case Roxburgh J said that:

> "that a person who has obtained information in confidence is not allowed to use it as a springboard for activities detrimental to the person who made the confidential information, and a springboard it remains even when all features have been published or can be ascertained by actual inspection by any member of the public".[338]

In Seager v Copydex Ltd,[339] Lord Denning MR in determining either public or private information observed that:

> "when the information is mixed, being partly public and partly private, then the recipient must take special care to use only the material which is in the public domain. ... He should not get a start over others by using the information which he received in confidence".[340]

Salmon LJ clearly adopted the principle in Terrapin and held that *"the law does not allow the use of such information even as a spring-board for activities detrimental to the plaintiff".*[341]

The law prevents the confidant from using the confidential information as a springboard without paying for the laborious effort, time and skills in devising the information. Commenting on this judgement, Gurry however opines that this doctrine is uncertain on the ground that it prohibits confidant from *ever* using the confidential information even after it ceased to have effect of its confidentiality character.[342] In this respect, although the person might not realise that the information is confidential, the court insisted that once he is aware, he must stop using the information.[343] In different instances, if the plaintiff himself has disclosed the information to the public, he cannot claim that the springboard doctrine operates.[344] In order to balance the interest of the defendant this doctrine is only applicable for a limited period of time as Lord Denning M.R stated in Potters-Ballotini Ltd v Weston-Baker[345] that:

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[338] Ibid, at 391 which was adopted by Roskill J in Cranleigh Precision Engineering Ltd v Bryant [1965] 1 W.L.R. 1293, 1317-1319.
[339] [1967] 1 W.L.R. 923.
[340] Ibid, at 931-932.
[341] Ibid, at 933.
[342] Gurry, n.180, at pp.245-246. He adds the prohibition on the confidant was only for specific context and does not continue when the information has lost its confidentiality character, at, p.248.
[343] Lord Denning M.R. in Fraser v Fraser [1969] 1 All E.R. 8, at 11.
[344] See for example Mustad v Dosen [1963] R.P.C. 41; Franchi v Franchi [1963] R.P.C. 41.
[345] [1977] R.P.C. 202.

> "although a man must not use such information as a springboard to get a start over others, nevertheless that springboard does not last forever. If he does use it, a time may come when so much has happened that he can no longer be restrained. That is another point of difficulty."[346]

May J in American Cyanamid's[347] considered that interim injunctions can be granted to prevent defendants from obtaining information as a headstart or springboard to the detriment of the person who provided the information. However, the "springboard" interim injunction should not provide the injured party with more protection than necessary, with a view to discourage or prohibit legitimate competition of the business. This is because the purpose of the injunction was to protect the plaintiffs, and not to punish the defendants.[348] The court also put a question that in granting the injunction, the court should ask that whether any injunction should be subject to a time limit other than the usual "until trial or further order" and for what period such injunction should be so limited.[349]

The speed of nanotechnology development emerges dramatically. The springboard doctrine is important because it preserves the interest of the plaintiff and at the same time encourages competition. When the speed of development is so rapid, this situation tends to encourage one party to use nanotechnology information as a headstart for other information without using his laborious effort. Therefore, the injunction can be applied to prevent the other party from taking information to the detriment of the 'owner' of the confidential information. It should be limited in time, by not allowing it to continue in its effect.

### 3.3.1.5 Objective and subjective test

Objective and subjective tests have been adopted by the courts to assess the quality of confidence. The objective test concerns what a reasonable person would consider to be confidential and for subjective test, what the owner himself believes to be confidential. In De

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[346] [1977] R.P.C. 202, at 206-207; see also Harrison v Project & Design [1978] F.S.R 81, at 87, Graham J agreed that springboard doctrine must be regarded as one of limited duration; also Fisher-Karpark Industries Limited v Nichols [1982] F.S.R. 351, followed in Roger Bullivant Ltd and Ors v Ellis and Ors [1987] F.S.R 172, at 184.
[347] American Cyanamid v Ethicon [1975] A.C. 396.
[348] Nourse L J in Roger Bullivant Ltd and Ors v Ellis and Ors [1987] F.S.R 172, at 182.
[349] Roger Bullivant Ltd. And Others v Ellis and Ors [1987] F.S.R. 172, at 188.

Maudsley v Palumbo[350] Knox J held that the test that imposes a duty of confidence is an objective test. The person must have taken steps to make that his information secret, or he has "secured" the information within a confidential relationship or he has taken steps to limit the access to the confidential information.[351] In Cray Valley Ltd v Deltech Europe Ltd[352] the party did not mark the information as confidential, and no attempt had been made to limit access to the confidential information or to control its use. The court held that the information was not capable of attracting the protection under the law of confidence – because the "desultory efforts" made to prevent the information from entering the public domain were not sufficient.[353]

In certain situations, the court has adopted both the objective and subjective tests in determining the confidentiality of a company's secret information. For example in Thomas Marshal Exports Ltd v Guinle[354] Megarry V.-C laid down four elements in the context of industrial or trade setting in identifying confidential which were:[355]

(a) the owner believes that the release of the information would be injurious to him or advantage to his rival;
(b) the owner believes that the information is confidential;
(c) the belief must be reasonable;
(d) the information must be judged in light of the usage or practices of the industry or trade concerned.

In observing this case, Hull comments that the subjective test must be treated with caution because the courts still emphasise the objective test.[356] Hull cites Ansell Rubber Co. Pty Ltd v Allied Rubber Industries Pty Ltd[357] and states that all considerations must be taken into

350 [1996] F.S.R. 447.
351 Carty, 2008, n.308, at p.429.
352 [2003] EWHC 728 (Ch).
353 Ibid, at para 61-62.
354 [1979] 1 Ch. 227.
355 [1979] 1 Ch. 227; [1978] 3 All E.R. 193, at 209-210.
356 Hull 1998, n.181, at p.49.
357 [1972] R.P.C. 811, at 825, Gowan J suggested the following guidelines *"There is little in these English cases enable one to identify a "trade secret". But some collation of the characteristics may be attempted, without trying to make it an exhaustive statement. Its subject matter may not be a process in common use or something which is public property and public knowledge, but if it is the result of work done by the maker upon materials which may be available for the use of anybody, so as to achieve a result which can only be produced by somebody who goes through the same process, it will be sufficient. All of its separate features may have been published, or capable of being ascertained by actual inspection by any member of the public, but if the whole*

account for example how the parties wish to treat the information, the practices and usages of the trade will also be a guideline.[358] This is because simply labelling non-confidential information as *"secret"* is not accepted because it does not mean that the information is secret.[359]

In Lancashire Fires Ltd v S.A. Lyons Ltd[360] Carnwath J refused to adopt a subjective test and stated:

> "The subjective view of the owner cannot be decisive. There must be something which is not only objectively a trade secret, but which was known, or ought to have been known, to both parties to be so. The normal presumption is that information which the employee has obtained in the ordinary course of his employment, without specific steps such as memorising particular documents, is information which he is free to take away and use in alternative employment".[361]

In nanotechnology, scientists and technologists must have taken steps to secure their confidential information, for example by applying secret encrypted code to access the data, or locked the information with special and limited accessible code, or by having limited access to their experimental laboratories or experimental processes.[362] They can also mark the information in their research or in the lab as confidential with limited access, or they can limit the control and use of the confidential information. They should also believe themselves that the information is confidential and disclosure of such information would be injurious to them. They should also believe that the public does not have accessed to the information. They have reasonably believed to secure and protect the information from being disclosed.

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*result has not been achieved, and could not be achieved, except by someone going through the same kind of process as the owner, it will not fail to qualify by reason of the publication… There is no suggestion of the need for invention. Little can be gathered of the degree of secrecy required beyond what is implied in what is said. But it is a fair inference from what is said that the [plaintiff] must have kept the matter to himself and from his competitors"*. In the context of nanotechnology, the subject matter involves at nanoscale seems unlikely in a common use, and public property or public knowledge because only the scientists and technologists who works with the subject matter. In order to achieve the result, the scientists and technologists have to go through the experiment and laboratory works. Although subject matter at nanoscale may be published or inspected later, but the whole results have not been achieved or could not been achieved yet, except with the same process of determining subject matter at the nanoscale, it does not fail to qualify confidentiality.

[358] Hull 1998, n. 181, at p.47, cites Drake Personnel v Beddison [1978] V.R 13 per Anderson J at 20.

[359] Hull, 1998, n.181, at p.49, cites Wright v Gasweld Pty Ltd [1991] 20 I.P.R. 481 at 490-491.

[360] [1996] F.S.R. 629; see also Carflow Products (UK) Limited v Linwood Securities (Birmingham) Limited [1996] F.S.R. 424, Jacob J recognized two approaches of objective and subjective test. He identified the objective test as relating to the action in contract; on the basis that the obligation of confidence is equitable, he emphasized the subjective view was that *"equity looks to the conscience of the individual"*, at 428. See Clark S 'Circumstances Importing an Obligation of Confidence: A Subjective or Objective Test? (1996) E.I.P.R. 632.

[361] [1996] F.S.R. 629, at 656.

[362] See also Stokes S 'Intellectual Property and Technology Issues' (2010) C.O.B.1, at p.18.

### 3.3.2 The obligation of confidence

The information must be imparted under circumstances of an obligation of confidence. The obligation of confidence may arise in different situations such as contractual obligation (either express or implied), equitable principle and to some courts are willing to deal with proprietary rights in the information.[363] In the early cases, judges confusedly treated contract, trust, equity, property as the basis of the decision.[364] As discussed above, the flexibility and dynamic nature of breach of confidence suggests that it well suited to such new fields like nanotechnology.[365] Furthermore, flexibility and pragmatism may be essential in a field characterised by collaboration between researchers from different science disciplines and working for different types of organisation for example universities, industrial companies, government research centres etc. It was stressed too in this study by the interviews that there are differing approaches of confidentiality, for example government employees may have official secrets obligation in addition to contractual and equitable ones. Although this section mainly considers obligation of confidence in relation to trade secret, it also spans the government information and personal confidences.

#### 3.3.2.1 Contractual obligation – express and implied terms

In many instances, parties may use an express terms to define clearly a contractual obligation. The obligation of confidence is imposed on parties either by means of express contractual obligation such as confidentiality terms in the contract, NDA, technology transfer agreements or know-how agreement. In nanotechnology, because of the research is still emerging, there are lots of collaborative research involved in nanotechnology using university facilities or collaboration between different institutions such as universities, industry and government. The contractual obligation arises in term of NDA between employer and employee, or other contractual agreement which stipulates the terms of confidentiality in the contract. The use of these and their terms may vary across the university-government-industry relationships. The express terms sometimes provides that the information will not be transmitted except for the purpose stipulated only. This means that

[363] Gurry, n.180, at pp.25-57.
[364] For example Prince Albert v Strange (1894) 41 All E.R. 1171.
[365] See 3.1.

the information will only be disclosed according to the terms prescribed in the contract.[366] The confidence is breached when the party has imparted the information beyond the terms in the contract and has disclosed the information to the unauthorised party.[367] Thus, it may be important to try to stipulate this in advance when the research ethics of a collaborative project are being worked out.

However, in the absence of any expressed terms either in written, oral or any other forms which could denote clearly the confidentiality duties of the parties, the court is willing to interpret an implied duty of disclosure to prevent unauthorised use and disclosure. The effect was emphasised by Lord Green Saltman Engineering Co. Ltd v Campbell Engineering Co. Ltd,[368] that *"the law will imply an obligation to treat that confidential matter in a confidential way as one of the implied terms of the contract"*[369] and not to use the information other than for the purpose for which it was imparted, nor make unauthorised disclosure to third parties. The courts infer the effect of the obligation as Lord Bowen LJ observed in Lamb v Evans.[370]

As to the test whether or not the information is bound by a duty of confidence, in Coco v Clark[371] Megarry V.-C stated that:

> "It seems to me that if the circumstances are such that any reasonable man standing in the shoes of the recipient of the information would have realised that upon reasonable grounds the information was being given to him in confidence...".[372]

This reasonable person test possibly works well with the objective approach that the recipient ought to have known that the information was disclosed to him in confidence.[373] This is a good basis for scientists or technologists they ought to have realised that upon reasonable ground that the information was imparted to them in confidence. For example, if a NDA

366 See Cornish and Llewelyn, n.307, at pp.321-323.
367 See for example Exchange Telegraph Co. v Gregory & Co [1896] 1 Q.B. 147.
368 1948] 65 R.P.C. 203.
369 Ibid, at 211.
370 [1893] 1 Ch. 218, at 229.
371 [1969] R.P.C. 41.
372 Ibid, at 48; see also Interfirm Comparison v Law Society [1975] R.P.C. 137, at 151; Yates v Electrofoils [1976] F.S.R. 345; applied in Haw Par v Jack Chiarupark [1991] 2 M.L.J. 428; [1993] 3 S.L.R. 285.
373 Hull 1998, n.181, at p.109.

stipulates clearly that information related to nanotechnology should not be imparted without authorisation.

In absence of express agreement, the court would rely on the circumstances of a contract to imply the obligation of confidence. The implication of terms in contract has been considered by the House of Lords (HL) in Liverpool City Council v Irwin.[374] The county court held that the landlord council were under an implied duty to keep the structure of the residential block in repair as well as common parts, and the council were in breach of that duty. In the HL, Lord Wilberforce stated that for the existence of an obligation between landlord and tenants in relation to the stairs, lifts and chutes, the test was one of necessity, and no more. The implied obligation on the council in relation to the common parts was to take reasonable repair to ensure usability with the conditions that the tenants themselves had their responsibilities according to what a reasonable set of tenants would and could do for themselves.[375]

However, the court may be trying to adopt a new approach to the objective meaning of an implied term; departing from the normal test of "necessary to give business efficacy". In AG of Belize v Belize Telecom Ltd[376] the question arise as to an implied term in a company's articles of association allowing for the removal of officers. In the Privy Council, Lord Hoffmann observed that in determining the implied term in the contract, the question was *"whether such provision would spell out in express words what the instrument, read against the relevant background, would reasonably be understood to mean?"*[377] Lord Hoffmann stated that:

> "the instrument may not have expressly said so, but this is what it must mean. In such a case, it is said that the court implies a term as to what will happen if the event in question occurs. But the implication of the term is not an addition to the instrument. It only spells out what the instrument means".[378]

In considering what the instrument meant Lord Hoffmann added that the:

[374] [1976] 2 W.L.R. 562; [1977] A.C. 239
[375] The court considered business efficacy as per Lord Cross, at 258; see also Tai Hing Cotton Mill Ltd. Appellant v Liu Chong Hing Bank Ltd. [1985] 3 W.L.R. 317; [1986] A.C. 80 at 91.
[376] [2009] UKPC 10; [2009] 1 W.L.R. 1988.
[377] Ibid, at 1994.
[378] Ibid.

> "meaning is not necessarily or always what the authors or parties to the document would have intended. It is the meaning which the instrument would convey to a reasonable person having all the background knowledge which would reasonably be available to the audience to whom the instrument is addressed".[379]

Lord Hoffmann referred to other relevant test for the implications of terms such as that implied term must "go without saying" or that it must be "necessary to give business efficacy to the contract" or that it must be capable of clear expression and it must not contradict to any express term of the contract. However, he added that these tests laid down before were not to be treated as different or additional test to the question that he asked above. Thus, in this case:

> "the implication is required to avoid defeating what appears to have been the overriding purpose of the machinery of appointment and removal of directors, namely to ensure that the board reflects the appropriate shareholders interests in accordance with the scheme laid out in the articles".[380]

The court should find the meaning of any documents or any background facts and consider whether the meaning would convey to a reasonable man. In this case, Lord Hoffmann seems to be extending the "purposive approach" from interpretation of express terms[381] to identification of implied terms. The cases provide helpful consideration for nanotechnology because, as in Liverpool, it was stated that the test is necessity, that the obligation arises should not exceed of what is necessity. Similarly, Belize seems to combine both business efficacy and purposive test that could generally be applied to nanotechnology. This integrative approach is very useful for nanotechnology for its multiple especially in terms of available material for enquiry purposes. For nanotechnology, a possible approach for the court to consider for the purpose of the contract is to maintain the interests of the different parties involved, for example those scientists or engineers from different backgrounds – chemistry, electronics, mechanical, manufacturing and medical. It may be necessary to balance university researchers' need to publish against industry's preference for patenting rather than secrecy, or a government's wish to publicise breakthrough widely with researchers' interest in using specialist journals to disseminate their work.

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[379] [2009] UKPC 10; [2009] 1 W.L.R. 1988, at 1994

[380] Ibid. The principle in this case was applied in Mediterranean Salvage and Towage Ltd v Seamar Trading and Commerce Inc: The Reborn [2009] E.W.C.A. Civ 531.

[381] Deutsche Bank [1996] 1 Lloyd's Rep. 113, Lord Steyn held that *"it is true that the objective of the construction of contract is to give effect to the intention of the parties. But our law of construction is based on an objective theory. The methodology is not to probe the real intentions of the parties but to ascertain the contextual meaning of the relevant contractual language. Intention is determined by reference to expressed rather than actual intention"*, at 122.

The same principle also applies in the employment contract where an employee is under obligation to maintain confidentiality either based on express or implied terms during the subsistence of the employment contract. The obligation between employer and employee may be transformed into express employment contract, for example restraint of trade covenant or NDA. In nanotechnology, the employment contract may arise between university, industry and government collaboration. This collaboration in nanotechnology potentially poses problems in assessing the obligation of confidence; it could be either a direct or an indirect obligation of confidence.

There are two situations that involve the contract of employment, the obligation during the subsistence of the contract of employment, and the obligation when the contract of employment has ended. There is very clear principle that during the subsistence of the contract, the employee is under obligation to keep the information in secret and a under duty not to disclose or use the information received to the disadvantage of his employer, he is not allowed to compete with his own employer during the employment period[382] and he is bound to disclose information which he receives qua employee from outside sources to his employer.[383]

The obligation of confidence from an implied term of the employee not to disclose the information to the unauthorised user was considered by Lynskey J in Bents Brewery Ltd v Hogan.[384] The employee also should reasonably expect that the information was disclosed to him in confidence. In Yates Circuit Foil Co. and Another v Electrofoils Ltd and Another[385], the court found no circumstances indicating that the operation of the plant design, plant construction or methods of running or maintenance were supposedly secret, and the employees were not told anything when they joined the plaintiffs' company that the plant were secret. This could be averted in nanotechnology case by expressly advising participants of confidentiality as mentioned by interviewee[386] in context of student NDA.

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[382] For example in Thomas Marshall Ltd v Guinle [1978] 3 All E.R. 193, the managing director has set up his own company in competing with employer's business and he was found in breach of his good faith and fidelity.
[383] Gurry, n.180, at p.179.
[384][1945] 2 K.B. 570; [1945] 2 All E.R. 570, at 576.
[385] [1976] F.S.R. 345.
[386] Interviewee D.

The employee is under a duty of good faith and fidelity not to disclose confidential information to an unauthorised party.[387] In Lamb v Evans[388] the employees collected materials during their employment to be used in their new company. The court granted an injunction to restrain the defendants from using the materials.[389] Another employer was entitled to claim for injunction and damages from the manager of the company who had secretly made a copy of the customer list purposely to be used in his own company.[390]

As above discussed, in the university researcher relationship for example, the researcher is restrained from using any materials which have been obtained to be used in new company/institution. The university should specify the confidential character of those materials that have been used for research purposes. However, if the researcher has secretly made a copy or obtained the materials that can later be used in other company/institution, the university will have right to claim for injunction or damages caused. This is because at the time of the agreement of NDA both parties are aware of the confidential character of those materials.

In the course of employment, the employee may be released from the obligation of confidence. In United Indigo Chemical Co. Ltd v Robinson[391] the court rejected the plaintiff's claim for an injunction restraining the defendant from using the information which he had obtained during employment because the plaintiff had failed to warn the defendant that the information of the manufacturing process was to be regarded as confidential, the information was freely available to other employees without any limited access imposed by the management and the defendant had obtained the information honestly.[392] In relation to university-industry-government projects, the employed researchers owe a duty of good faith to their own employers as well as to all collaborative parties. However, when it involves other participants, probably they owe a lesser duty of good faith as with ex-employees.

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[387] See for example Roger Bullivant Ltd v Ellis [1987] F.S.R. 172; Faccenda Chicken Ltd v Fowler [1986] 1 All E.R. 617.
[388] [1893] 1 Ch. 218.
[389] Ibid, per Lindley L.J at 226.
[390] Robb v Green [1895] 2 Q.B. 315.
[391] (1932) 49 R.P.C. 178; see also for example Worsley & Co Ltd v Robinson (1932) 1 All E.R. 290; Yates Circuit Foil Co v Electrofoils Ltd [1976] F.S.R. 345; see also discussion in Gurry, n.180, at pp.181-183
[392] (1932) 49 R.P.C. 178, at 186-187.

The obligation of confidence is also important when the contract of employment ends. The ex-employee is also under obligation to maintain the confidentiality, with certain limitation not to misuse confidential information or disclose it to an unauthorised party of his ex-employer after the termination of the contract of employment as for example in Robb v Green.[393]

In all cases the dividing line is difficult to draw between the knowledge of a former employer and the knowledge that belongs to ex-employee. The Court in Herbert Morris Ltd v Saxelby[394] noted that:

> "trade secrets, the names of customers, all such things which in sound philosophical language are denominated objective knowledge – these may not be given away by a servant; they are his master's property, and there is no rule of public interest which prevents a transfer of them against his master's will being restrained. On the other hand, a man's aptitudes, his skill, his dexterity, his manual or mental ability – all those things which is sound philosophical languages are not objective, but subjective – they may and they ought not to be relinquished by a servant; they are not his master's property; they are his own property; they are himself".[395]

As relates to nanotechnology, the most difficult the example is the university's employees. The academician may choose to move from one university to another university, and may carry with him not only the skill, or the knowledge that he had gained in the previous university but sometimes a project funding as well. He should be free to make use of his own personal skill, knowledge and experiences. This free use of his skill, information and knowledge is usually subject to the requirement of ex-employee that did not made any deliberate action such by memorising it or by writing down of the information. But balance may be different for academics than for industry or government employees, because normally university academic is public university. What approach for the court to take or whether to diverge from it? Can this difficulty be overcome by express contractual agreements? It is suggested perhaps by developing proposal or NDA.

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393 [1895] 2 Q.B. 315, Lord Esher M.R at 316-318; see also Lamb v Evans [1893] 1 Ch. 218, at 229.
394 [1916] A.C. 688.
395 Ibid, per Lord Shaw at 714.

In Faccenda Chicken Ltd v Fowler[396] at trial the court held that in the absence of any express stipulation, the employee could use sales, price and route information which was part of his own skill and knowledge either for his own benefit or benefit of a new employer. Neill LJ outlined the principles[397] and stated the circumstances to be considered when deciding whether the information falls within the implied terms of the contract to prevent the employee from its use and disclosure after the contract of employment has ended.[398] The court held that the information as a whole did not have the degree of confidentiality to be protected after the contract of employment had ended. There was no evidence of an express instruction that the sales or the prices information to be treated confidential. The sales and the price information were necessarily acquired by the defendants in order for them to do their work and the salesman could quickly commit the information to his own memory. The information was also generally known among employees. The COA however, doubted Goulding J's view that an intermediate class of information could be protected by a restrictive covenant.[399] The appeal from Faccenda's decision was considered in Lancashire Fires Ltd v S. A. Lyons & Comp. Ltd[400] where Carnwath J determined that the plaintiff failed to establish the case for breach of confidence against the defendant. The court held that the normal presumption can be made that the information obtained in the ordinary course of his employment, without specific steps taken such as memorising particular documents, he was free to take away and use of the information. In this case, there was nothing in the laboratory books or in other documents to suggest that the defendant was put in position of confidence, either expressly or impliedly. There was nothing have been said to suggest that the defendant has limit to use of any particular information. The information therefore was not regarded as protectable information to be protected under the law of confidence. The court has distinguished this from the information which was protected in the course of employment contract, and continues to remain secret after the contract of employment has ceased, even in the absence of any covenant to suggest for its secrecy. On Appeal, Lord Bingham M.R stated that employer wishing to protect less confidential information than trade secret after the contract of employment has ceased would have to do so by way of express covenant.

[396] [1986] 3 W.L.R. 288; [1987] Ch. 117 at 135-6 and 137-8.
[397] [1987] Ch 117 at 135-136.
[398] Ibid, at 137-138.
[399] Ibid, at 137
[400] [1996] F.S.R. 629.

However, for the covenant to be valid ex-employer must have legitimate interest in maintaining its confidentiality.[401]

In a more recent case, Arnold J in Vestergaard Frandsen S/A (MVF3 AFS) v Bestnet Europe Ltd[402] stated that the scope of obligation whether express, implied or equitable once the employment ceased, did not extend beyond the information of trade secret. The ex-employee is free to use for his own benefit of his own skill, knowledge or experience but not to use trade secret information. In this case, Arnold J provided a checklist as follows[403]:

(a) the nature of the work
(b) the nature of the information
(c) the attitude of the employer
(d) steps taken to protect the information
(e) the separability of the information
(f) the commercial value of the information
(g) the usage and practice of the trade

It was discussed earlier in the cases above that the ex-employee is able to carry with him the skill, knowledge or experiences, except trade secret information, when he moves to another company, provided that during his course of employment in the previous employment, he has not deliberately memorised, or written or removed any information. However, the question may arise to determine the implied term in the contract after the contract of employment ends, especially when it was devised by individuals or team of individuals like nanotechnology. How would the court determine what information that ex-employee will be able to bring to another company or transmit to the other person? This is because as was observed that *"too stringent protection may hamper and harm the free movement of the employees to change job and may be detrimental to their professional development and career"*.[404] This potential problem of determining implied term that may be preventing

[401] Lancashire Fires Ltd v S. A. Lyons & Comp. Ltd [1996] F.S.R. 629 at 667.
[402] [2011] EWCA Civ 424.
[403] Ibid, at 652.
[404] De Werra, n.220, at p.35; The law is recognised to balance the interest of the parties in G. D. Searle & Co. Ltd. v Celltech Ltd. and Others [1982] F.S.R. 92, Cumming-Bruce LJ observed, at 99.

exchanging of ideas or free movement of the employee to another company may suggest that a proprietary analysis as made by Honore' could be helpful.[405]

If the employer made an express term stated that the ex-employee is prevented from exercising his skill and knowledge, the ex-employee may use the defence under restraint of trade. The restraint of trade to be valid must have a reasonable basis for the interest of contracting parties and for the interest of the public. In Herbert Morris Limited v Saxelby[406] a covenant that the defendant would not during a period of seven years work for another company similar to his former employer (appellant) from the date of his ceasing to be employed was held unreasonable for the interest of contracting parties and for the interest of the public. In Malaysia the principle of restraint of trade has been adopted in Stamford College Group Sdn Bhd v Raja Abdullah Raja Othman.[407] In this case, the defendant argued that the contract of employment was void and unlawful because the contract prohibited him from working as lecturer or teacher within two years with another employer after his service has ended without the permission from the plaintiff. The defendant applied to be discharged from interim injunction restraining him working at another company. In this case, the court contended that the restriction was unreasonable and discharged the injunction on the ground that the restriction was unreasonable because it affected the livelihood of the defendant.

In nanotechnology, the example is still revolving around the discussion in the employee of the university context. According to Monotti and Ricketson, in the absence of express terms of confidentiality, it is rather difficult to bring an action for breach of confidence.[408] They provide two situations; one is that, in the absence of an express term of confidentiality, if the result from the research done is conducted outside the scope of his employment, the employee owed no obligation of confidence towards the employer. Secondly, in the absence of express terms of confidence, if the research results are done during the course of

[405] However, see 3.1.
[406] [1916] A.C. 688. The earlier example of restraints of trade can be seen in the HL decision in Nordenfelt v Maxim Nodenfelt Guns and Ammunition Co [1894] A.C. 535, per Lord Macnaghton, at 565.
[407] [1991] 2 C.L.J. 1135. The court did not grant the defence of restraint of trade to the defendant because the restriction made was not attempt to work at another company, but restraint from using or disclosing confidential information to the detriment of the plaintiff, see for example Schmidt Scientific Sdn Bhd v Ong Han Suan & Ors [1998] 1 C.L.J. 685; Yeohata Industries Sdn Bhd & Anor v Coil Master Sdn Bhd & Ors [2001] 6 C.L.J. 418. This suggests that how covenant recommended by Lord Bingham MR should be drafted or constructed.
[408] Monotti A L and Ricketson S *Universities and Intellectual Property: Ownership and Exploitation* (Oxford: OUP, 2003), at p.93.

employment, the freedom to publish the result from the research is very important in the academic world and that will probably overrides any imposition of obligation in the normal contract of employment.[409] The view can be adopted in a nanotechnology context. It is true that the results from research conducted outside the scope of the university's employment would not make the obligation of confidence towards the university. However, this principle may not always be easy to determine in the absence of the express term, for example the scope, or the duration. For the second situation, this would seem problematic where in the academic world the publication is given a greater consideration, for example, in terms of job promotion and knowledge sharing in the academic circles. Thus it is important for the university to set a balance between maintaining confidentiality and at the same time provide the interest to the academic or researcher to publish their research result or finding. Nevertheless, these two situations may become even more problematic in the complex multidiscipline like nanotechnology. Thus, to safeguard the situation, the important task is by putting express term of the obligation of confidence.

#### 3.3.2.2 Equitable obligation

Equity imposes an obligation on the parties in the absence of express and implied terms in the contract. Equitable principle also imposes an obligation where the parties are not contractually linked. The equitable principle provides that the party has a duty to maintain confidentiality and not to take unfair advantage by imparting the information to other persons. The equitable principle will be relevant when there is no answer in the contract either because parties are not in a contractual relationship or the claim is against the third party who is not privy to the contract.[410] The equitable obligation will only arise if the recipient knows or has notice that the information is confidential by objectively assessed upon reasonable man standing in the shoes of the recipient.[411]

[409] Ibid, at p.93. This is important because according to Deazley, there are different reasons why academician writes research articles – for example financial gain, disseminate and sharing intellectual, reputation and develop the thinking, Deazley R 'Publishers be Damned! (As Well As HEFCE, Government and Apathetic Academics): Some Thought on the Science and Technology Committee's Report on Scientific Publications' (2005) E.I.P.R. 97, at p.100.
[410] Gurry, n.180, at pp.36-46.
[411] Megarry J in Coco v Clarks [1968] F.S.R. 415, at 421; Campbell v MGN [2004] UKHL 22; [2004] 2 A.C. 457; Lord Nicholls, at para 14; Lord Hope of Craighead, at para 85.

The test for equitable principle in breach of confidential information has been confirmed in Saltman (Engineering) Co. Ltd v Campbell (Engineering) Co. Ltd[412], Lord Green held that *"If a defendant is proved to have used confidential information, directly or indirectly obtained from a plaintiff, without the consent, express or implied, of the plaintiff, he will be guilty of an infringement of the plaintiff's rights"*.[413] This equitable principle was upheld in Seager v Copydex.[414] It was emphasised further in Coco v Clark[415] by Lord Greene that:

> "I think that the Court, despite the caution which must be exercised before implying any obligation, must be ready to make those implications upon which the same and fair conduct of business is likely to depend. ...In the case before me I would imply a term if there was a contract and, so, a fortiori, I imply the equitable obligation".[416]

The court in Kitechnology BV v Unicor GmbH Plastmaschinen[417] clearly awarded damages for a breach of confidence prohibited by equity. The court also stated that the claim for breach of confidence did not arise in tort, but was part of equitable jurisdiction.[418] This case was decided before the introduction of the EU Regulation 864/2007 of the European Parliament and the Council of July 11, 2007 on the Law Applicable to Non-Contractual Obligations (Rome II) which came into effect on January 11, 2007. Under Rome II Regulation, the parties for non-contractual obligation are free to make their own choice of applicable law under the Rome Regulation II.[419] Article 4(1) of the Rome II Regulation provides as a basic rule that:

> "unless otherwise provided for in this Regulation, the law applicable to non-contractual obligation arising out of a tort/delict shall be the law of the country in which the damage occurs irrespective of the country in which the event giving rise to the damage occurred and irrespective of the country or countries in which the indirect consequences of that event occur".

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412 (1948) 65 R.P.C. 203.
413 Ibid, at 213.
414 [1967] 1 W.L.R. 923, per Lord Denning M.R, at 931
415 [1969] R.P.C. 41.
416 Ibid, at 50; the principle of equitable principle was considered also by the HL in Spycatcher [1990] 1 AC 109, at 255, 267 and 281.
417 [1995] F.S.R. 765.
418 Ibid, Evans LJ stated that as to whether the defendants' alternative submission is correct, namely, even if the non-contractual claims are properly categorized as tort, nevertheless the present case is not within Article 5(3) of Brussels Convention 1968, given statutory force in England by the Civil Jurisdictions and Judgments Act 1982 because the plaintiffs cannot show that the harmful event has occurred in England, at 778-779.
419 See for example discussion on this by Wadlow C 'Trade Secrets and the Rome II Regulation on the Law Applicable to Non-contractual Obligations' (2008) E.I.P.R. 309, and argues that in light of this Regulation, trade secrets are governed by tort; For a more extended analysis of the broader implications of the Rome II Regulations, see Carruthers J M and Crawford E B 'Variations on a Theme of Rome II. Reflections on Proposed Choice of Law Rules for Non-Contractual Obligations: Part 1' (2005) Edin. L. R. 65 Part 1 and (2005) Edin. L. R. 238 Part 2.

Article 6(2) of the Rome II Regulation deals with unfair competition and trade secret i.e. where trade secret is treated as an aspect of unfair competition law.

Although Kitechnology does not recognise breach of confidence as a tort, however it is submitted that tort principles as Wadlow contends should be applied to breach of confidence claims involving conflicts of laws.[420] This is particularly significant in the context of nanotechnology information because frequently, nanotechnology disputes will have a cross-border element generally and this is important for nanotechnology to have such treaty.

### 3.3.3 Unauthorised use of the information

The third requirement provided under the test in Coco v Clark[421] that the confidential information is breached when the person who is not authorised used the information to the detriment of the confider or the party communicating it. According to Hull, the inclusion of detrimental effect in Coco v Clark is an additional to the test for unauthorised used and disclosure, although the court was doubt whether that it was necessary element for an action for breach of confidence.[422] The situation was confirmed later in A.G v Guardian Newspapers Ltd (No.2)[423] where Lord Goff referred to Coco v Clark and stated: *"... whether detriment to the plaintiff is an essential ingredient of an action for breach of confidence. Obviously, detriment or potential detriment to the plaintiff will nearly always from part of his case; but this may not always be necessary."*[424]

Based on this judgment, the confider does not necessarily have to show that he himself has suffered detrimental effect from the disclosure of the information. Sufficient only to prove that the confidant has used the information beyond what it was intended, or misused the information of the confidential information.

420 Wadlow, n, 419, at pp.316-317.
421 [1969] R.P.C. 41, *"...an unauthorised use of the information to the detriment of the part communicating it"*, per Megarry J at 47.
422 Hull 1998, n.181, at pp.170-171.
423 [1988] 3 All E.R 545.
424 Ibid, at 659.

In nanotechnology, the example can be referred to the contract of manufacturing process developed by a company for a client.[425] The question here is whether the company will be able to give it to another client? The clear proposition is that the company may not use beyond what is intended and may not misuse by disclose to another client. The confidant must also not take unfair advantage as pointed out by Lord Denning M.R in Seager v Copydex[426] that *"... the broad principle of equity that he who has received information in confidence shall not take unfair advantage of it. He must not make use of it to the prejudice of him who gave it without obtaining his consent"*.[427]

In Saltman Engineering Co. Ltd v Campbell Engineering Co. Ltd[428] Lord Green M.R held that *"If a defendant is proved to have used confidential information directly or indirectly obtained from a plaintiff without the consent, express or implied, of the plaintiff, he will be guilty of an infringement of the plaintiff's rights"*.[429]

It is a question of fact whether confidential information has been used beyond the purpose for which it was disclosed.[430] In nanotechnology, an example may be when the confidant has disclosed it to a person other than the team member of nanotechnology research collaborations. The purpose of nanotechnology information for example is limited to be used in the confidential process, but the confidant had misused or disclosed it for another person. In this regards, the confidant will be liable for the breach of confidence because the confidant has taken an unfair advantage by the used and disclosed of the information without the consent from the team member.

#### 3.3.3.1 Recipient of the confidential information

The confidant or the recipient of confidential information may be bound by express or implied contractual obligation not to misuse or disclose the information without authorisation of the confider. Undoubtedly, a problem of uncertainty occurs in the case of third party

[425] Interviewee B.
[426] [1967] 2 All E.R. 415.
[427] Ibid, at 417.
[428] [1948] 65 R.P.C. 203.
[429] Ibid, at 213.
[430] Gurry, n.180, at p.256; Hull 1998, n.181 at p.175.

recipients who are not privy to a contractual link between the parties. It has been argued that the origins and juridical nature of the obligation of third party recipients of confidential information is uncertain and confusing.[431] It is particularly important for the courts to determine whether at the time he receives the information he has knowledge[432] or was innocent, until further notice was given to remind him that the information was confidential.[433] In Prince Albert v Strange[434] the plaintiff was granted an injunction restraining the defendant from publication of a catalogue containing private etchings related to Prince Albert and Queen Victoria. The decision was upheld by Lord Cottenham V.C that a third party Judge was also restrained from exhibiting the catalogue of the etchings although he was not contractually linked with the plaintiff, and that *"the possession of the etchings or engravings, on the part of the defendant or Judge, has its foundation in a breach of trust, confidence, or contract"*.[435]

It was settled law that the obligations of confidence not only bind the original recipient but extend also to the other person who has knowledge at the time he receives the information that it was originally given in confidence.[436] The person is prima facie bound under obligations of secrecy or confidential not to improperly further disclose or use the confidential information without the consent of the confider.[437] In order to establish the liability of the party, Hull views that the actual, constructive or implied knowledge acquired should be applicable for the third party.[438]

For the innocent third party who has receives information as referring to the defence of bona fide purchaser for value without notice is still doubtful.[439] There are two reasons why the courts may intervene and make the innocent third party liable for breach of confidence; (a) to prevent further abuse of confidence and (b) discretionary power under the equitable

[431] Colston and Galloway, n.217, at pp.232-234.
[432] This knowledge according to Gurry may be actual, imputed or by constructive notice, n.180, at p.270.
[433] Ibid, at pp.269-289.
[434] (1894) 41 All ER 1171; see Phillips J 'Prince Albert and the Etchings' (1984) 12 E.I.P.R. 344.
[435] (1848) 1 Mac. & G. 25 at 44.
[436] Fraser v Thames TV Ltd [1983] 2 All E.R. 101, at 116, Per Hirst J; Talbot v GTV [1981] R.P.C. 1, at 18, per Harris J; Printers and Finishers Ltd v Holloway [1965] R.P.C. 239, at 253 and 257, per Cross J.
[437] Dillon L.J. in AG v Newspapers Ltd (No.2) [1988] 3 All E.R. 545, at 614.
[438] Hull 1998, n.181, at p.165.
[439] Gurry, n.180, at p.277.

principle.[440] Stuckey views that the defence of bona fide purchaser in an action for breach of confidence is not appropriate because (a) its theoretical availability is based on the inaccurate analysis of action on the property rights in information and (b) likelihood of inequitable consequences for its utilisation.[441]

Arnold (now Arnold J) suggests for an objective assessment for the reasonable man, where he contends that:

> "a correct statement of the law is that an obligation of confidence arises whenever confidential information is received or acquired by a person with notice that the information is confidential, and whether a person has notice is to be objectively assessed by reference to the reasonable person standing in the position of the recipient".[442]

Wei agrees that that it is necessary to establish that the innocent recipient have the knowledge of the unauthorised use of the information by the confidant/direct acquirer, but the question has arisen on the degree of knowledge required and remains uncertain; as to whether carelessness to the knowledge is sufficient or any other element of recklessness or dishonesty before the action is established.[443] In this sense, in applying reasonable man test, he must at least possess reasonable thinking that there is a serious assertion of the confidential information by the confidant.[444]

As far as team approach of nanotechnology is concerned, the third party recipient of the information is relevant. In the research collaborative projects, the person within a team is not allowed to disclose or use of the information without the consent of other member in the same team. This is well applied to between different team that involve, i.e one team will not disclose of use of the information without the consent of another team in the collaborative projects. Although, in certain situation they may claim that they are innocent third party, nevertheless they may still be liable for breach of confidence. As Arnold pointed out, for the

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[440] Gurry, n.180, at p.280.
[441] Stuckey, n.186, at p.77.
[442] Arnold R 'Circumstances Importing an Obligation of Confidence', (2003) 119 Law Q. Rev. 193, at p.198
[443] Wei, n.186, at pp.29-30 and he refers this as downstream users of the confidential information. Inevitably he suggests that the law must seek to balance the interests of the plaintiff and the downstream users who are not directly responsible for the original breach of the confidential information and development of the infringing product arising from the confidential information, at p. 37; See also in Wei G 'Surreptitious Takings of Confidential Information' (1991) 12 Legal Stud.302.
[444] Wei, n.186, at p. 30.

innocent third party recipient of the information this should be assessed objectively from the perspective of reasonable man test standing in the shoes of recipient that the information received is confidential.

### 3.4 Public interest defence

Despite Article 10 of ECHR, the public interest defence is still alive and well as a defence within UK breach of confidence.[445]In applying the defence of public interest, the question is what aspects of nanotechnology might require disclosure?

Being new there are concerns about the risk that nanotechnology could pose for health, environment and safety of the public. The exposure of the body to the nano-particle is likely to cause the safety issue, for example the use of aerogel that made from rice husk, if it is misused, it can cause the danger to the safety and health.[446] Some may think that this technology could potentially provide risks as well as benefits to the society.[447] It has been recognised that a lot of research needs to be conducted in order to determine the harmful effect of nanoparticles to the health and environment.[448] It is important to note that the procedure for assessing the risks of nano-materials is still under development.[449] Nanotechnology's potential risk or harmful effects cannot be presumed or predicted of having same risk as the material at the macro-scale because the property at nano-level behaved differently from the macro-scale counterparts. Although it is unclear to what extent the properties at nanoscale have toxicity, evidence shows that some materials are proven more toxic at the nanoscale due to effect of surface area.[450] For instance, some speculate that

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[445] See 3.1 above.
[446] Interviewee C.
[447] Interviewee C whom stated that whether good or bad of certain technology, it all depends on how we manage the technology; interviewee D admitted that nanotechnology could potentially provide a risk to the health and safety for example by inhalation.
[448] See for example Rushton T 'Very Small and Very Special' (2010) Construction Research and Innovation, Vol. 1, Issue 3, 24, at p.27; also stating that there is need to develop the measure to verify the safety of nano-medical products, Munir and Mohd Yasin, n.13, at p.261.
[449] See for example European Commission, Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) Opinion on the Appropriateness of Existing Methodologies to Assess the Potential Risks http://files.nanobio-raise.org/Downloads/scenihr.pdf accessed on 9 Nov 2010.
[450] RAE, n.36, at p.71; the current risk assessment methodologies for nanoparticles may be inadequate because of reliance on mass metrics, therefore some cosmetic products containing nanoparticles may not be effectively regulated under the current regulatory framework, see Bowman D M and Van Calster G 'Flawless or Fallible? A Review of the Applicability of the European Union's Cosmetics Directive in Relation to Nano-Cosmetics'

carbon nanotubes are the new asbestos due to their smaller size, stronger and highly biopersistant, but their harmful effects are still unclear.[451] It may be argued that small technologies like nanotechnology have the tendency to be dangerous, for example in relation to cosmetics products enhanced with nano-particle, for example nano-silver; and the used of titanium dioxide at nano-range could also bring the safety issue.[452] The potential risk also might occur in the inhalation of nano-particle or the penetration of nano-cream into the skin.[453] It may be uncertain whether nanotechnology could be toxic, for example the use of nano-particle in sunscreen and whether it could have the same effect as in asbestos.[454] Nevertheless, as compared to nanoelectronics, nano-chemistry is more likely to bring environmental issues and toxicological effect.[455] Another example that nanotechnology could pose issue to the health is that the interaction between nanoparticles and the human biological system, and this free nano-particle enters into the organisms will remain in organs and tissues for undetermined of time.[456] The mobility of nanoparticles and the free movement of nanoparticles are prone to health and environmental side effects, for example dust and powder formulated nanoparticles could get into the body by inhalation.[457]

### 3.4.1 The principle of public interest defence

The information transmitted in confidence to the recipient must be kept in confidence or used according to the purpose which has been disclosed to him. However, the recipient may disclose the information in considering the interest of the public, and he will not be considered as breaching confidence. As Lord Goff of Chieveley stated in AG v Guardian Newspapers Ltd (No.2)[458]

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(2008) Studies in Ethic, Law, and Technology, Vol 2, 6, at p.29; see also Mandel G N 'Nanotechnology Governance' (2007-2008) 59 Ala. L. Rev. 1323, at pp.1340-1344.

451 Rushton, n.448, at p.27.

452 Interviewee C; the same argued by interviewee A that nano-particle in cosmetics and beauty treatment may have toxicological effect.

453 Interviewee D.

454 Interviewee A.

455 Interviewee A.

456 Spanolo A G and Daloiso V 'Outlining Ethical Issues in Nanotechnologies' (2008) Bioethics 1, at p.4

457 Meili, n.7, at, p.12

458 [1990] 1 A.C. 109; and in Initial Services Ltd v Putterill [1968] 1 Q.B. 396, at 405 *"the disclosure is justified in the public interest".*

"although the basis of the law's protection of confidence is that there is a public interest that confidences should be preserved and protected by the law, nevertheless that public interest may be outweighed by some other countervailing public interest which favours disclosure".[459]

The property at nanoscale behaves differently from the macro-scale – it becomes stronger than the steel, or it can develop small machine, for example like nano-robots than bacterium and capable of making a complex products. As mentioned above, nanotechnology provides many promises and potential risks, and the more promising the technology seems to be, the more concern is raised about it detrimental effects.[460]

The important principle of public interest defence has been established by the court in Gartside v Outram.[461] In this case the court considered the public interest defence includes an iniquitous act. Wood V-C observed that:

"there is no confidence as to the disclosure of iniquity. You cannot make me the confidant of a crime or a fraud, and be entitled to close up my lips on any secret which you have the audacity to disclose to me relating to any fraudulent intention on your part; such a confidence cannot exist".[462]

According to this case, iniquitous act includes crime and other serious misconducts.[463] The defence extended to the appropriate disclosure of the crime such as in Malone v Metropolitan Police Commissioner.[464] In nanotechnology, the suppression of information about dangerous properties may be considered as iniquitous act. For example, the dangerous properties of nanotubes which have been considered as the next "asbestos" may be considered as the iniquitous act. The self-replication device i.e. nano-machines that could reproduce

[459] [1990] 1 AC 109, at 282. See also the justification of the public interest defence; for example Pizer J 'The Public Interest Exception to the Breach of Confidence Action: Are the Lights About to Change?' (1994) 20 Monash U. L. Rev. 67 states that the public interest defence is important in order to prevent the controller of the information from exercising his power over the information in a harmful manner, at p.98; see also Gurry, states that *"the public interest require confidences, like contract to be held sacrosanct. In this role, the public interest operates not only in the private sector, to enforce a confider's right to preserve confidentiality of information which he entrusts to another, but also in the public sphere"*, n.208, at p.324.

[460] Heselhaus S 'Risk Management of Nanomaterials: Environmental and Consumer Protection under Existing EC Legislation on Chemicals, Pesticides and Biocides' (2010) Env. L. Rev. 115, at pp.115-116. However, whether nanotechnology have the hazardous effect for example to the environment is all depended on its management properly, interviewee C.

[461] (1856) 26 L.J Ch. 113.

[462] Ibid, at 114.

[463] See also Jones who states that iniquitous act to include criminal act, Jones G *'Traditional" Legal Scholarship: A Personal View* in Birks P B H (ed) (Oxford: CP, 1994) at p.448.

[464] [1979] Ch 344.

themselves which might act in uncontrollable manner in the human body[465] or the suppression of the information about the danger of the nano-robot that can penetrate into the body[466] may be considered as iniquitous act.

The principle has been adopted by the court of appeal in Tournier v National Provincial and Union Bank of England[467] that it is the right of the bank to disclose their customers' information *"to the extent to which it is reasonably necessary ... for protecting the bank, or persons interested, or the public, against fraud or crime"*.[468]

The principle of iniquity has been developed further to include less serious misconduct. In Initial Services Ltd v Putterill,[469] the court of appeal recognised that under the contract of employment, an employee is under an implied obligation not to disclose any information or documents which he received in confidence. The Court has also stated that this obligation is subject to exception. Lord Denning MR stated that this exception is not limited but *"it extends to any misconduct of such a nature that it ought in the public interest to be disclosed to others"*.[470] Similarly, Salmon LJ applied the principle in Gartside v Outram[471] and broadened the concept of iniquity by stating that *"but what is the sort of iniquity that comes within that doctrine is certainly not easy to define. What was iniquity in 1856 may be too narrow or perhaps too wide for 1967"*.[472]

The example of misconduct in nanotechnology may be the claimed of certain product to have nano-particle enhancement, but in fact it does not have it. Or the product contains certain percentage of nano-particle, but it has never been disclosed of the percentage.

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465 Lin A C 'Size Matters: Regulating Nanotechnology' (2007) Vol 13, Harv. Env. L. Rev. 349, at p.355.
466 Interviewee C.
467 [1924] 1 K.B. 461.
468 Ibid, per Atkin LJ at 486. See however, comment made by Sir John Donaldson MR in Francome v Mirror Group Newspapers Ltd [1984] 1 W.L.R. 892 that the word "iniquity" is classic but has been ill-defined, at 895.
469 [1968] 1 Q.B. 396.
470 Ibid, at 405.
471 (1857) 26 LJ Ch 113.
472 [1968] 1 QB 396, at 410. Commenting on this case, Ricketson S 'Public Interest and Breach of Confidence' (1979-1980) 12 Melb. U. L. Rev. 176 states that the court has taken wider approach for the disclosure of information for public interest, where the judges have extended the defence to the relationship between master and servant (contract of employment), at p.187.

In Fraser v Evans[473] the court developed further the principle of public interest to include "just cause or excuse".[474] In this case, Lord Denning MR noted that *"no person is permitted to divulge to the world information which he has received in confidence, unless he has just cause or excuse for doing so"*.[475] In this case Lord Denning MR observed that iniquity *"is merely an instance of just cause or excuse for breaking confidence. There are some things which may be required to be disclosed in the public interest, in which event no confidence can be prayed in aid to keep them secret"*.[476] In the instance, even though there is no misconduct or misdeeds, the court applied the principle of "just cause or excuse" for the interest of the public. The examples of "just cause or excuse" can be seen in the exposing of the unreliability breathalysers by the police,[477] ensuring the safety of the public from medically dangerous practices,[478] discharging a patient from mental hospital to the community[479] and preventing the public from being misled of the image of certain pop stars.[480] Based on these cases, the principle of "just cause or excuse" is wider than the principle of iniquity. In other words, whether the disclosure of information can be regarded in the public interest does not necessarily means that the action was misconduct. In nanotechnology for example, that use of nanoparticles by inhalation or absorbed to the body or exposure to the environment does not necessarily means that it is an act of misconduct, but the disclosure is justified for public interest because that nano-particle may have the potential risk, harm and danger to the human health and environment.

In agreeing with the principle developed in Fraser v Evans, Sir Robert Megarry V.-C said in Malone v Metropolitan Police Commissioner[481] that the principle of public interest should not be limited to the act of misconduct or misdeed only. But in fact, the act *"may relate to some apprehension of an impending chemical or other disaster, arising without misconduct, of which the authorities are not aware, but which ought in the public interest to be disclosed*

[473] [1969] 1 Q.B. 349.
[474] The principles of "just cause or excuse" is wide for the court to act upon it on speculative and subjective area of inquiry, and the phrase should be applied objectively and should not be left open, Ricketson, n.472, at p.191.
[475] [1969] 1 Q.B 349, at 361.
[476] Ibid, at 362.
[477] Lion Laboratories [1985] 1 Q.B. 526 where the disclosure of accuracy of the functioning of the instrument for measuring intoxication levels of alcohol was justified publication in the Sunday newspaper, but not in Francome v Mirror Group Newspaper Ltd [1984] 2 All E.R. 408.
[478] Hubbard v Vosper [1972] 2 W.L.R. 389; Church of Scientology v Kaufman [1973] R.P.C. 635.
[479] W v Edgell [1990] Ch 359.
[480] Woodward v Hutchins [1977] 1 W.L.R. 760.
[481] [1979] Ch 344, at 377.

*to them"*.[482] In nanotechnology, the effect is still unknown whether it could bring the dangerous or harmful effect,[483] but it may concern the issue of public interest of the disclosure of nanotechnology related information.

The court in Malaysia has adopted the principle of "just cause or excuse" in relation to presenting relevant evidence to the court. In Attorney General of Hong Kong v Zauyah Wan Chik & Ors[484] the Malaysian witnesses were called to give evidence in Hong Kong in relation to criminal proceedings against appellants. The witnesses feared that the disclosure of the information might expose them to the criminal liability and would be breaching the law of confidentiality and application to court for declaration. The court ruled that the witnesses could rely on the defence of just cause or excuse. The Court of Appeal (COA) held that the witnesses have legitimate excuse or reason for breaking confidence because they were bound by section 132(1) of the Evidence Act 1950 to make such disclosure. NH Chan JCA also emphasised that:

> "there is no duty of confidence where the disclosure is made in obedience to the law which required it to be made. In the present case, the duty of confidence is outweighed by the requirements of section 132(1) of the Evidence Act 1950".[485]

As compared to the UK approach, the defence of public interest in Australia has been considered as uncertain[486] and subject to a narrower approach.[487] Rath J in Castrol Australia Pty v Emtech Associates Pty Ltd[488] has approved the principle as in Beloff v Pressdram Ltd[489] and stated that in the information being disclosed, the principle of just cause for breach of confidence must be assessed as more weighty and precise than a public interest. Therefore, the public interest is established as was developed in Gartside v Outram on the principle of

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[482] Ibid, at 362.
[483] Interviewee A stated further that nanotechnology unknown effect must be carefully developed; interviewee C stated that all technology would have good or bad effect but it all depended on how human manage the technology, and examined further that small particle at nanoscale will have the tendency to be dangerous.
[484] [1995] 2 A.M.R. 1955.
[485] Ibid, at 1986.
[486] Ricketson, n.472, at p.177; see also Pizer which states that the scope and the effect of the public defence is still uncertain, n.459, at p.90; see also Davison M J et al. *Australian Intellectual Property Law* (Melbourne: CUP, 2008), at p.368 and cited AG Holdings v Burton (2002) 58 N.S.W.L.R. 464, 513.
[487] See for example Davison M J et al., n.486, at pp.369-370; see also Wheat K 'Lawyers, Confidentiality and Public and Private Interests' (1998) 1 Legal Ethics, No.2, 18, at p.30; see also interesting discussion of different view of the interpretation of public interest under Australian jurisprudence, Glover T 'The Scope of the Public Interest Defence in Action for Breach of Confidence' (1999) 6 James Cook U. L. Rev. 109, at p.135.
[488] (1980) 33 A.L.R. 31.
[489] [1973] 1 All E.R. 241, at 260.

iniquitous act. This is the most "favoured sense" in which the public interest defence has been used is narrower and limited to iniquitous act. Thus, it is not surprising that in different decision, Gummow J has criticised the law of public interest in England as *"picturesque but somewhat imprecise"*.[490] In Smith Kline and French Laboratories (Australia) Ltd v Department of Community Services and Health[491] Gummow J continued to criticise English public interest defence on the basis of that it is involved unfounded doctrinal and historical analysis. He further added that it was *"not so much a rule of law as an invitation to judicial idiosyncrasy by deciding each case on an ad hoc basis as to whether, on the facts overall, it is better to respect or to override the obligation of confidence"*.[492] Gummow J's criticism of public interest as being *"judicial idiosyncrasy"* has been considered in Regina v Department of Health[493] where the COA determined the importance of confining the public interest defence within strict limits.[494] Therefore, as we can see, the courts have limited the scope of public defence concerning privacy or personal information. In Hyde Park Residence Ltd v Yelland[495] concerned the photographs of a visit by the late Princess of Wales, Diana and Dodi Fayed to a villa in France. The publication of the photographs in the newspaper could not be justified by means of public interest defence, but only the facts. Similarly, the limit is that of privacy in Campbell v MGN Ltd[496] the Mirror newspaper published two articles of Naomi Campbell concerning that she was a drug addict and that she was attending meetings of Narcotics Anonymous (NA) for her rehabilitation, contrary to her false statements. The articles were accompanied by photographs of Naomi Campbell leaving a meeting of NA. In the exercise of the freedom of expression, the Mirror contended that it was entitled to publish the articles and photographs. The HL examined that the publication of the fact that Naomi Campbell was receiving treatment at NA, the details of the treatment was an infringement of her right to privacy that could not be justified for the interest of the public. The photos leaving of NA enabled people to link to the articles, which were also considered intrusion to her private life. In relation to personal confidence, it has been made through the introduction

[490] Corrs Pavey Whitting & Bryne v Collector of Customs for the State of Victoria (1987) 10 I.P.R. 53, at 71.
[491] [1990] F.S.R. 617.
[492] Ibid, 617, at 663.
[493] [2001] Q.B 424.
[494] Ibid, at 444.
[495] [2000] 3 W.L.R. 215.
[496] [2004] 2 All E.R. 995.

of the HRA 1998.[497] However, the same principle applies even to commercial confidences, that the extent of publication must be appropriate.

### 3.4.2 The scope and limits of public interest defence

It is a matter of the discretionary power of the court whether to invoke the public interest defence or not for confidential information.[498] The cases discussed above laid down the principle for the court to interpret what constitutes public interest defence. It is significant to discuss of what to disclose, to whom does the disclosure should be made and when of disclosure to justify for the public interest defence. There may be also limits as to how much information should be disclosed as in Campbell v MGN[499] (not to disclose her photograph). The gravity of reason for/effect of the disclosure should also be taken into consideration for the defence to be applicable.[500] Particularly important is looking at the likelihood and severity of the danger involved by such disclosure in order to prevent harm of the health and welfare of the public.[501] The gravity assessment can be seen also in London Regional Transport v Mayor of London[502] where Robert Walker LJ noted that *"the court will also consider how much disclosure the public interest requires; the fact that some disclosure may be required does not mean that disclosure to the whole world should be permitted"*.[503]

#### 3.4.2.1 To whom the disclosure should be made?

For the question to whom should the information be disclosed was decided in Francome v Mirror Group Newspaper Ltd[504] Sir Donaldson MR accepted that the media is an essential foundation of democracy, but the media should not confused their interest with the public interest. In this case, the public interest was served by informing to the relevant authorities

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[497] Article 10(3) arguably applies equally to commercial confidence, see Aplin (2007), n.204, at p.412.
[498] See per Lord Griffiths in AG v Guardian Newspapers (No.2) [1990] 1 A.C 109 at 268-269; per Lord Fraser in British Steel Corporation v Granada Television Ltd [1981] A.C. 1096, at 1202.
[499] [2004] 2 All E.R. 995.
[500] See for example Stephenson LJ in Lion Laboratories Ltd v Evans and Others [1985] Q.B. 526, at 537.
[501] Simes C 'The Development of the Public Interest Defence to Breach of Confidence' (1999) 7 Waikato L. Rev. 165, at p.183.
[502] [2001] EWCA Civ 1491; [2003] E.M.L.R. 4.
[503] Per Robert Walker LJ in London Regional Transport v Mayor of London [2001] EWCA Civ 1491; [2003] E.M.L.R. 4, at 100.
[504] [1984] 2 All E.R. 408.

rather than to the national newspaper. The court emphasised that the disclosure would not serve the public interest but instead it served the interest of the newspaper (Daily Mirror).[505] The consideration of what might be considered as the proper authority will depend on the nature of the information.[506] In Schering Chemicals Ltd v Falkman Ltd[507] a company manufactured a drug called Primodos which was used as a pregnancy test. However, it was found that the drug had caused abnormalities in new born baby and was subject much of publicity in newspapers and on television. Thereafter, the drug was withdrawn from the market. The defendant, an ex-employee of a drug manufacturing company sought to make the information available to a television company for a documentary and alleged that the documentary was justified for public interest. Furthermore, the defendant also claimed that the information about the drug was already available in the public. The COA held that the act amounted to a breach of confidence and granted an injunction restraining the broadcast of the documentary. The documentary shown in the television is not the right person whom to disclose the information although the information was already available in the public domain. The documentary shown in a television would give harmful effect to a company, thus the disclosure was not to the right authority i.e. the television show, rather than to the appropriate authority that control the effect of the drug.

The principle in Schering may be equally applicable to nanotechnology, that the disclosure must be made to the responsible authority to justify the defence of public interest. Similarly, in Lion Laboratories the COA stated that the press was an appropriate recipient of information relating to defective breathalysers for the level of intoxication. In nanotechnology, the disclosure must be made to the relevant authority for example those who involved in the environmental issues, or the scientists or technologists in securing the safety of nanotechnology to the human health, and environment. To some extent, the relevant authority may be the newspaper if the information relates to the danger or risk of nanotechnology to the society.

[505] Ibid, at 413; For disclosure to the relevant authorities see also AG v Guardian Newspapers [1990] 1 A.C. 109, per Lord Griffiths, at 213; Initial Services Ltd v Putterill [1968] 1 Q.B. 396 at 405-406; W v Edgell [1990] 1 All E.R. 835 at 852-853; but in Lion Laboratories Ltd v Evans [1985] Q.B. 526 the information was disclosed to the national newspaper was justified of the accuracy of the functioning of intoxication meter.
[506] Pizer, n.459, at p.80.
[507] [1981] 2 All E.R. 321.

#### 3.4.2.2 What to disclose?

There are limits for the defence to be applied. The limit of the scope of operation of the defence is based on the individual cases, and it is said that the limits of the defence are still unclear.[508] According to Ricketson, the word "misdeeds" and "iniquities" clearly exclude acts of *"trivial, sensational or purely salacious nature"*.[509] In Beloff v Pressdram Ltd[510] Ungoed-Thomas J listed the limits of the public interest defence and further added that the public interest defence also *"does not extend beyond misdeeds of a serious nature and importance to the country"*.[511]

#### 3.4.2.3 When of disclosure in the public interest?

In Distillers Co (Biochemicals) Ltd v Times Newspapers Ltd[512] the court held that the defendants failed to establish that the use of the documents related to the effect of thalidomide was still apparent to the interest of the public. The court ruled that the justification to invoke the public interest defence will not be successful if the suspected danger to arise in the future. In Schering Chemicals Ltd v Falkman[513] the court held that the fear of the harm in the future does not justify disclosure for the public interest. As Shaw LJ pointed out that *"there is no occasion to beat the drum again"*.[514]

This note is very significant to nanotechnology, as the effects for example toxicological or environmental are still unclear or unknown;[515] much more on the speculative effect in the future as nanotechnology would bring a dramatic effect as compared to the particle at larger scale. The question of precautionary principle would be important here when the technology

[508] Gurry, n.180, at 326.
[509] Ricketson, n.472, at p.189.
[510] [1973] F.S.R. 33.
[511] Ibid, at 57.
[512] [1975] Q.B. 613
[513] [1982] Q.B. 1
[514] Ibid, at 27.
[515] Interviewee A queried whether or not to adopt precautionary principle for nanotechnology. This is because the environmental and toxicological effect relates to nanotechnology must be developed carefully which requires for the test to come out first, before use of nanotechnology, interviewee A; see also Lin, n.465, at p.356.

is still uncertain as to the effects. The European Union's Communication on the Precautionary Principle 2000 states that:

> "the Communication underlines that the precautionary principle forms part of a structured approach to the analysis of risk, as well as being relevant to risk management. It covers cases where scientific evidence is insufficient, inconclusive or uncertain and preliminary scientific evaluation indicates that there are reasonable grounds for concern that the potentially dangerous effects on the environment, human, animal or plant health may be inconsistent with the high level of protection chosen by the EU".[516]

The principle of precautionary principle is only applied if the damages are serious or irreversible and there are still lacking in scientific certainty of the damages.[517] The risk threshold required to prove for the application of precautionary principle is lower than scientific certainty[518] and the risk should be addressed even there is no suspected link between the cause and the environmental harm.[519] In Pfizer Animal Health SA/NV v EU Council[520] the Court of First Instance (CFI) stated that in the event of scientific uncertainty, the precautionary principle could be applied without having to wait for the scientific outcome if there was a need to prompt an action to avoid unacceptable risk to the health. In nanotechnology, for example there is the possibility that nanoparticles could destroy the biodiversity in the river. This is serious and irreversible therefore there should be some measure to prevent the harms, for example, by preventing the use of nanoparticles at all.[521] For example, the use of nanoparticles to purify the fish in the river, and these nanoparticles are toxic to the fish population and some of the fish die through the purification.[522] The European Court of Justice (ECJ) ruled that the first step for the application of the precautionary is the identification on the potential negative consequences for health, and secondly a comprehensive assessment of the risk to health based on the most reliable

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[516] http://www.gdrc.org/u-gov/precaution-4.html (accessed June 25, 2009).
[517] Allhoff F 'Risk, Precaution, and Emerging Technologies' (2009) Studies in Ethics, Law, and Technology, Vol 3, Issue 2, Article 2, 1, at p.17; These existence of a threat or the serious or irreversible nature of possible risk or damage are interacting each other, Cheyne I 'The Precautionary Principle in EC and WTO Law: Searching for a Common Understanding' (2006) Env. L. Rev. 257, at p .263.
[518] Cheyne, n.517, at pp.262-263; provides an interesting discussion of the law and practice of the EC and WTO of the real implications and meaning of the precautionary principle.
[519] McEldowney J and McEldowney S 'Science and Environmental Law: Collaboration Across the Double Helix' (2011) Env. Law Rev. 169, at p.185.
[520] Case T-13/99 [2002] ECR II-03305.
[521] Allhoff, n. 517, at p.17.
[522] Ibid, at p.4.

scientific data available and the most recent results of international research.[523] Then this is followed by a risk management, where the appropriate measures must be identified.[524]

In other words, the precautionary principle would be useful when the human activities lead to morally unacceptable harm which is scientifically plausible but uncertain.[525] Therefore, action should be taken in order to diminish the harm. Thus, the precautionary principle is significant to consider uncertain risks that certain technology could provide.[526] It is said that precautionary principle would be appropriate for nanotechnology because there exist scientifically tenable grounds that the release for example nano-materials into the environment would give serious harm to the human health and environment.[527] Another reason precautionary principles are necessary in the case of nanotechnology is the ability of this technology to penetrate into the body, the toxicity effect and nanoparticles which are unlikely to be easy to be removed from the environment giving an indication of the negative consequence of being irreversible.[528]

### 3.4.3 Balancing the rights within breach of confidence

The court has to balance the interest of public interest by such disclosure and the public interest is served by such refusal to disclose such information. Lord Denning stated in Woodward v Hutchins[529] that *"it is a question of balancing the public interest in maintaining the confidence against the public interest"*.[530] Lord Widgery CJ in Attorney-General v Jonathan Cape Ltd[531] also stated that *"the public interest in non-disclosure must be weighed against disclosure in the interests of justice ... The courts should recognise that even if injustice to an individual results there is a higher public interest in relation to the protection*

[523] Commission of the European Communities v Denmark [2003] 3 C.M.L.R. 29, at para 51; However, this is not apply when the uncertainty is so severe, potentially applicable to harms of nanomaterials, Hesselhaus, n. 460, at pp.130-131.
[524] Heselhaus, n.460, at p.130.
[525] World Communication on the Ethics of Scientific Knowledge and Technology, UN Education, Scientific and Cultural Organization, the Precautionary Principle 13 (2005) at http://unesdoc.org/images/0013/001395/139578e.pdf accessed on 27 February 2011.
[526] Lin, n.465, at p.384.
[527] Ibid, at p.384.
[528] Ibid.
[529] [1977] 1 W.L.R. 760.
[530] Ibid, at 764
[531] [1976] Q.B. 752.

*of a certain class of material".*[532] The HL in Attorney-General v Observer[533] held that the matters relied by the courts to balance the interest will be based on the moral principles of loyalty and fair dealing as against other matters that will be served by the publication of the confidential information.[534] However, it is not an easy task to balance the interest of the parties, as Sir John Donaldson MR pointed out in Francome and Another v Mirror Group Newspapers Ltd[535] that *"they are peculiarly vulnerable to the error of confusing the public interest with their own interest. Usually these interests march hand in hand, but not always".*[536]

The cases above showed that that the disclosure must be made to the appropriate person, so in nanotechnology the appropriate authority can be predicted to include for example those in charge from the department of environment, the police or the authority from the medical line, or those who have a real interest in addressing the harm or risk. On matters of what to disclose, related to nanotechnology it may involve matters concerning the issue of health, safety and environment as mentioned above. The disclosure of the information must be based also in balancing the rights, which can be presumed to include those who are developing the technology and the public. However, this is a bit tough to balance the interest since nanotechnology is still new and emerging, whereas at the same time to preserve the interest of the public of not to expose to the risk or danger from the technology. Thus, looking at other statutory parallel of right to access the information with other rights might be appropriate for nanotechnology as discussed below.

### 3.4.4 Statutory parallels and external balances

This study does not consider data protection as primary directed towards personal data. However, other statutes require an access to information somewhat parallel public interest defence. In this regards, it is significant the balancing act between the public interest in maintenance of confidentiality and the public interest that may be served by such disclosure.

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[532] [1976] Q.B. 752, at 755. See also per Lord Denning MR in Woodward and Others v Hutchins and Others [1977] 1 W.L.R. 760, at 764.
[533] [1988] 3 W.L.R. 776; [1990] 1 A.C. 109.
[534] Ibid, Per Lord Griffiths, at 268-269.
[535] [1984] 1 W.L.R. 892.
[536] Ibid, at 898.

In the UK, the balancing of the rights is made by the ECHR and now is made through the effect of the HRA 1998. Article 10 of the ECHR guarantees the freedom of expression. The balancing interest of the media freedom of speech and privacy interest was highlighted by the HL in Campbell v MGN[537] that the treatment of the known model at the NA and her photographs of leaving a place was not amounted to breach of confidence and was not justified for public interest under Article 10 of the ECHR.[538] Cream Holdings v Banerjee[539] concerned freedom of expression under section 12 of the HRA 1998 and whether to grant relief or not in the exercise of the freedom of expression under the ECHR, the court must regard to the significant of this right. In this case Lord Nicholls observed that the information disclosed was justified for serious public interest, and further noted that *"the whistleblower provisions were intended to give additional protection to employees, not to cut down the circumstances where the public interest may justify private information being published at large"*.[540]

Another interesting piece of legislation that may be of relevance to nanotechnology is the UK Environmental Information Regulations 2004 (EIR).[541] The EIR provides the public access of the environmental information upon the request by the relevant authority.[542] The Regulation 5(1) provides that subject to exceptions, the public authority must make available of any environmental information upon request. Regulation 6(1) provides the request of the information be made available in the relevant form or format, the public authority must make it so available in a particular form or format unless, it is reasonable to make it available in another form or format or the information is already available or accessible to the public in another form or format. Regulation 12 provides for the exception to the rule by stating that the public authority may refuse to disclose the environmental information upon request by the public if the public interest in maintaining the right is outweighs the public interest in disclosing the information. Regulation 12 also provides the exception that the public authority may refuse such disclosure of the information if the disclosure would affect international relations, defence, national security or public safety and intellectual property

[537] [2004] UKHL 22; [2004] 2 A.C. 457.
[538] Ibid, Per Lord Hoffmann at 473-474; Lord Hale at 489.
[539] [2004] UKHL 44.
[540] Ibid, at 262.
[541] SI 2004 3391.
[542] For example the information request regarding the location of an endangered and rare species, Altaras D, The Environmental Information Regulations 2004 – An Update' (2010) J.P.L. 310, at p.319.

rights. The ground for refusal to supply information should be interpreted in a restrictive way that the public interest is served by such disclosure should be weighed against the public interest is served by such disclosure.[543]

Office of Communications v Information Commissioner[544] concerned the Stewart Report of the risk health posed by electro-magnetic radiation emitted from mobile phone. Ofcom established Sitefinder website which contains details of all mobile phone base stations and their emissions for base stations. The Sitefinder did not mention about the precise information of location of particular base station. The Information Manager for Health Protection Scotland requested information relating to grid references for each base station from Ofcom. Ofcom stated that information already available on the Sitefinder website and pursuant to Reg (6) (1) (b) of EIR there was no requirement to provide it in another format. The Information Manager stated that exceptions to disclosure in Reg 12(5) (a) and (c) applied that the disclosure of the information sought would compromise the security of the sites which provide the police and emergency service radio network and would also interfere with the IPRs of the mobile network operators (MNOs). The Information Commissioner ordered Ofcom to make such disclosure and he did not accept that the exception under Reg 12(5) (a) and (c). Ofcom appealed and the Tribunal found that the exceptions under Reg 12(5)(a) and (c) were engaged but that in each case the public interest in maintaining the exception did not outweigh the public interest in disclosure. The Tribunal held that the contemplated use of the data in those datasets for the purposes of epidemiological research would infringe those database rights, but would also constitute a "benefit" in the public interest. In the COA, it was observed that the purpose of legislation is to weigh the pros and cons with the presumption in favour of the disclosure, and concluded that the since EIR did not explicitly stated that of what amounted to public interest of such disclosure, therefore, it should be an implicit of an aspect of public interest benefit. The disclosure of the names of mobile network operators was considered in the public interest because the names clearly be a relevant factor in public debate arising out of epidemiological research.

On the balance between public interest in the disclosure of the information and the public interest is served in maintaining its confidentiality, Australia has also the statutory parallel as

543 Altaras, n.542, at p.314.
544 [2009] EWCA Civ 90; [2009] AC 48.

exemplified in the Freedom of Information Act 1982 (FOI 1982).[545] The purpose of the FOI 1982 is to serve the broad public interest by improving openness and accountability and promoting participation of the public and to balance the competing interests for and against the disclosure of the information.[546] Paterson and McDonaugh discuss cases that deal with the FOI 1982, for example Re Wiseman and Defense Service Homes Corporation[547] where the request to have access to the information was refused because what the FOI concerned was more on the personal and private interest rather than public interest. In Re Kamingga and Australian National University[548] the distinction was made between private and public interest in the application of public interest test. In this case, the Commonwealth Administrative Appeals Tribunal examined that the disclosure of the information that is against the interest of the public, it requires the balancing of competing interest between the public interest in the applicant's right to know and the applicant's personal interest to know about the information. Thus, in Australia, in providing justice to the individual, it was justified for public interest for right to know of the information.[549]

To date, there is no similar provision in Malaysia as regards to the freedom of information.[550] Therefore, there is a need for Malaysia to have similar provision, as emphasised by Raja Azlan Shah J that:

> "the right to access to information has assumed increasing importance in recent years as one of the steps in achieving the concept of open government. I believe that we need a Freedom of Information, under which members of the public have a right to access specifically requested records, and that there should be made available, as a right within reasonable time. A Freedom of Information Act will greatly improve the climate of trust in this country".[551]

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[545] Similar Act in the UK, the UK Freedom of Information Act 2000. Section 2(2) provides where the public interest in maintaining the disclosure is outweighed the public interest in the disclosure of the information, the right to access of the information does not apply. See also 3.1.
[546] Hanbury-Sparrow [1997] A.A.T.A. 323, September 10, 1997 at 64, as stated in McDonagh M and Paterson M 'Freedom of Information: Taking Account of the Circumstances of Individual Applicants' (2010) P.L. 505 at p.518.
[547] (1987) 14 A.L.D. 301.
[548] (1992) 15 A.A.R. 297.
[549] McDonaugh and Paterson, n.546, at p.519.
[550] To date only one state in Malaysia, i.e. Selangor has passed the Bill, the Selangor Freedom of Information Act 2010, news available at http://thestar.com.my/news/story.asp?sec=nation&file=/2011/4/1/nation/20110401113453, accessed on 15 May 2012.
[551] Azlan Shah 'The Right to Know" (1986) J.M.C.L. Vol, 13, 1, at p.22.

To the same effect Munir and Yasin also emphasise the importance of having the freedom of information law in Malaysia by stating that *"is not an ideal but a necessity"*.[552] The reason for Malaysia to have Freedom of Information Act is to improve transparency and accountability as a well-governed democracy government and to protect fundamental liberties of the right to information.[553]

Other than public interest defence, there are other available statutory parallel rights that justify the disclosure of the information in the interest of the public and balancing the act of maintaining confidentiality. In the UK, the statutory rights have well developed, as have been through the HRA 1998 for the freedom of expression. In the context of environment, i.e. the EIR is closely significant to nanotechnology where it gives right to the public to access of the information upon request made by the relevant authority. In Australia, the introduction of the FOI Act is to serve the public interest and promoting participation of the public and to balance the competing interest for and against such disclosure of the information. In Malaysia, there are no similar statutory rights of the information which balances the act to disclose the information and right to confidentiality.[554] The FOI as applied in Australia and UK may be persuasive for Malaysia to adopt a similar approach for nanotechnology.

### 3.5 Conclusion

The law of confidence is suitable to protect nanotechnology information based on the policy consideration and emphasised through the interviews conducted in this study. Furthermore, the law of confidence does not differentiate between products and services, and it lasts forever so long the information is kept secret. The law of confidence has been well established and by using Megarry's J characteristics for confidentiality, the protection accorded under the law of confidence is quite straight forward at national or international law, except on the issue of proprietary rights of the information.

[552] Munir A B and Mohd Yasin S H *Information and Communication Technology Law, State, Internet and Information: Legal and Regulatory Challenges* (Petaling Jaya, S&M: 2010), at p.34. They also examine in light of Agenda 21 of the Rio Declaration of the Earth Summit in Rio de Janeiro where Malaysia is a party, it requires member state to guarantee the rights of citizens to access information related to environment.

[553] Ibid, at p.55.

[554] Freedom of speech in Malaysia is constitutionally guaranteed under Federal Constitution, Article 10.

In nanotechnology, the quality of secrecy can be maintained because the scientists and engineers are working toward new creation in their research. The concept of accessibility of the information is important generally, and particularly significant when the number of considerable people had known of the information in nanotechnology. This is because nanotechnology research is often devised by exclusive teams of researchers. Furthermore, because of the size differences between nanoscale and macro-scale, the mere availability of the information does not necessarily mean that the public has accessed to the confidential information. The reason is to understand the information in nanotechnology one may need to go through a thorough process of experiment and laboratories test. However, the relevant group of transmission will be relevant in the context of nanotechnology because if the information has been transmitted to the scientist or engineer who is directly involved in devising nanotechnology, the information may become public knowledge. Novelty in confidentiality is also important because breach of confidence is "provisional protection" for patent rights. The doctrine of springboard is also very important in consideration of the speed of development in nanotechnology. When the speed of technology is so rapid, there is a tendency for the other party to use the confidential information as a headstart without putting his own effort in. Therefore, this doctrine is important to prevent other party to use the information to the detriment of the 'owner' of the information. Nevertheless, this doctrine should be limited in time.

The court applies the objective and subjective test in determining the quality of confidence. In nanotechnology the scientist and technologist must have sufficiently taken steps to secure their confidential information such as by applying secret code to the information, or by limiting the access to the information. They must also believe that the information is confidential and the public has no access to the information. The pragmatic and flexible cause of action may be essential for nanotechnology characterize by collaborative approaches. For contractual obligation, in order to interpret implied term nanotechnology the integrative approach may be significant to suit to multiple disciplines like nanotechnology. Equitable principle may also provide a cause of action for nanotechnology, when there is no answer in the contractual obligation. Nevertheless, there are choices of law applicable for non-contractual obligation as provided under Rome II Regulation especially when the information has the element of cross-border like nanotechnology.

In the contract of employment, all team participate in nanotechnology should be advised to expressly provide the confidentiality clauses or NDA. The mobility of employee especially in the university may also be made their obligation through NDA. Although proprietary interest may provide useful consideration as discussed in Honore, nevertheless, it shows less likely to be adopted by the court in Malaysia and UK in the near future. The party to a confidential information must not use or disclose the information without authorization of the party communicating it. In nanotechnology, since it is involved team members or teams of individuals, third parties recipient may be significant to determine whether the information has been used according to what was intended.

Nanotechnology could potentially have risk or hazardous to the health, safety and environment, for example its level of toxicity. The scope and principle of public interest defence may be identified for nanotechnology. In considering the uncertainty of nanotechnology risk, the precautionary principle also may be adopted. There may be a little difficulty to balance the right to disclose and right to maintain such disclosure of information, since nanotechnology is still new and emerging. Thus, other statutory parallel rights may be useful for nanotechnology to access the information.

# CHAPTER 4
# NANOTECHNOLOGY AND PATENT LAW

## 4.1 Introduction

Legal commentators tend to assume that patent protection is the most suitable for nanotechnology.[555] The qualitative interviews with key nano-technologists confirmed that patent-like protection is seen as necessary and desirable, although not the only route to protecting creative effort and fostering suitable models for research, development and commercialisation.

This chapter discusses types of creation that nanotechnology is bringing about and whether these can be characterised as "inventions". Given that there is no commonly accepted terminology for nanotechnology so far,[556] this chapter critically examines how difficulty in defining nanotechnology could pose problems for patent law. This chapter investigates whether material at nanoscale can be regarded as novel, inventive and industrially applicability. It also discusses how ownership is determined in this complex and collaborative field. This chapter also examines whether nanotechnology could pose risk to the environment and offend against the principle of morality or public order. It also identifies whether nanotechnology requires specific defences or any defences are problematic.

The case law in Malaysia is limited and so reference will be made mainly to UK and European patent laws, with some mention of US cases. In Malaysia, patents are governed by the Patents Act 1983 (PA 1983) and Patent Regulations 1986; in the UK, by Patents Act 1977 (as amended) (PA 1977) and Patents Rules 2007 and Patent Fees Rules 2007 (as amended). As a contracting state of the European Patent Convention 1973 (amended 2000)[557] the UK law should correspond to the Convention through its patent Administration,

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[555] See for example Behfar B and Fernandez D 'Intellectual Property in Nanotechnology' (2002) Thin Solid Films, 420; Matsuura J H *Nanotechnology Regulation and Policy Worldwide* (London: Artech House, 2006) at p.37; Wolfson J R 'Social and Ethical Issues in Nanotechnology: Lessons from Biotechnology and Other High Technologies, (2003) 22 Biotech L. Rep. 376 at 395; Lemley, n.25, at p.605; Newberger, n.25, at p.649.
[556] See 2.2.
[557] Convention on the Grants of European Patents, 1973 (EPC).

Regulations and Guidelines.[558] The decision of the granting office, its Boards of Appeal (BOA) and Enlarged Board of Appeal (EBOA) of the European Patent Office (EPO) are persuasive authority in the UK.[559] The EPC has attracted commentary, case law and comparison in its own right.

## 4.2 Types of nanotechnology creation

Patent law protects products and processes that are new, involve an inventive step and are industrially applicable.[560] These are also the criteria of Article 27(1) of the WTO TRIPS agreement.

Examples from case law suggests that there are different types of nanotechnology creation, in the US, the first nanotechnology case was Re Kumar[561] concerning alumina nanoparticles useful for chemical-mechanical polishing of ultra-smooth surfaces. In the EPO EBOA for example considered a cellulose ester material of titanium dioxide having an average particle size of less than 100nm;[562] fluid handling in micro fabricated analytical devices;[563] antireflective film consisting of titanium nitride with thicknesses in the nanometre range;[564] a method for treating or coating wood with an aqueous composition of copolymer particles with the range of 20 to 70nm.[565]

Other patentable examples include the process of making aerogel from rice husk at nanoscale,[566] sensory devices to detect molecules in the blood,[567] the system of imitating

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[558] Some provisions of the UK PA 1977 Act 'are so framed as to have, as nearly as practicable, the same effects in the United Kingdom as the corresponding provisions of the European Patent Convention', Section 130(7).
[559] See for example Merell Dow Pharmaceuticals Inc v HH Norton & Co Ltd [1996] R.P.C. 76, per Lord Hoffmann at 82; Biogen v Medeva [1997] R.P.C. 1, per Lord Hoffmann at 41; Generic (UK) Ltd v Lundbeck A/S [2009] UKHL 12, per Lord Walker at para 35, Per Lord Mance at para 46 and per Lord Neuberger at para 86.
[560] Section 11 PA 1983; Section 1(a)(b)(c) PA 1977; Art 52(1) EPC 2000.
[561] 418 F.2d 1361 (Fed Cir 2005) (Newman J). This case set a precedent for future cases in nanotechnology, although the judge did not establish separate rules for nanotechnology patents.
[562] T 0006/02 Photodegradable Cellulose Ester Tow.
[563] T 0070/99 Fluid Handling in Micro Fabricated Analytical Devices.
[564] T 0453/97 Antireflective Coating for Use in Photolithography Case.
[565] T 0952/01 Method of a Coating a Substrate Case.
[566] Interviewee C who holds five different patents.
[567] Interviewee A – and also orthopedics devices such as arms and joint replacements.

nature called ‘bio-mimetic’,[568] High Performance Varistos[569] and bio-marking process.[570] Other examples for products and processes of nanotechnology include upstream manufacturing methods (methods, techniques and tools) and computational techniques; and downstream inventions such as – nanoelectronics (quantum dots); sensors (carbon nanotubes gas sensors, nanocantilever-based sensors); aeronautics/space travel (durable, light weight fullerenes); environmental clean-up (self-assembly monolayers, dendrimers); nanobiotechnology/nanomedicine (drug delivery systems, liposomes, nanoparticles and nanoshells, prosthethics, surgical robot, implantable smart devices).[571]

The above cases and examples show that the “creations” of nanotechnology may involve products or processes. A creation can be modelled from macro-scale and be reduced into different forms at nanoscale, and it may also be a completely new product or process.[572] However, whether a mere down-scaling of product or process to nanoscale could be protected under patent law is not wholly clear.[573] Whether a nanoscale creation would be considered as “invention” or “discovery” is discussed below.

## 4.3 The patentability requirements

The building up and manipulation of material at the molecular scale has caused scientists and technologists to encounter many surprising results. This section examines the challenges for nanotechnology inventions to meet patentability requirements.

### 4.3.1 Invention or discovery at nanoscale

The issue concerning nanotechnology is whether the reproduction of a known entity at the molecular structure would meet the requirement of patentability so as to be considered as an

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568 Interviewee D – and also lab-on-chip which could stored huge amount of genetic information.
569 See n.111.
570 The use of label-free nano-sensor technique which is simple, portable, small and speed instant reading enables biomarker detection from whole blood for certain diseases such as cancer, see, n.111, at p.4.
571 Bawa, n.67, at p.44.
572 eg metal that could be manufactured at nanoscale, interviewee A.
573 The same issue was posed by interviewee A.

"invention" and not merely a "discovery".[574] Some nano-materials are naturally occurring substances, are they therefore unpatentable, or would patenting block innovation?[575] The development of nanotechnology has resulted in a blurring of the interface between invention and discovery[576] and the boundaries may be hard to fully appreciate at the time of discovery.[577]

Articles 27(1) of TRIPS sets a minimum standard for patentability for WTO member states to follow. The non-discrimination clause under patent law means that the availability and the scope of enforcement of patent rights should not unjustifiably discriminate between different technologies.[578] These requirements of patentability may be a challenge for nanotechnology.[579]

Malaysia's PA 1983 provides a definition of 'invention' as well as a non-patentable list. Section 12 of PA 1983 defines invention as *"an idea of an inventor which permits in practice the solution to a specific problem in the field of technology"*.[580] According to this provision, to constitute an invention, there must be a conception of an idea which is able to solve the problem in the relevant field of technology. The exclusion of discovery from patentability is provided under section 13 of the PA 1983.[581]

In determining "invention" and "discovery" Purchas LJ has stated that:

> "there may be a critical distinction to be drawn between a claim to new knowledge or to a discovery "as such" which is not patentable under section 1(2) of the 1977 Act and a claim to a method embracing a discovery which may well be an invention which is patentable".[582]

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574 Discovery as such is not patentable under PA 1983; PA 1977; Art 52(2) EPC.
575 Eg. Zech H 'Nanotechnology – New Challenges for Patent Law?' (2009) Vol. 6, Issue 1, ScriptEd 144 at p.151.
576 Bastani B and Fernandez D 'Intellectual Property Rights in Nanotechnology', Menlo Park, CA; Fernandez and Associates, LLP, 2002, available at http://www.iploft.com/Nanotechnology.pdf, accessed 5 July 2009; same view, see Bowman, n.15, at p.311.
577 Troilo, n.25, at p.38; this interface continues to reside in the patent law, and the boundaries should be continually policed and clarified, Vaver D 'Invention in Patent Law: A Review and a Modest Proposal' (2003) I.J.L.I.T Vol. 11, 286, at pp.305-306.
578 Correa, n.229 at p.282.
579 See for example, Koppikar V et al., 'Current Trends in Nanotech Patents: A View from Inside the Patent Office' (2004) 1 Nanotech Law & Bus. 24, at p.27.
580 There is no similar provision in the UK and EPO to define what invention is. The PA 1977 provides only the non-exclusive list of non-inventions under section 1(2); see also section 125 of the PA 1977. See also per Lord Hoffmann in Biogen Inc v Medeva [1997] R.P.C. 1, at 41.
581 Section 1(2)(a) PA 1977; Art 52 (2) (a) EPC 2000.
582 Genentech Inc's Patent [1989] R.P.C. 147, at 208.

By way of example Mustill L.J referred that *"you cannot invent water, although you certainly can invent ways in which it may be distilled or synthesised."*[583]

In relation to biotechnology, Genentech's Patent[584] the COA affirmed the view of Whitford J.[585] This case related to human tissue plasminogen activator or 't-PA'. In deciding whether the main claim was an invention or discovery within section 1(2) PA 1977, Dillon L.J. stated that:

> "the claims ... are not claims for the discovery of the sequences as such, but claims in relation to the practical application of the discovery in the production of human t-PA by recombinant DNA technology. In my judgment, therefore, this patent does not fall foul of subsection (2) of section 1 of the 1977 Act".[586]

Thus, if somebody has discovered a known entity in nature, but manages to put it to practical use, this may be patentable. The EPO Guideline provides:

> "if a new property of a known material or article is found out, that is mere discovery and unpatentable because discovery as such has no technical effect[587] and is therefore not an invention within the meaning of Art 52(1). If however, that property is put to practical use, then this constitutes an invention which may be patentable. For example, the discovery that a particular known material is able to withstand mechanical shock would not be patentable, but a railway sleeper made from that material could well be patentable".[588]

The law requires human intervention for the discovery to be patentable. This has been incorporated in the Biotechnology Directive,[589] Recital 20 of which reads:

> "…an element isolated from the human body otherwise produced by means of a technical process, including the sequence or partial sequence of a gene, may constitute a patentable invention, even if the structure of that element is identical to that of a natural element…".[590]

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583 Per Mustilll LJ in Genentech Inc's Patent [1989] R.P.C. 147, at 264.
584 [1989] R.P.C. 147.
585 *"It is trite law that you cannot patent a discovery, but if on the basis of that discovery you can tell people how it can be usefully employed, then a patentable invention may result. This in my view would be the case, even though once you have made the discovery, the way in which it can be usefully employed is obvious enough.",* Per Whitford J [1987] R.P.C. 533, at 566.
586 Ibid, at 240.
587 The concept of technical effect is equally important for software patents, 'computer programs…as such' being excluded subject-matter under s1(2) and Art 52(2), see, eg, Merrill Lynch's Appn [1989] R.P.C. 561; Aerotel Limited v Telco Limited; Macrossan's Application [2007] R.P.C. 7 (Macrossan was a business method); Symbian Ltd's Appn [2008] EWCA Civ 1066, [2009] R.P.C. 1.
588 EPO Guidelines (2009) Chap IV, Part C, 2.3.1. Discoveries.
589 Directive 98/44/EC of the European Parliament and of the Council on the Legal Protection of Biotechnological Inventions 6 July 1998.

Thus, the known entity found should prove to have some technical contribution as the result of the human intervention. The human effort and skill to isolate substances from nature and identify their uses may lead to patentability; the court and the EPO have recognised this in Howard Florey/Relaxin,[591] Harvard/Onco-Mouse,[592] Kirin-Amgen v Transkaryotic Therapies[593] and Kirin-Amgen v Hoechst Marion Roussel.[594] Based on these decisions, nano-creations may benefit from the experience of patenting naturally occurring substances in biotechnology and from the technical requirement under computer programs and business methods.[595] Nanotechnology involves synthesising and analysing structures and studying the interaction of individual atoms, controlling and manipulating chemical reaction at the atomic levels. If the study is only about the finding of naturally occurring materials rather than a practical product, it is only "discovery".[596] If all of this interaction of atoms can be proved to be the result of the human intervention by skills and effort which manages to put it into practical use, it may be considered as invention. Miniaturisation to nanoscale may be treated as an invention if it demonstrates enhanced technical effect as a result from its different size. The mere findings of previously unknown substances at nanoscale are "discovery" and as the cases in biotechnology show,[597] if the elements or substances are purified from the naturally occurring substance, or synthesised they may be patentable if all other requirements (discussed below) are met.

### 4.3.2 Novelty of nanotechnology

The invention is new if it is not anticipated by the prior art.[598] Malaysia, like UK and EPC, practises absolute novelty - anything in the world made publicly available either orally, written or through use or in other way shall form the state of the art. This disclosure to form

[590] See also Art 3(2) and Schedule A2 PA 1977, paras 2 and 5.
[591] T741/91 [1995] EPOR 541.
[592] [2003] OJ EPO 473 (Opposition Division), at 491.
[593] [2003] R.P.C. 31, CA at 62.
[594] [2005] R.P.C. 9, Lord Hoffmann differentiated products of nature from inventions by stating that *"an invention is a practical product or process, not information about the natural world",* at 196.
[595] N.587 above; see also HHJ Birss in Halliburton Energy Services v Comptroller-General [2011] EWHC 2508(Pat) at paras 30-38.
[596] Kirin-Amgen v Hoescht Marion Roussel [2005] RPC 1659, paras 76-77, per Lord Hoffmann, holding that a claim to DNA sequence without any practical qualification of the product or process was only discovery.
[597] EPO Guidelines (2009), Part C chapter IV 2.3.1 states that finding of previously unrecognized naturally occurring substances are not patentable, but if the substance produce a technical effect, it may be patentable.
[598] Section 14 PA 1983; section 2 PA 1977; Art 54 EPC 2000.

the prior art also includes the contents of domestic patent applications having an earlier priority date.

Does simply reducing the geometrical size make the subject matter new? If the prior art relates only to the macro or micro-scale, the nanoscale equivalent is generally not anticipated.[599] The rules of anticipation and selection patents will be discussed below.

As a general rule, mere scaling down does not confer patentability. In the US, it has been decided that simply reduced the size of the invention does not make it new in Re Gardner v TEC Systems INC[600] the Federal Circuit examined that where the difference between prior art and the claims was a relative dimensions of the claimed device, and a device having the claimed relative dimensions would not perform differently from the prior art, the centralised prior art should be developed claimed device was not patentable.[601] In Re Rose[602] the claimed lumber package *"of appreciable size and weight requiring handling by a lift truck"* was held not patentable over prior art lumber packages which could be lifted by hand. Similarly, in Re Rinehart[603] it was stated that *"mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled"*[604] and in Texas Instruments v ITC[605] that the mere change in size because of improved miniaturisation by technological advance does not in itself avoid the devices from infringement. The cases show that mere downscaling of device or structure does not automatically novel. However, this situation could be distinguished in nanotechnology where the laws of classical physical and quantum mechanics meet. With creations in nanotechnology, there is not only a mere down-scaling to nanoscale, but properties change dramatically, and this may be patentable.

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599 Schellekens, n.25 at p.51.
600 725 F.2d 1338, 220 USPQ 777 (CAFC 1984).
601 Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984).
602 220 F.2d 459, 105 USPQ 237 (CCPA 1955).
603 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); the obviousness of downscaling under the EPC, see Trustees of University of Pennsylvania T0070/99
604 531 F.2d at 1053, 189 USPQ at 148.
605 805 F.2d 1558 (Fed. Cir. 1986).

#### 4.3.2.1 Anticipation

The principle of disclosure to the public and the rules of anticipation were highlighted in Malaysia in Heveafoam Asia Sdn Bhd v PF (Teknologi) Sdn Bhd.[606] In this case Low Hop Bing J considered that the utility innovation[607] was anticipated by a US Patent which was available publicly and publication of an article in a magazine and was therefore not new.

The rule established for the prior art to destroy novelty is that there must be disclosure of the invention. The disclosure must be enabling to the person skilled in the art to perform the invention.[608] In nanotechnology creations, disclosure at larger scale does not necessarily provide an enabling disclosure at nanoscale. The important point is that the disclosure must enable the person skilled in the nanotechnology to perform the invention. The principle of anticipation was decided in General Tire and Rubber Co v Firestone Tyre and Rubber Co Ltd:[609]

> "to anticipate the patentee's claim the prior publication must contain clear and unmistakeable directions to do what the patentee claims to have invented … A signpost, however clear, upon the road to the patentee's invention will not suffice. The prior inventor must be clearly shown to have planted his flag at the precise destination before the patentee".[610]

This does not require the person skilled in the art to possess extra knowledge or need to conduct further experiment or acquire further knowledge.[611] Applying the principles in these two cases, Lord Hoffmann in Synthon BV v Smith Kline Beecham[612] explained that to avoid a serious risk of confusion, the concept of disclosure and enablement should be kept distinct. He explained that the disclosure was satisfied if it is capable of being performed, and the carried out of this performance may result that the patent being infringed.[613] The meaning of enablement is *"that the ordinary skilled person would have been able to perform the*

[606] [2001] 2 M.L.J. 660.
[607] Utility innovation is defined under section 17 PA 1983 as "any innovation which creates a new product or process, or any new improvement if a known product or process which is capable of industrial application and includes an invention"; it is a type of smaller invention, Azmi I M *Patent Law in Malaysia: Cases and Commentary* (Petaling Jaya: S&M, 2003), at p.7.
[608] See Asahi Kasei Kogyo KK's Application [1991] R.P.C. 485.
[609] [1972] R.P.C. 457.
[610] Ibid, at 485-486.
[611] Hill v Evans (1862) 31 LJ Ch (NS) 457.
[612] [2006] R.P.C. 10(HL).
[613] Ibid, at 334.

*invention which satisfies the requirement of disclosure."*[614] Lord Hoffmann further stated that the test for enablement of a prior disclosure for the purpose of anticipation was the same as the test for enablement of the patent itself for the purpose of sufficiency. However, the application of these tests are different; in the case of sufficiency the skilled person is attempting to perform the claimed invention whilst in the case of prior art the subject matter may have disclosed the invention but is not identified as such.

Applying these principles to nanotechnology, disclosure at the macro-scale does not necessarily mean that the nanoscale invention is anticipated. The disclosure must enable the skilled person to work the invention. If the prior art refers only the macro-level, the nanoscale invention may not be anticipated.[615] Furthermore, as mentioned above, reducing to nanoscale can cause unexpected and surprising results.[616]

It was decided by the EBOA that a generic disclosure of plastic material does not take away novelty of any specific example of increased photodegradility by addition of nanoparticles of Titanium.[617] Similarly, the EBOA decided that nanocrystal Nickel material which was obtained by electrodeposition with crystal size less than 11nm was novel over identical material disclosed in the literature, but comprising macro-crystalline Nickel obtained by electrodeposition.[618]

#### 4.3.2.2 Selection patent

Selection patent is another type of novelty previously recognised in the field of chemical inventions. Many substances are known to exist, but their functions are yet to be discovered. This may be relevant to nanotechnology because nanotechnology has been known for

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614 [2006] R.P.C. 10(HL), at 335.

615 All interviewees agreed that macro-scale and nanoscale is not the same thing; In Re Kumar 418 F.2d 1361 (Fed Cir 2005) the Board of Patent Appeals stated that the claimed invention was obvious because the value of the claimed particle size distribution was overlapped with the previous patent of Rostoker; see also Baluch A S et al 'In Re Kumar: The First Nanotech Patent Case in the Federal Circuit' (2005) Nanotech Law & Bus. No. 2, Vol. 4, 342, at p. 345.

616 See 2.2.2. For example, carbon is a poor conductor in bulk, but it becomes a good conductor when turned into nanotubes, Miller J C and Harris D L 'The Carbon Nanotube Patent Landscape' (2006) 3 Nanotech. Law & Bus. 427, at p.428; Interviewee C encountered a problem to encourage patent examiner that nanotechnology is different from technology at macro-scale.

617 T 0006/02 (Photodegradable Cellulose Ester Tow).

618 T 0915/00 Nanocrystalline Metals.

years[619] but only recently has its functions and structures been appreciated. In case of chemical compounds, the principles established for chemical selection patent apply where the disclosure has been made in a broader group of compounds. The selection of a smaller group made from the larger group of substances previously disclosed in a broader terms may be patentable if disclosed non-obvious advantages.[620] In nanotechnology for example, the sub-range for semiconductor nanocrystals in the area between 2nm to 10nm is selected from a larger range known to the prior art of semiconductor crystals with size smaller than 1 millimetre.[621] Furthermore, the mere mention of certain substances is not novelty-destroying provided that the prior art does not anticipate by describing the existence of a substance, structures, functions, qualities and the method of making it.[622] These are really helpful analogy to determine the novelty of a nanotechnology invention where geometry is already in existence or disclosed at the macro-scale, but certain of its functions, properties, structures are not yet discovered at the nanoscale. A size range may be claimed in which the novel and non-obvious advantages are present. Selection patents have been recognised to protect the original inventor, as regards the invention which he has made, and to encourage other researchers in the field to use their inventive powers to discover fresh advantages and to treat the discovery of such advantages of selected members of the group or class as patentable.[623]

In the UK, the selection patent was accepted in IG Farbenindustrie's Patents[624] where Maugham J laid down an important principle for selection patent. The selection invention had been described in general terms and claimed in the originating patent. To be accepted as patentable invention, the selection patent must be novel, possess unexpected character or advantage and involve an inventive step.[625] In order for selections patent to be valid where the individual compound had not been previously known for its advantage, Maugham J further laid down requirement that:[626]

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[619] See 2.3.
[620] Grubb P W, *Patents for Chemical, Pharmaceuticals and Biotechnology*, 4th edn, (Oxford: OUP, 2004), at p.214.
[621] Huebner S R 'The Validity of European Nanotechnology Patents in Germany' (2008) Nanotech. Law & Bus. 353, at p.354.
[622] MacQueen H et al. *Contemporary Intellectual Property: Law and Policy* (Oxford: OUP, 2008) at p.441.
[623] E.I. du Pont de Nemours & Co. (Witsiepe's) Application [1982] F.S.R. 303, at 309.
[624] (1930) 47 R.P.C. 289.
[625] Ibid, at 321.
[626] Ibid, at 322-323.

(a) the selection must be based on some substantial advantage to be secured by the use of the selected members (or avoiding some substantial disadvantage).
(b) all members of the selected class must possess the advantage in question.
(c) the selection must be in respect of a quality of a special character which can fairly be said to be peculiar to the selected group.

However, this case was later criticised in the light of EPO jurisprudence, especially on (c), by Floyd J because Maugham J was only dealing with inventive step, but not an exception to the law of novelty.[627]

EI. Du Pont de Nemours & Co. (Witsiepe's) Application,[628] concerned a prior specification of ICI describing a series of polymers made by polymerising any one of nine glycols with terephthalic acid (TPA). The ICI specification stated the polymers had improved absorptive capacities whilst maintaining their softening points. It contained a specific suggestion of making such a polymer using 1,4 butane diol as the glycol; one of the nine glycols. However, the worked examples in the specification used ethylene glycol alone. The Du Pont specification was based on the discovery that one of these polyesters, namely made with 1,4 butane diol and TPA, was useful in injection and high speed extrusion operations, especially for making hosepipes. It was common ground that the claim extended to the result of carrying out the prior ICI specification, provided that one had chosen the 1,4 butane diol. Nevertheless the HL held that Du Pont claim was novel. Lord Wilberforce concluded *"it is the absence of the discovery of the special advantages, as well as the fact of non-making, that makes it possible for such persons to make an invention related to a member of the class"*.[629] Compared to IG's criteria by Maugham J, the Du Pont decision was consistent with the EPO on the general principle of novelty i.e. the specification of an earlier patent did not disclose an 'individualised form' of the co-polyester of 1,4 butanediol.[630]

[627] Dr Reddy's Laboratories (UK) Ltd v Eli Lilly and Co Ltd [2008] EWHC 2345, at 97; Nonetheless, Floyd J held at [106] that the selection patent has survived under the 1977 Act.
[628] [1982] F.S.R. 303.
[629] Ibid, at 311-312.
[630] Dr Reddy's Dr Reddy's Laboratories (UK) Ltd v Eli Lilly and Co Ltd [2008] EWHC 2345 at [91]-[94], per Floyd J.

In Ranbaxy UK Limited and Another v Warner – Lambert Company[631] Pumfrey J observed that the nature of advantage will be taken into consideration in assessing obviousness which was highlighted in the previous case law. Pumfrey J stated that *"unless the later patent states what the advantage possessed by the selected class is, it is merely an arbitrary selection among things already disclosed, and will lack novelty".*[632] The decision was confirmed on appeal, holding that the allegation of anticipation will succeed if the specification gave clear and unmistakable directions to use common general knowledge to produce a specific material.[633]

In Sanofi/Enantiomer[634] Claim 1 of the application was directed to the dextrorotatory isomer of a specified compound and its pharmaceutically acceptable salts. The Examining Division had rejected it for lack of novelty over prior EP-A-0099802 which in its Example 1 disclosed the manufacture of the same compound in racemate form. EP-A-0 099 802 disclosed the existence of "enantiomers." The Technical Board of Appeal (TBOA) stated that the later-claimed enantiomer was not new because the mention of enantiomers in the earlier description referred expressly to the fact that these enantiomers were considered to be an integral part of the invention claimed and were described in the form of an individual technical teaching which could be reproduced by the person skilled in the art.

This case is relevant to nanotechnology where nanotechnology produces a divergent property of nanoscale structures of a known thing, thus conferring novelty and non-obviousness.

HOECHST/Thiochloroformates[635] held that the selection of a sub-range singled out from a larger range is novel when: (a) the selected sub-range is narrow; (b) the selected sub-range is sufficiently far removed from the known range by way of examples; (c) the selected sub-range is not arbitrarily chosen from the prior art, but results to another invention (purposive selection). The TBOA stated that novelty can only be denied if there is unambiguous disclosure of such individual chemical configuration in the form of a technical teaching. The TBOA viewed that it was not sufficient that the configuration in question belonged to a

[631] [2005] EWCH 2142 (Pat) at para 64.
[632] Ibid, at para 64.
[633] [2006] EWCA Civ 876 at para 41.
[634] [1996] EPOR 24.
[635] [1979-85] EPOR C987.

disclosed class of possible configurations, without specific pointer to the individual member.[636]

In Dr Reddy's Laboratories (UK) Ltd v Eli Lilly & Co Ltd[637] the respondent was the proprietor of a European Patent (UK) relating to olanzapine, a widely prescribed anti-psychotic agent used for the treatment of schizophrenia. The appellant sought revocation of the patent on the grounds of lack of novelty in that olanzapine was a member of the $10^{19}$ compounds previously disclosed by a 'Markush' formula. The long standing test of Maugham J in IG was rejected, and the COA took the opportunity to harmonise the position in the UK and at the EPO.[638] In this case, Jacob LJ considered the "individualised" approach of the TBOA in Hoeschst Enantiomers[639] and further stated that what amounted to "individualised description" is a question of degree and could include consideration such as the specificity of any indicated purpose for making the compounds.[640] Thus, the Court found that the previous disclosure of olanzapine among $10^{19}$ compounds according to the Markush formula and as one of 86,000 compounds of a preferred class was not considered as an individualised description - Jacob LJ emphasised *"this case is miles from that"*.[641]

Under UK and EPO law harmonised through the decision in Dr Reddy's, a claim to a specific compound would not destroy novelty unless the compound was disclosed in "individualised description". This is likely relevant in nanotechnology that the claim to a specific compound of the macro-scale would not destroy novelty, unless the claimed invention had been made known of its specificity for its purpose.

### 4.3.3 Inventiveness of nanotechnology

The invention has an inventive step if it is not obvious to the person who has ordinary skill in the art, having regard to any matter which forms part of the prior art.[642] Does reduction in

[636] Pfizer/Penem [1995] E.P.O.R. 207.
[637] [2009] EWCA Civ 1362; [2010] RPC 9 (CA (Civ Div)).
[638] Ibid, at 252-253.
[639] [1990] EPOR 337.
[640] [2009] EWCA Civ 1362; [2010] RPC 9 (CA (Civ Div)), at 236-237.
[641] Ibid, at 237.
[642] Section 15 PA 1983; section 3 PA 1977 states that *'if it is not obvious to a person skilled in the art, having regard to any matter which forms part of the state of the art'*, despite identical wording in EPC Art 56, EPO

size makes the invention obvious to the person skilled in the art in nanotechnology? This is because the mere downscaling of dimension may be obvious to the person skilled in the art.[643] Who is considered the person skilled in the art in nanotechnology?

Similar argument as in novelty above (4.3.2) applies here that nanotechnology does not merely involve making the invention into smaller version *per se*; the behaviour of the nano-structures may change dramatically and unexpectedly. The industrial application of these findings should then be patentable for the reasons articulated by Whitford J in Genentech Patent.[644] The BOA[645] has considered that when the miniaturisation of analytical device produces an unexpected result, the miniaturisation is found to be an inventive step. This is regardless whether there is an apparent obviousness of the means to achieve it. In this case, the BOA was satisfied that the prior art disclosed in other documents cited by the appellant did not come close to the invention. The BOA confirmed the same conclusion in Nanocrystalline Metals.[646]

#### 4.3.3.1 Person skilled in multiple arts

Unlike UK and EPC which requires the person to be skilled in the art, Malaysia's test for obviousness is the person who is having *ordinary* skill in the art.[647] However, it is submitted that this does not make the degree of obviousness in Malaysia different.[648] Since nanotechnology does not involve a single technology, but is rather multidisciplinary, the question is how to determine the "art" and characterise the "person" skilled in the art. It is helpful to observe the principle adopted by the courts in other fields.

The person skilled in the art possesses knowledge and skill in the relevant area of subject matter as Lord Reid stated in Mills & Rockley (Electronics) Limited v Technograph Printed

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uses "problem/solution" approach: see eg Bayer/Carbonless Copying Paper [1981] O.J EPO 206; but problem/solution approach was criticized in Alcan/Aluminium Alloys Case T465/92 [1995] EPOR 501.

[643] In Trustees of University of Pennsylvania T0070/99 where the BOA stated that mere downscaling of dimension is obvious.

[644] See n.585.

[645] T 0070/99 Fluid Handling in Micro Fabricated Analytical Devices.

[646] T 0915/00 Nanocrsytalline Metals.

[647] See section 15 PA 1983; section 3 PA 1977; Art 56 EPC 2000.

[648] See also the same view in Azmi, n.607, at p.123.

Circuits Limited.[649] The patent specification should be disclosed clearly enough to enable the person skilled in the art to work the invention. As the court stated in Valensi v. British Radio Corp:[650]

> "the hypothetical addressee is not a person of exceptional skill and knowledge, that he is not to be expected to exercise any invention nor any prolonged research, inquiry or experiment. He must, however, be prepared to display a reasonable degree of skill and common knowledge of the art in making trials and to correct *obvious* errors in the specification if a means of correcting them can readily be found".[651]

In Windsurfing International Inc. v Tabur Marine (Great Britain) Ltd,[652] Oliver LJ considered that:

> "the hypothetical Skilled Man is, no doubt, (together with his cousins the Reasonable Man and the Officious Bystander) a useful concept as setting a standard and, in the instant case, as providing the touchstone by which the question of obviousness may be judged by the equally hypothetical Juror."[653]

In Genentech's Patent[654] the person skilled in the art *"would be a team of persons, each of whom would be the holder of a Ph.D. in a relevant field of science. They are thus necessarily persons of very considerable intellectual capacity"*.[655] The appropriate degree of knowledge and the skills possess by the person skilled in the art in a team are varied according to the relevant field in which they work.[656] The person skilled in the art may be a team that has ordinary skills and received formal academic qualifications[657] or they could be *"in*

[649] [1971] F.S.R. 188, at 193.
[650] [1972] F.S.R. 273.
[651] Ibid, Per Russell LJ, at 310.
[652] [1985] R.P.C. 59.
[653] Ibid, at 71.
[654] [1989] R.P.C. 147; see also Halliburton Energy Services Inc v Smith International (North Sea) Ltd [2006] R.P.C. 2 at para 39 and 40.
[655] Per Dillon LJ [1989] R.P.C. 147, at 241. In healing the wound, for example a team is those who has practical interest in apparatus for facilitating the healing of wounds which may include clinician with regular experience of treating wounds, and biomedical engineer with experience in the manufacture of wound dressing, Kitchin J in Mölnlycke Health Care AB v Wake Forest University and Wake Forest University Health Sciences [2009] EWHC 2204 (Pat), at para 24.
[656] Genentech's Patent [1989] RPC 147, Mustill LJ, at 278. In this case the different team of techniques involve such as protein sequencing, handling mRNA, building a library, making a probe. See also team approach of person skilled in the art in VDO ADOLF SCHINDLING/Illuminating Device v (Opposition by DIEHL) [1997] E.P.O.R. 146.
[657] Dredge v Parnell (1899) 16 R.P.C. 625, at 628 Lord Halsbury; Genentech's Patent (1989) R.P.C. 147, Purchas LJ at 214.

*appropriate cases, be a team—an assembly of nerds of different basic skills, all unimaginative".*[658]

From this, it is clear that the UK person skilled in the art is quite ordinary in the context of the invention and can be anyone from a workshop technician (Saint-Gobain) to an "average" though a highly skilled biotechnology research team (Genentech).[659] The skills and qualifications of the person should be varied according the fields that they are working in. In nanotechnology, the skills and background knowledge are varied, and according to different fields that they involved. Furthermore, not only single person is involved, but rather a team of people.[660] However, it may be even more difficult to identify the correct team in nanotechnology than biotechnology because of the range of arts involved. On the level of skills they could possess, in nanotechnology, the skilled person would be the highly qualified "persons" as evidenced in Genentech and comprise persons with different skills and expertise/ fields of specialisation with the same common interest to the nanotechnology as evidenced in Mediummune Limited v Novartis Pharmaceuticals UK Ltd, Medical Research Council[661] which referred to team of scientists with different background in areas such as immunology (particularly antibody structural biology), molecular biology and protein chemistry with common interest to antibody engineering.

### 4.3.4 Industrial application

The invention must capable of industrial application.[662] An invention is having industrially applicable if it can be made or used in any kind of industry.[663] The industrial application reflects that the invention is to have a concrete and technical character,[664] to be applied in

[658] Per Jacob LJ in Technip France SA's Patent [2004] R.P.C. 46, at 926; See also Jacob LJ in Saint-Gobain PAM SA v Fusion Provida Limited, Electrosteel Castings Limited [2005] EWCA Civ 177, referring to the person skilled in the art as *"an unimaginative person (or team) in the research department of a company in the underground pipe manufacturing trade. He would have considerable knowledge of the problems of corrosion suffered by buried pipework."*, at para 4.
[659] They are not highly skilled expert or Nobel prize winner nor a lowest common denominator, but someone with "the Skilled Person", the Manual of Patent Practice, the PA 1977 Jan 2011, at 3.20.
[660] All the interviewees claim for the team approach in nanotechnology, for example D has to work with people from medical line, same with A.
[661] [2011] EWHC 1669 (Pat), at para 92.
[662] Section 11 PA 1983; section 1(1)(c) PA 1977; Article 52(1) EPC 2000.
[663] Section 16 PA 1983; section 4(1) PA 1977; Article 57 EPC 2000.
[664] Bently and Sherman, n.211, at p.393.

real world application and not just a matter of speculation. In Chiron Corporation and Others v Murex Diagnostics Ltd. and Others[665] the COA referred to industrial applicability in its widest sense to include whether or not for profit, and it must have some useful purpose.[666] However, industrial applicability does not extent to scientific information where its practical application is yet to be ascertained.[667] Based on the widest interpretation of the word 'industry', this is likely pose little problem for nanotechnology, because nanotechnology is used in or applicable to many kinds of industry.

### 4.3.5 Public order and morality

Article 53 of the EPC 2000 provides that a patent shall not be granted for an invention the commercial exploitation of which would be against the *"ordre public"* and morality.[668] Article 27(2) of the TRIPS also permits members to exclude such inventions from patentability.

In Plant Genetic Systems/Glutamine synthetase inhibitors (Opposition by Greenpeace)[669] Greenpeace argued that the invention could have the environmental concerns, citing surveys of Swedish farmers and Swiss citizens. The TBOA rejected the evidence and stated that a survey and opinion poll conducted were not sufficient in establishing that the subject matter is contrary to "ordre public" or "morality". According to TBOA, there was no sufficient evidence to show for the actual disadvantages of the invention, and the balancing approach of advantages and disadvantages of the invention was seen as one of possible way of assessing patentability under Article 53(a) of the EPC.[670] The invention was not against the principle of morality: the claimed subject matter did not relate to a misuse or destructive use of plant biotechnology and concerned activities or products which could not be considered wrong from the accepted standards of the European culture, rather the plant biotechnology was similar in its goal to the traditional selective breeding.[671] It was observed that in order for the subject matter to be against the "ordre public" there must be sufficient evidence

[665] [1996] R.P.C. 535.
[666] Ibid, at 607.
[667] Cornish and LLewelyn, n.307, at p.213.
[668] See also section 1(3) PA 1977; the EPO Guideline, Ch IV, 3.1; Section 31(1) PA 1983.
[669] [1995] EPOR 357.
[670] Ibid, at 373.
[671] Ibid, at 369-370.

substantiating that the patent would seriously prejudice the environment, and no such conclusive evidence had been presented in this case.[672]

What likely damage could nanotechnology inventions bring to the environment? There are considerable ranges of concerns of potential environmental risk[673] that result from nanotechnology. ETC Group states that nanotechnology potentially brings *"horrendous social and environmental risks"*.[674] It was viewed that the potential risk to the environment likely came from chemical rather than electronic fields[675] due to the exposure of particle to the environment and public health. It is felt that effective coordination and communication within the scientific community as well as international cooperation is needed in respect of public health, safety, the environment, risk assessment, consumer protection, methodology, nomenclature and norms.[676] In nanotechnology, size is the main factor in determining the toxicity, the smaller a particle size is; the more toxic it proves to be.[677] Thus, because of their size, nanoparticles are easily accessible to human body and able to cross the cells, tissues and organs as compared to larger size; while nanomaterials can easily access to the blood stream through human inhalation, ingestion and skin absorption.[678] For example, carbon nanotubes have been shown to cause death of kidney cells and many types of nanoparticles have been proved to be toxic to human tissue and cell cultures.[679] Another example is that although quantum dot is really useful as tagged marker, however certain size and materials of quantum dots have shown to be cytotoxic.[680] However, as argued in Plant Genetic Systems above, since the uncertainty is still surrounding nanotechnology as to its effect to the environment

[672] Ibid, at 372.
[673] Environmental risks mean that nanotechnology *"might cause, tends to cause, or will cause negative impacts"*, Allhoff, n.517, at p.2.
[674] See n.116. From the historical and sociological perspective, public respond initially to newly introduced technology and this attitude changes after the benefits start to emerge, for example in 1970s a recombinant DNA of bioengineered organisms was opposed by the public for the fear to damage the environment but it appears that the attitude has changed after bioengineering proved to produce synthetic insulin and pharmaceuticals application, Agovic A 'Stem Cell Patents on a Knife Edge' (2008) J.I.P.L.P. Vol. 3, 718, at p.719.
[675] Interviewee A.
[676] Missoni E and Foffani G 'Nanotechnologies and Challenges for Global Health' (2009) 3(1) Studies in Ethics, Law and Technology, at p.7; for the extended discussion on impact of nanotechnology in the health sector in India see Vivekanandan J 'Nano Applications, Mega Challenges: The Case of the Health Sector in India' (2009) 3(3) Studies in Ethics, Law and Technology at pp.2-3.
[677] Blackwelder B *Nanotechnology Jumps the Gun: Nanoparticles in Consumer Products'* in Cameron N M and Mitchell M E (eds) *Nanoscale: Issues and Perspectives for the Nano Century* (New Jersey: JWS, 2007) at p.74.
[678] Ibid, at p.74.
[679] Ibid, at p.75.
[680] Collins J C in Cameron N M and Mitchell M E (eds) *Nanoscale: Issues and Perspectives for the Nano Century* (New Jersey: JWS, 2007) at p.122.

and public health (insufficient evidence could be adduced to establish that the said subject matter of nanotechnology is contrary to "ordre public" or morality"), it is more important to protection rather than refuse patents.

The principle of *ordre public* was considered in HARVARD/Onco-Mouse[681] where the Examining Division has decided that a careful weighing up of the risks to the environment and the positives aspects of the usefulness of the invention to the mankind should be given consideration. The acceptance of the notion of *ordre public* to include the protection of the environment was adopted and has been given a flexible approach by the TBOA in Plant Genetic Systems.[682]

The extent of the test has become wider not only to the likelihood of the animal suffering or environmental risk and likelihood of the substantial benefits to the human that should be carefully weighing up. The TBOA opined that other considerations should be taken into account such as threat to evolution, increased trade in genetically manipulated animals, unacceptability of animals' manipulation and the degree of suffering.[683]

The TBOA has stressed the performing of the invention as commercial exploitation where stated that:

> "in this context, it is important to point out that it is not the fact of the patenting itself that is considered to be against ordre public or morality, but it is the performing of the invention, which includes a step (the use involving its destruction of a human embryo) that has to be considered to contravene those concepts".[684]

There is no doubt that nanotechnology invention may potentially pose damages or risk to the environment. The patent office has to carefully weigh the interest of the inventor against the human and environmental damage. However, a more careful consideration should be paid for both interests. With the ruling in Wisconsin Alumni Research Foundation (WARF), the patent office should not only consider the commercial exploitation to determine whether the

[681] [1991] E.P.O.R. 525.
[682] [1995] E.P.O.R. 357, at 366
[683] HARVARD/Transgenic animal [2005] E.P.O.R. 31.
[684] WARF/Stem cells [2009] EPOR 15; [2008] EWHC 2345; Rowlandson M WARF/Stem cells (G2/06): The Ordre Public and Morality Exception and its Impact on the Patentability of Human Embryonic Stem Cells (2010) E.I.P.R. 67, at p.75.

nanotechnology invention is environmentally damaging, but should consider other aspects such as the nature and making and using of the invention. It has been suggested that the patent office should establish a special Ethics and Public Interest Panel that comprises experts from different background such as law, ethics, technology and members of the public in giving the consideration of whether the invention should or should not be patentable on the issues of ordre public and morality.[685] This was also highlighted in the interviews conducted in this study, as desirable to include people from religious groups, scientists and policy makers. Furthermore, we may note the UKIPO's practices which recognise inventions that relate to "green" or environmental-friendly technology, called "green patents" for example a manufacturing process which uses less energy or a recycling process.[686] This is for nanotechnology for example the use of safe nanoparticles in eco-friendly applications.

## 4.4 Technical and Administrative Issues

The definitional issue of nanotechnology is still fragmented and debatable.[687] The popular use of the prefix 'nano'[688] does not justify the assumption that nano-products and processes are patentable. The non-existence of a common accepted terminology and the multidisciplinary nature of nanotechnology create problems the patent offices to classify and examine the scope of invention at the nanoscale.[689] This section examines the problems of nanotechnology classification and monitoring systems, searching the relevant prior art, determining the relevant patent examiners and examination and drafting the claims construction.

[685] Vaver, n.577, at pp.306-307.
[686] Available at "Green Patents" http://www.ipo.gov.uk/news/newsletter/ipinsght/ipinsight-201007/ipinsight-201007-5.htm accessed on 11 August 2010.
[687] See 2.2.
[688] This is the challenge because the applicant may use other term such as 'microscale' or 'quantum dots' to describe the nanotechnology invention, or the applicant may incorrectly describe his invention as 'nanotechnology' although it may be not, so the search term of the word 'nano' alone is not a good search term, see for example Bleeker R A et al., 'Patenting Nanotechnology' (2004) materialstoday 44, at p.46; see discussion in 5.3.5.
[689] Creating issues for search-file allocation, multidisciplinary classification schemes; complete prior art searches, substantive examination and examiner recruitment, Scheu et al., n.43, at p.205.

### 4.4.1 Classification and monitoring system

The problems of classification and monitoring occur because of multidisciplinary nature of nanotechnology and the fragmented understandings of the technology[690] have attracted the attention of Patent Offices to come with a solution. For example, in 2004 the USPTO created a new classification reference system for nanotechnology, Class 977,[691] as a cross reference digest for nanotechnology. This helps patent examiners to search for the prior art. In the USPTO, there exists "centres"[692] which have been divided into seven technologies[693]and interdisciplinary nanotechnology patent applications will be decided according to the subject matter which is closest to the application at hand. Because of the unique nature of nanotechnology, it was seen as impossible to have a centre as such for nanotechnology.[694] One view was that if no centre is available to nanotechnology, it renders examiners unfocused in nanotechnology and would lead to less collaboration and communication with other various centres.[695] Instead, it was suggested that a working group be established within each technology centre with the aim to identify patent application in their own field, formulate the examination guidelines, train the selected examiners and periodically discuss with other technology centres.[696] It was suggested too that the multidisciplinary nature requires that the patent application should be assessed by a team of examiners (trained to recognise the inter-disciplinarity of nanotechnology application) rather than just one examiner and the efforts have been made to form a centralised command centre for nanotechnology application instead of multiple separate technology centres.[697]

[690] See 2.2.
[691] USPTO under 35 U.S.C. §8. The term "nanostructures" is referred as an atomic, molecular, or macromolecular structure that (a) has at least one physical dimension or approximately 1 to 100 nanometres, and (b) possesses a special property, provides a special function, or produces a special effect that is uniquely attributable to the structure's nanoscale physical size.
[692] "centre" is a technical division of technology at USPTO.
[693] This centre consisted of different technology of (1) computer architecture and software (TC 2100); (2) biotechnology, organic chemistry (TC 1600); (3) chemicals and materials engineering (TC 1700); (4) mechanical engineering, manufacturing and products, designs (TC 3700 and TC 2900); (5) transportation, construction, agriculture, national security and electronic commerce (TC 3600); (6) semiconductors, electrical, and optical systems and components (TC 2800); (7) communications (TC 2600), Miller et al, n.32, at p.69.
[694] The patent office remains open for a discussion and continues to re-visit the issues, see for example Bleeker et al., n.688, at p.46.
[695] Bawa, n.67, at p.47.
[696] Ibid, at p.47.
[697] Halluin A P and Westin L P 'Nanotechnology: The Importance of Intellectual Property Rights in an Emerging Technology' (2004) 86 J. Pat. & Trademark Off. Soc'y 220, at pp.227-228.

In 2006, the EPO introduced the tagging system to label nanotechnology (see **Appendix 4**).[698] The tagging system is a collaborative intellectual effort of many examiners from different technical disciplines.[699] The tagging system is regularly being updated and improved to adapt the classification scheme to changes of technological development.[700] There are however limitations for the tagging system to operate. This is because the tagging relies upon the European Classification Entries, and not every nanotechnology patent published was tagged.[701] Furthermore, the tagging system might operate to bias towards certain technology.[702] Even, in the case that the patent is not classified under the European Classification, it may slip through the tagging system.[703] In an effort to find the correct definition for trend watching nanotechnology patents and for interdisciplinary searches, the EPO has also formed a nanotechnology working group (NTWG).[704] Generally the working group of nanotechnology at the EPO is to:[705]

(a) create the special tagging system (Y01N)
(b) catalogue the available information from journal articles and conference proceedings on nanotechnology to be appeared online and in-house at the EPO
(c) implement policy for research assistance in nanotechnology
(d) create an awareness to the EPO staff of the new development of nanotechnology, monitor case law and social impact of nanotechnology

In a different jurisdiction, the JPO has also followed to classify nanotechnology system by introducing ZNM Class.[706] The EPO is also developing the Patent Statistical Database

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698 The classification includes (1) Y01N2 – nanobiotechnology; (2) Y01N4 – nanotechnology for information processing, storage and transmission; (3) Y01N6 – nanotechnology for materials and surface science; (4) Y01N8 – nanotechnology for interacting, sensing, and actuating; (5) Y01N10 – nanotechnology for optics; (6) Y01N12 – nanomagnetics.
699 Scheu et al., n.43, at p.209.
700 Ibid, at pp.207-208.
701 Ibid, at p.209.
702 Ibid.
703 Ibid. In this regard, the tagging system Y01N net is decreasing with constant refinement of the European Classification by reclassification.
704 Scheu et al., n.43, at pp.205-206, discuss that the definition has to match closely by the definition used in major industrial R&D programs and by the governmental funding programs where nanotechnology R&D has been given priority.
705 Collin J 'European Commission Action Plan on Nanotechnologies: A Brief Presentation with a View on Intellectual Property' (2006) 3 Nanotech. Law & Bus. 80, at p.82.
706 See for example in Escoffier L 'A Brief Review of Nanotechnology Funding and Patenting in Japan' (2007) 4 Nanotech Law & Bus. 101, at p.107; Igami M and Okazaki T 'Capturing Nanotechnology's Current State of Development Via Analysis of Patents' OECD, STI Working Paper 2007/4, Statistical Analysis of Science, Technology and Industry, DSTI/DOC (2007) 4, 23 May 2007, at p.12.

(PATSTAT) in a collaborative program with the Organisation for Economic Cooperation and Development (OECD). This database acts as indicators for the inventive activity across different technological fields, companies and economical activities and also provides useful assistance in advanced statistical research.[707] At the World Intellectual Property Organisation (WIPO) level, the European Classification System (ECLA)/ International Patent Classification (IPC) Sub-Classes of B82B of Nanotechnology Classification was introduced.[708] From 1 January 2011, a new symbol was introduced, B82Y and the used of tagging system Y01N was discontinued. This new code can be seen in **Appendix 4**. For example, a nanotechnology invention in Zeolite field might also be assigned to class C (Chemistry, Metallurgy) subclass C01 (Inorganic Chemistry) sub-sub class C01B39 Zeolites as well as C01B82B.

The effort to classify nanotechnology should be encouraged and developed further. Commentators agree that a common unique definition for nanotechnology is unnecessary and is unrealistic for a new technology like nanotechnology.[709] What is crucial for overcoming the differences in definitions and to better identify the important field is that nanotechnology should be broken down into sub-disciplines, and only these sub-disciplines would be compared.[710] Currently, Trilateral cooperation is still ongoing which is focusing on a common definition for tagging and harmonisation of classification in nanotechnology, as

[707] For brief information of PATSTAT, see at http://documents.epo.org/projects/babylon/eponet.nsf/0/be6342bb479cc0e8c12575770032025f/$file/patentinfo_news_0901_en.pdf.

[708] See for example available at http://www.wipo.int/ief-projects/c452/c452-a02_usre.pdf, accessed on 14 February 2011. But the class provided according to this ECLA/IPC classification is very narrow and not all patents can fit to this definition, and furthermore nanotechnology related patents are scattered in the ECLA/IPC classification scheme, see Kalinger C 'IPR in Nanotechnology – Lessons from Experiences Worldwide' Proceedings of the Workshop in the Frame of the INC 3 Conference, jointly organized by the European Patent Office and the European Commission, DG Research, 16 April 2007, Brussels, Belgium, available at ftp://ftp.cordis.europa.eu/pub/nanotechnology/docs/iprworkshop-proceedings_02052007en.pdf accessed on 14 Feb 2011. The ECLA is an extension of the IPC and is used by the EPO. Both IPC and ECLA have divided into eight sections from A-H and further subdivided into classes, subclasses, groups and subgroups. The sections are A – Human necessities; B – Performing operations, transporting; C – Chemistry, metallurgy; D – Textiles, paper; E – Fixed constructions; F – Mechanical engineering, lighting, heating, weapons, blasting engines or pumps; G – Physics and H – Electricity, the EPO brochure (2009) available at http://documents.epo.org/projects/babylon/eponet.nsf/0/623ECBB1A0FC13E1C12575AD0035EFE6/$File/nanotech_brochure_en.pdf accessed on 6 March 2011, at p.4.

[709] Hullman and Fycek, n.78, at pp.15-16.

[710] Ibid, at pp.15-16.

well as personal exchanges and comparison of examination process especially in the three offices.[711]

By contrast, Malaysia is yet to have the classification for nanotechnology. The efforts of patent offices from the EPO, USPTO and JPO provide useful guidelines for Malaysia to adopt. The classification not only helps examiners to classify the invention or for examination purposes, but also to search and locate the available prior art. Unlike the practice in the EPO, USPTO and JPO, Malaysia does not have anything as such for cross reference digest and access to prior art for nanotechnology.[712] Since nanotechnology involves more than one technology, the approach of classification should be according to the sub-discipline that concerned of the technology. For the unique terminology of nanotechnology, Malaysia should adopt the common terminology for nanotechnology, not only to alleviate the confusion among the scientific communities but also the legal communities. The monitoring system for nanotechnology will also need to be established. The examiners and trainers in the patent office, their level of technical knowledge should be upgraded and improved from time to time to handle the complexities of nanotechnology. They should prepare themselves with cross-functional expertise across different sub-disciplines. The example of classification of sub-division that nanotechnology cut-across of several classes can be seen in **Appendix 4**, which is taken from the EPO.

### 4.4.2 Patent examiners and examination purposes

Nanotechnology is new and emerging, interdisciplinary by nature, cutting across many different fields. The patent examiners may not have the necessary level of knowledge to understand the technologies for the patent classification and examination purposes.[713] The patent examiner will be highly specialised in his own field, but unlikely to be familiar in

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[711] Ibid, at p.5; the Trilateral Offices could adopt a common and homogenous policy to tag nanotechnology inventions in the future, Escoffier, n.706, at p.107.

[712] Interviewee C assumed that SIRIM will adopt later the nanotechnology terminology as far the standard requirement is concerned.

[713] See for example Halluin and Westin, n.697, at p.226; Bleeker, n.688, at p.44; It is difficult to estimate the number of patents covering in nanotechnology because of the lack of standardization of the terminology, Burger, n.33 at p.249. The role as examiner is important, challenging and critical and the examiner has to provide an effective, efficient and sound judgment of their patent examination, Linn R 'Perspectives on Becoming a Successful Examiner' (2009) 91 J. Pat & Trademark Off. Soc'y 418, at p.419.

other sub-disciplines. Furthermore, examiners may not necessarily receive sufficient training in new technologies, such as nanotechnology. Therefore, examiners may take the simplistic view that a particular ‘invention’ is nanotechnology; without knowing the fact that it may or may not sufficiently constitute nanotechnology.[714] Indeed, the patent office has admitted that, given the complexities, it does not fully understand the technology.[715] To overcome the situation, collaboration and team approach should be encouraged.[716]

It is undoubtedly emphasis that the team approach for examination purpose of the patent would be very much appropriate mechanism to overcome the unique characteristic of nanotechnology. The team approach of the patent examiners comprises an individual expert in each respective field to represent the diverse fields of nanotechnology would be very helpful for the patent office.

### 4.4.3 Prior art

In order to assess novelty and inventive step, the examiner has to identify relevant earlier disclosures or “prior art”. This involves identifying appropriate areas of science, technical literatures and search, and selecting appropriate search terms that are relevant to nanotechnology. Lack of the level of knowledge of the multidisciplinary nature of nanotechnology also gives rise to the issue of determining the availability and the scope of the prior art.[717] Thus, there is limited availability of prior art in nanotechnology because of multidisciplinary and new technology which is still not fully developed. Even, if there is availability of the prior art relevant to nanotechnology, nevertheless difficulty arises because

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[714] This is personal experience of the interviewee C; Almeling, n.82, at para. 35.

[715] From the perspective of the USPTO, see for example Tullis, n.25, at p.5; Halluin and Westin, n.697, at p.8; Norton V ‘What Nanotechnology Means for Intellectual Property’ (2002-2003) Managing I.P. 38, at p.39; personal experience of interviewee C saying that the invention was likely to be refused patentability because the patent examiners do not understand the nanotechnology.

[716] For example see Halluin and Westin, n.697, at p.227; Schellenkens who states that *“a team of examiners is harder to fool than an individual examiner. At the same time, it must be admitted that a multidisciplinary team of examiners does not solve all problems”* because it is still unclear of what standards to use for examining nanotechnology patents, n.25, at p.67.

[717] Section 14(2)(a) PA 1983 refers prior art as anything either by written or oral disclosure made available to the public disclose; Section 2(2) PA 1977; Art 54(2) EPC 2000. Re classification difficulties, see Escoffier, n.706, at p.107.

it is scattered everywhere among various disciplines of science and technology.[718] Although, the prior art may be categorised under different sub-disciplines, it may overlap. This has caused a problem for examining nanotechnology patent applications.[719] The effect of the situation may seem that subsequent researchers will not know the boundary of the nanotechnology patent scope extent, and whether their actions are likely to infringe the rights of other inventors.[720] In classifying and locating prior art for example, the examiners may seek assistance from the industry and academia in order to increase prior art collection relevant to nanotechnology;[721] and they may also get the second review in identifying the resources for nanotechnology prior art from other disciplines in case that the primary examiners might not realised them.[722] For example in the UKIPO websites, in its system of non-binding opinions of validity and infringing invites such information by publication of the cases on the website. This is post-grant procedure or called ex-officio for evidence.

A centralised nanotechnology prior art is inevitably important to be developed.[723] The classification of nanotechnology in terms of a tagging system, as applied at the EPO is a good guideline to provide database for nanotechnology prior art, especially for Malaysia to learn.

### 4.4.4 Specification and claims construction

The challenges of nanotechnology in compliance with the principle of patent law may lie in the construction of the claims and interpretation of the claims as disclosed in the patent applications. The drafters and examiners may find it difficult to sufficiently provide clarity and a concise description of the claims to teach the person skilled in art to practise the

[718] For the same view see Sharma K and Chugh A 'Legal Aspects of Nanobiotechnology Inventions: An Indian Perspective' (2009) Scripted Vol. 6, Issues 2, 433, at p.438; Burger, n.33, at p.248; Zekos, n.294, at p.118.
[719] Reich L D 'Protecting Tiny Gizmos: The Patent and Trademark Office is Preparing for Nanotech Applications' (2004) N.L.J., SI at SI; Tullis, n.25, at p.5.
[720] For an interesting discussion on this point Maebius S B 'Key Considerations in Protecting Your Intellectual Property in Nanotechnology' (2002) 4 J. Nanopart. Res. 373; Miller et al, state that at this stage nanotechnology infringement is hard to enforce because most of inventions are at the early research and relatively few products nanotechnology inventions, n.32, at p.226; Almeling gives an example on dendrimers, because of early and upstream research stage, there is not much available prior art and its boundaries are difficult to know, at n.82, para 21; Lemley, n.25, at p.623.
[721] Halluin and Westin, n.697, at p.228.
[722] Ibid, at p.228.
[723] Ibid, at p.223.

invention. [724] This new issue of claiming strategy is inevitably unavoidable in the complex technology like nanotechnology.[725] The lack of classification also makes the claims more likely to be insufficiently disclosed because competitors will have difficulty in devising suitable sources to identify patents that they might infringe. What amounts to sufficiency for nanotechnology?

Section 56(1)(b) of the PA 1983 provides for the ground of invalidation of patents if the claim or description does not comply with section 23.[726] Regulation 13(1) of the Malaysian Patents Regulations 1986 (Regulations 1986) provides that the claims should be specified clearly, concisely and supported by the description.[727] In other words it reflects the general legal principle that the extent of the patent monopoly, as defined by the claims should correspond to the technical contribution to the art.[728]

Under Regulation 12 of the Regulations 1986, the claims must:[729]

> (c) disclose in such terms that can be understood and in a manner sufficiently clear and complete for the invention to be evaluated and to be carried out by a person having ordinary skill in the art, and state any advantageous effects of the invention with reference to the background art;
>
> …
>
> (e) describe the best mode contemplated by the applicant for carrying out the invention; (UK and EPO do not have a best mode requirement)

This effect of these provisions has been decided in <u>Heveafoam Asia Sdn Bhd v PF (Teknologi) Sdn Bhd.</u>[730] In this case, the plaintiff claimed that the defendant's invention was insufficiently disclosed and did not comply with section 23 of the PA 1983. The defendant

[724] For example see Troilo, and adds however that the disclosure requirement sets boundaries to prevent the patentees at the macro-scale invention from expanding their inventions to the nanoscale, n. 25, at p.38

[725] Axford, L A 'Patent Drafting Considerations for Nanotechnology Inventions' (2006) 2 Nanotech. Law & Bus. 305, at pp.305-306. There is no effective "dictionaries" to interpret the nanotechnology claim construction, so the patent drafters have to exercise their diligence as lexicographers, Tullis, n.25, at p.2.

[726] Section 23 of the PA 1983 provides that 'every application for the grant if a patent shall comply with the regulation as may be prescribed by the Minister under this Act'; section 14(5)(c) PA 1977; Art 84 EPC

[727] Section 14(3) PA 1977 which has been referred by EPO Guideline for Examination, Part C, Chap IV reads *"the specification of an application should disclose the invention in a manner which is clear enough and complete enough for the invention to be performed by a person skilled in the art"* and Art 83 EPC 2000; whereas section 14(5)(c) PA 1977 provides that the claims must be disclosed in clear and concise and be supported by description, and Art 84 EPC 2000.

[728] <u>Exxon/Fuel Oils</u> [1994] OJ. E.P.O. 653, para 3.3.

[729] Section 14(3) PA 1977

[730] [2001] 2 M.L.J. 660.

argued that the claim was clear and precise enough to enable person skilled in the art of latex foam manufacture to understand and perform it. Low Hop Bing J determined that the defendant failed to comply with the requirement under Reg. 12(1) (c) and (e) of Regulation 1986. His Lordship was of the view that the purpose and the meaning of the specification enable the public to evaluate and carry out of the utility innovation in as ample and beneficial a way as the patentee himself uses it. In this case, the judge further stated that the inventor failed to state the parameters including diameter, thickness and the pattern distribution of the annular bores clearly puts the secret of the utility innovation out of the public's reach and as such it was invalid for insufficiency. The judge also stated that the defendant failed to describe the best mode contemplated by the applicant for carrying out the invention by omitting the parameters of the utility innovation, leaving one to a guessing of the relative values.

What is "sufficient"? The specification of the application must an "enabling disclosure".[731] Enabling disclosure forms part of the requirement of 'support' required under section 5(2)(a) of the PA 1977, and one of the grounds for patent revocation for lack of enabling disclosure as provided under section 72(1)(c) of the PA 1977[732]. The HL stated the specification to have enabling disclosure to be 'available to the public' in Asahi Kasei Kogyo KK's Application[733] In Biogen Inc v Medeva[734] Lord Hoffmann emphasised the importance of enabling disclosure by holding that *"the requirement of an enabling disclosure in a patent application is a matter of substance and not form. Its absence should therefore be a ground not only for refusal of the application but also for revocation of the patent after grant."*[735] In assessing what was the appropriate amount to enable disclosure:

> "the specification must enable the invention to be performed to the full extent of the monopoly claimed.[736] If the invention discloses a principle capable of general application, the claims may be in correspondingly general terms. The patentee need not show that he has proved its application in

[731] Such as to enable a person skilled in the art to work the invention.
[732] and Art 138(1)(b) EPC.
[733] [1991] R.P.C. 485, at 536.
[734] [1997] R.P.C. 1.
[735] Ibid, at p.47.
[736] See Pharmacia Corporation v Merck [2002] R.P.C. 75, per Aldous LJ (CA) at 800; Aldous LJ stated in American Home Products v Novartis Pharmaceuticals [2001] RPC 159, at 179 *"I do not believe that the patent system should be used to enable a person to monopolise more than which he has described in sufficient detail to amount to an enabling disclosure if it was, it would stifle research".*

> every individual instance. On the other hand, if the claims include a number of discrete methods or products, the patentee must enable the invention to be performed in respect of each of them".[737]

Thus, disclosure of a recombinant technique to make antigens in a prokaryotic host cell did not justify a claim to a monopoly of any recombinant method of making antigen because the claim was too broad. In Kirin-Amgen Inc v Transkaryotic Therapies Inc[738] the COA stated that for section 72(1) (c) to operate, the question was whether the disclosure of the specification was enabling. Insufficiency was concerned with the enablement requirement and not the clarity or support:

> "in our view TKT's allegation is not a ground of insufficiency, it is an attack of lack of clarity dressed up to look like insufficiency. We can see no reason to stretch section 72(1)(c) to seek to cover issues of lack of clarity of claiming as patentees will not be able to establish infringement of unclear claims".[739]

"Biogen insufficiency" was clarified in H. Lundbeck A/S v Generics (UK) Limited & Ors, Arrow Generics Limited, Teva UK Limited and Teva Pharmaceuticals Limited[740] where Kitchin J had based his decision on insufficiency on Biogen and stated that the claim 1 and 3 were insufficient because claim 1 was a claim to a monopoly of the product (Citalopram). Lundbeck only disclosed one way of making it which would not entitle them to a monopoly of every way of making it. The COA overruled the Patent Court's decision, stating that it is sufficient in a claim to a product (as opposed to a class of products as in Biogen) if the specification discloses one way of making it to the person skilled in the art, Jacob LJ explained that product claims can protect in two ways:

> "Firstly such a claim will have the effect of covering all ways of making the product including ways which may be inventive and quite different from the patentee's route. Secondly it will give him a monopoly over all uses of the patented compound, including uses he has never thought of. I elaborate on the second point a little. A patent can only be granted for a novel substance if the patentee specifies a use for it (absent this he has simply not made an invention at all — has added nothing to human knowledge). But once he has specified a use, his claim to the substance will cover any use."[741]

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[737] [1997] R.P.C. 1 at p.48. Earlier in Chiron Corporation v Organon Teknika Ltd [1994] F.S.R. the court assumed that it was enabling disclosure if the specification enabled single embodiment to be performed.
[738] [2002] EWCA Civ 1096; [2003] R.P.C. 3.
[739] Ibid, at 69. In Kirin-Amgen Inc v Hoeschst Marion Roussel Ltd [2004] UKHL 46; [2005] R.P.C. 9 see obiter of Lord Hoffmann who supported Biogen in paras 111-117.
[740] [2008] EWCA Civ 311; 2008 WL 833673.
[741] Ibid, para 54-55. Arnold J interpreted Lundbeck and applied Biogen in Medimmune Limited v Novartis Pharmaceuticals UK Limited, Medical Research Council [2011] EWHC 1669 (Pat), para 475 but found the

Does "Biogen insufficiency" apply only where there are unusual claims, and not simple product claims?[742] It has been emphasised that Biogen insufficiency is only limited to the form of claim and cannot be extended to an ordinary product claim where the product is not defined by a class of processes of manufacture.[743] Furthermore, it was viewed that Biogen insufficiency is of 'unusual nature' and should be limited to the facts of the case.[744] As regards to nanotechnology, it involves cross-disciplines which is less likely to disclose only one single or simple product (a claim which is difficult to provide in sufficiently clear and concise to be carried out by the person skilled in the art), but rather a class of product that cut across many disciplines. Thus, as Lord Hoffmann laid down the principle in Biogen, such claims in nanotechnology should cover all ways of making the product and enable the person skilled in the art to perform across the whole range of the claim.

### 4.5 Ownership rights in nanotechnology

Patent law grants the inventor the rights of ownership. The patent owner has the rights to exploit the patented invention, to assign or transmit and license their rights.[745] The complexities and multidisciplinarity of nanotechnology challenge on the pre-existing problems in determining the right owner of the invention. Furthermore, research activities in nanotechnology are likely to arise from the government lab and university with public funding, where the question over allocation of the ownership is still uncertain.[746] Being complex in nature, research in nanotechnology is formed on the basis of collaborative research. The partners in the collaborative research normally define their research goals and their undertaking responsibility which more often aims to meet the differing needs of the

disclosure sufficient. See, also Sandvik v Kennametal [2011] EWHC 3311 (Pat) at [106] to [124] per Arnold J, applied by Floyd J in Regeneron Pharmacueticals Inc v Genentech Inc [2012] EWHC 657 (Pat).

742 Aplin T and Davis J *Intellectual Property Law: Text, Cases and Materials* (Oxford: OUP, 2009) at p.582.

743 Lord Hoffmann in H. Lundbeck A/S v Generics (UK) Limited [2008] EWCA Civ 311; 2008 WL 833673, para 35, upheld at [2009] UKHL 12.

744 Freeland R and Blachman G 'The Law of Insufficiency: Is Biogen Still Good Law?' (2009) E.I.P.R. 478, at p.482.

745 Section 36 of PA 1983.

746 Interviewee C; in Australia ownership has proved a thorny problem in University of Western Australia v Gray [2008] F.C.A. 498, see also Monotti A L 'Australia: Patents – Ownership of Academic Employee Inventions' (2004) E.I.P.R. N-129.

parties.[747] In the contract between employee and the employer of the university, the issue in determining what model should be adopted for a clear policy on ownership rights. The first issue is determining the "inventor".[748]

The case law lays down a two step tests in determining the "inventor" i.e. identify the inventive concept and who is responsible for the inventive concept. In Henry Brothers (Magherafelt) Ltd v Ministry of Defence and Northern Ireland Office[749] the proprietor argued that anyone who contributes to the claim in a substantial way must be regarded as an inventor. Therefore, according to the proprietor what is critical is whether the alleged co-inventor took part in the actual devising to a significant extent. Jacob J did not agree with this contention and stated the one who in substance made the combination of elements and was responsible for the inventive concept was the inventor.[750] This was approved later in the COA that it was necessary to identify the inventive concept and it was not just routine application of the engineering skill, however doubting to agree with Jacob J that the invention was a "combination".[751] The difficulty with this approach according to Rose and Roughton is that the invention was a combination in bringing together of things of known attributes to achieve unknown result, and not all inventions are combinations of things, but had admitted that Jacob J's approach cannot be wrong on the facts of the case in question.[752] Rose and Roughton commented that this approach assumed that one person or group of people are entirely responsible for the inventive concept, but it happens that different people make different contributions to an inventive concept.[753] This is fairly true for nanotechnology that it is very likely more than one person to be responsible for different contribution to the inventive concept.

[747] Monotti and Ricketson explain that industry research tends to be strategic and applied with direct commercial application whereas university traditionally tends to answer basic and fundamental questions, n.408,at p.125.
[748] Section 7(3) PA 1977, there is no similar definition in Malaysia or under EPC
[749] [1997] R.P.C. 693; [1999] R.P.C. 442 CA.
[750] Ibid, at 706.
[751] [1999] R.P.C. 442, at 449
[752] Rose D and Roughton A *Entitlement* in Roughton A et al. (eds) *The Modern Law of Patents* (London: Butterworths, 2005), at p.268.
[753] However stated that *"it is impossible to provide any more guidance than that"*, Ibid, at p.268-269.

The inventive concept was examined by Laddie J in IDA v University of Southampton's Applications. [754] In this case, Laddie J argued that to identify the "inventive concept", the person must come up with the inventive concept; the contribution made must be the formulation of the inventive step.[755] Laddie J further determined that it may be impossible to distinguish between the contributions of a number of individuals to a single inventive concept. Laddie J rejected that the inventors could be widened to include those who contributed to a patent for the purpose of making it an enabling disclosure. Commenting on Laddie J's judgement, Rose and Roughton view that this approach will make all inventors rank equally, but the question may arise as to the portion of benefits in accordance with the magnitude of inventive contribution.[756]

These principles were confirmed later in Rhone-Poulenc Rorer International Holdings Inc and another v Yeda Research and Development Co Ltd[757] by Lord Hoffmann.[758] The court took the view that someone is not inventor if he merely assists the inventor in making up the invention after the conception and or merely describes a well-known principle to the inventor.[759]

As Rose and Roughton argued, it is entirely true to say that different people make different contribution to an inventive concept, and it is unwise to assume that only one person or group of people are responsible. This argument is fairly true for nanotechnology since inventor may constitute more than one, who contributes from different disciplines for the inventive concept. For an example as relates to nanotechnology, in making Lab-On-Chip[760] in order to be considered as inventors, the scientist and the computer technologist must establish that they have made actual contribution to the making of the invention, to formulating the inventive concept or "heart" of the inventions not merely assisting in running the experimentation or testing. The cases demonstrate that it is difficult to prove what constitutes

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[754] [2004] EWHC 2109 (Pat); [2005] R.P.C. 11.
[755] Ibid, at para 47; and in the COA [2006] EWCA Civ 145; [2006] R.P.C. 21, at per Jacob LJ at 577.
[756] This is because since all inventors are regarded equal irrespective of their contributions, there is a concern whether equity will step in to solve it and so far there is no case law on this, Rose and Roughton, n.752, at p. 269.
[757] [2007] UKHL 43; [2007] Bus. L.R. 1796.
[758] Ibid, at 1804.
[759] See also Radomsky L and Maebius S 'Patent Ownership Challenges for Nanotechnology' (2004) 1 Nanotechnology Law & Bus. 159, at p.161.
[760] Interviewee D.

inventive concept and who contributes to inventive concept in non-nano situation. This situation will be more difficult in nanotechnology to prove the inventive concept for its being interdisciplinary in nature.

Joint ownership[761] is very significant in relation to nanotechnology because of its multidisciplinary nature. An agreement for collaborative work may specifically state that the inventions will be jointly owned, or will be owned by one or other of the parties. [762] Who is the "joint inventor"? If the person only made a suggestion which is included in the patent claim, he would not be considered as a joint inventor.[763] Florey and Others' Patent[764] related to the invention of new antibiotic by a research team. It was examined that:

> "whatever their several contributions may have been, the members of a team pursuing different aspects of a research project under the direction of a team leader should, in any event, be entitled to an equal share in any benefit resulting from what must inevitably be regarded as a joint effort".[765]

This case concerned biotechnology and research conducted by team, which is relevant in the context of nanotechnology. As this case highlighted, the members of a team pursuing different aspects of a research project under the direction of a team leader would be entitled as a joint effort to an equal share of any benefit. In nanotechnology, a team research consisting of researcher from medical, biology, computer engineering, in designing and building bio-mimetic apparatus. All of the experts provide different aspects to the research project, and they may equally share the benefit arising from the research project. This is supported by decisions from older technologies such as Staeng Ltd's Patent[766] where a contributor with complementary expertise had alerted the other to a method of attaching cable braids to backshell adaptors was held to have come up with the idea behind the invention and not merely contributing advice or assistance. It would have been otherwise, if all he did was to articulate a known problem which was normally encountered in the field.[767]

[761] Section 18(3) PA 1983; section 36(1) PA 1977.
[762] Marchese D 'Joint Ownership of Intellectual Property' (1999) E.I.P.R. 364, at p.365.
[763] Allen v Rawson (1845) 1 C.B. 551, 135 E.R. 656.
[764] [1962] RPC 186.
[765] Ibid, at 193.
[766] [1996] R.P.C. 183.
[767] Chandler P 'Employees Inventions: Inventorship and Ownership' [1997] E.I.P.R 262, at pp.262-263.

The precise issue of who devised the invention is less significant where the invention is produced by a research team all employed at the same company.[768] The issue becomes more significant if the invention is produced by joint project of two different companies or institutions. It was suggested that those who are involved positively from the beginning in the making of the invention until the maturation of an invention are to be regarded as *"joint inventors"*.[769] The reason being, it is not only that this approach maintains the good industrial relationship, but it is also reducing the difficulty in determining who was the actual deviser of the invention when it is involved a team of researchers.[770]

The "actual deviser" is the person who in substance has contributed to the invention, and not merely provided some advice or assistance to the invention. He involves in inventive concept i.e. contributing sufficient input to enable the idea to be transformed into practicality. In nanotechnology "actual deviser" is not merely giving general information on how the size works differently at nanoscale, but he has also to show that the nanoscale information would have different practical application, for example[771] chemical reactivity of the rice husk; nano-robots that seek to destroy cancerous cell or devices that imitate nature (bio-mimetic) or nanoscale sensors device in detecting molecule in the blood. Joint ownership is very significant for nanotechnology as it involves multidiscipline fields. As discussed, for researchers in the same team, they would be considered as the joint inventors, and this may seem less problematic. For nanotechnology, it is not only involves a single research team, but it may involve different teams who are in the same research project. For researcher in different teams, are they still consider as joint inventors? Complex inventorship may lead to joint ownership and differences as quoted from Marchese *"joint ownership is regarded by many legal practitioners as fraught with problems, and therefore to be adopted only as a last resort – one of the problem is the lack of certainty in the rules."*[772] This is undoubtedly likely to occur in complex nanotechnology scenario. Unfortunately, with nanotechnology patents, these difficulties may be unavoidable unless ownership can be agreed among the parties in

[768] Although it will still be necessary to mention the inventors; section 13 PA 1977; Article 62 EPC 2000. And most companies and institutions would have "rewards for inventors" scheme, Marchese, n.762, at p.365.
[769] Phillips J and Firth *A Introduction to Intellectual Property Law* 4th ed (Butterwoths, London: 2001) at p.67.
[770] Ibid, at p.67.
[771] These are examples from interviewees.
[772] Marchese, n.762, at p.364.

advance[773] or it can be resolved through the employee invention code or employment contract that can be invoked against the employee.

### 4.5.1 Inventions under contract of employment

Most of nanotechnology research starts at the university or government's laboratory, the issue of ownership between employee and employer becomes significant. Under Article 60(1) of the EPC 2000, this is a matter for the relevant national law, section 39A of the PA 1977 in the UK. Who in Malaysian law are the employer and employee in the contract of employment? Employee is "*a person who works or has been worked under a contract of employment, or who is in employment under, or for the purposes of, any individual or organization.*"[774] The general rule is that any works done under the contract of employment shall be deemed to accrue to the employer, save in the absence of any provision to the contrary.[775] The proviso provides that in the case that the invention acquires economic value greater than the parties could reasonably foresee at the time of concluding the contract of employment, the inventor shall be deemed to be entitled to equitable remuneration.[776] This provision requires that invention made 'in the performance' and 'in the execution' of such work, in the absence of any provision stated otherwise shall be accrued to the employer. However, how the practice of this provision may be debatable because what constitutes "in the performance" and "in the execution" of the works is uncertain. The invention is deemed to accrue to the employer where the employee invents in the fields of activities of his employer by using data or means placed at his disposal by his employer.[777] Under this provision (section 20(2) PA 1983) requires that when the contract of employment has not provided for any inventive activity, but the employee has used the data or placed for his activities, the invention made shall belong to the employer. This provision is also likely to create problems because of the wording "does not require him to engage in any inventive activity" and "using data or means placed at his disposal by his employer" look ambiguous in their application.

[773] See also 3.3.2.
[774] Section 3 PA 1983, whereas the employer is defined as 'in relation to an employee, means the person by whom the employee is or was employed'.
[775] Section 20 PA 1983.
[776] Section 20 (1) PA 1983.
[777] Section 20(2) PA 1983.

There was only one case in Malaysia dealing with the contract of employer and employee.[778] In determining whether there existed the contract of employment between the parties, the court in Transachieve Sdn Bhd v Econ PI Pile Sdn Bhd & Anor[779] held that the documents produced were insufficient to prove that Wu Bong was actually an employee of the company when he made the invention. In this case, the inventor, Wu Bong invented *"improvements in and relating to apparatus for pile driving"* and taking the form of a hydraulic piling apparatus using a three hydraulic jacks system. Wu Bong later assigned his patent to Econ PI Pile Sdn Bhd. Transachieve Sdn Bhd claimed to be the rightful owner of the invention because Wu Bong had made the invention in his duties under the contract of employment. The company produced evidence to prove that Wu Bong was an employee such as remuneration vouchers, certified attendance and wages of workers, payment for certain crane charges, quotation for piling works, minutes of the meeting and progress claim for piling works of the company. However Abdul Aziz J stated that none of the documents produced proved that Wu Bong was an employee of the company at the time of the invention. The court said that the salary vouchers indicated Wu Bong was an employee from April 1994, whilst in fact he had made the invention earlier than that. The court further stated that the payments received by Wu Bong in considering his involvement in the affairs of the company as were as executive director but not as employee.

The dearth of court decisions in Malaysia, allows observing the practices in the UK. Section 39 of the PA 1977 provides two situations when the employee's invention belongs to the employer that is (1) the invention belongs to the employer if (i) if it has been made in the course of employee's duties which can either be "normal duties" or "specifically assigned"; (ii) where circumstances such that an invention might reasonably be expected to result from the carrying out his duties; and (2) the invention belongs to the employer (i) if it has been made in the course of the employee's duties; and (ii) while making the invention, the employee had a special obligation to further the employer's undertaking because of the nature of his duties and the particular responsibilities arising from it.

[778] Even in the UK there is not much decided case law on the issue of employer-employee relationship.
[779] [1997] 4 C.L.J. 500 (HC).

The phrase "normal duties" was considered in Greater Glasgow Health Board's Application[780] Dr Montgomery was employed as at Registrar and conceived the original idea for the invention not during clinical work but while he was involved in private study at home. The Hearing Officer examined that the invention did not belong to Dr Montgomery because it was connected with his primary duties as a clinician. On appeal, Jacob J stated that the word "circumstances" under section 39(1)(a) referred not on the general circumstances but on the particular circumstances surrounding the making of the invention. Thus, the invention was not related to his normal duties as Registrar, and he was doing it at home.[781]

In LIFFE Administration and Management v Pavel Pinkava[782] the appellant devised a system and related inventions in trading on an electronic exchange of various financial instruments. The COA stated that in the six months leading up the invention, the employee's duties had been directed to the creation and development of credit derivatives systems, and therefore were characterised as "normal" rather than "specifically assigned". The COA opined that the test was an objective test, the relevant invention was owned by LIFFE.[783] In this case the court looked at what employee actually did and at the contract of employment. As such, it is possible for the normal duties of an employee to exceed of those terms stipulated in the employment contract.

By contrast, section 20 of PA 1983 provides that rights to the invention made in the course of employment shall be deemed to accrue to the employer. Thus, employer asserts their rights over all patents generated in the course of employment. The section also states that employer also has rights over patents generated by the employee outside their employment contract where substantial data and place have been used. Some employer rewards the employee with remuneration where the invention has benefited the company and was successfully exploited. This section seems to give unfair treatment for the employee, where potentially in all circumstances, it assumes that all invention created in the course of employment is accrued to the employer. Thus, in light of UK law, Malaysia's best move would be to amend this section, in particular for nanotechnology. The situations provided under the UK law, would

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[780] [1996] R.P.C. 207; see also Staeng Limited's Patents [1996] R.P.C. 183.
[781] Ibid, at 222.
[782] [2007] EWCA Civ 217; [2007] R.P.C. 30; see comment on this case in Chandler A 'Ownership of Employee's Inventions: Duties, Expectations and Variable Objectivity' (2008) E.I.P.R. 164.
[783] [2007] EWCA Civ 217; [2007] R.P.C. 30, at 696.

be more convenient for employees who is working in nanotechnology. What could be considered as "normal duties" or "specifically assigned" in nanotechnology is based on the circumstances in each case. For example, "normal duties" and "specifically assigned" in developing bio-mimetic devices could be analysing the related data, testing and experimenting, how could the devices mimicking nature, and the use of the devices in detecting disease in the body. If the invention is created by the employee in his employment contract, this invention would belong to the employer. There are circumstances to consider too, as Rose and Roughton pointed out above such as term in the contract, instructions directed from the employer, employee's qualification and degree of proximity with other technology would be taken into consideration to expect that the invention is resulted from carrying out his duties.[784] He is also under obligation to further the employer's undertaking because of the nature of his duties and particular responsibilities arising from it. What is important is that the ownership created in the course of employment would be vary according to the case by case basis, especially significant to emerging technology like nanotechnology, if not, it would have the potential to impede further development.

The contract of employment related to the university context is worth exploring for nanotechnology. However, it is admitted that the course of employment in the university is rather important and complex.[785] The issue becomes contentious, as Monotti and Ricketson state *"IP issues have now moved to the forefront ... and the questions of ownership and entitlement have become of pressing concern to university administrators, academic, students, government and other outside bodies"*.[786] Hull and Toutoungi point out *"the age-old question--what is an academic actually employed to do?"* [787] This entitlement dispute generally has been predicted to increase in the future where Jacob LJ has observed that:

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[784] N.752, at p.273.
[785] Interviewee C; see also Monotti, A, 'Who Owns My Research and Teaching Materials – My University or Me? (1997) 19 Sydney L. Rev. 425, at p.428; McSherry C Who Owns Academic Work? (Cambridge: HUP, 2001), strongly states that *"the relationship between IP law and academia is not a simple one,"* at p.65.
[786] Monotti and Ricketson, n.408, at p.10.
[787] Hull J and Toutoungi A 'Topsy-Turvey or Just Down Under? A Case Note on University of Western Australia v Gray (2010) E.I.P.R. 43, at p.47; see also Poore come up with interesting questions relevant to the patent ownership in the university and joint collaboration such as (a) where do university's inventions come from?; (b) who was the inventor?; (c) in the cross discipline collaborations, who devises the invention?; (d) whether the inventor has assigned the right to the third party? Poore A 'Patently Too Far? University Inventions – Lessons from Cambridge' (2006) Bio-Science Law Review available at http://pharmalicensing.com/articles/disp/1158246495_4509705f6bb6d accessed on 10 August 2007.

"we were told that in very recent years there has been (and are) a rash of entitlement cases before the Comptroller. No-one really knew why this jurisdiction (which in my time at the Bar was moribund) has recently come alive. There was some speculation about an increase in joint ventures, or an increase in the appreciation of the significance of patents. None of them really explain it".[788]

Ownership has always been problematic to determine, and this could be doubled for multidisciplinary fields of research collaborations programme like nanotechnology. In the UK, the ownership right governing the university employee has no specific provision, only the provisions under the section 39 above.

In universities elsewhere, the rights of ownership normally derive from statutory or common law provisions, or an IP policy for the management of the IP.[789] Some may refer to the Research and Development Agreements, the legal regimes governing inventions made by academic employee.[790] Nevertheless, although universities provide their own IP policy, the details of allocation of the royalty or the ownership are not often clearly articulated and are ambiguous.[791] The lack of clarity over IP in research collaborations has been recognised by the Lambert Review produced in 2003 which stated that:

"when a research project is fully funded by the university and public sponsors, such as the Research Councils and Funding Councils, there is no question of business owning any IP that results. On the other hand, when a university carries out contract research that is fully funded by industry, the company will usually own any resulting IP. However it is much more difficult to agree the ownership of IP in research projects that have been funded by both universities and industry. Most business funding for university research is in this form. IP ownership is often strongly contested in these research collaborations, because the sponsors have different interests in the rights to exploit and use the IP. Universities say that they need ownership to ensure that their future research is not held back. Industry often argues that it needs ownership to protect the

[788] IDA v University of Southampton [2004] EWHC 2107 (Pat) and on appeal [2006] EWCA Civ 145, at 578.

[789] However, the use of statutory and common law provision may not be a perfect way to determine the ownership rights at the university, Monotti, n.785, at p.470.

[790] Stallberg C G 'The Legal Status of Academic Employee's Invention in Britain and Germany and its Consequence for R&D Agreements' (2007) , at p.489.

[791] Interviewee C who strongly stated although in theory the royalty basis has been determined, but in practice the allocation of the royalty is still vague and this is reinforced by the low level of commercialization in IP. Malaysia lacks innovation hotspots to develop homegrown technology and this situation should be supported by the development of centres of basic and applied research to generate the idea and encourage the commercialization, 'Local Universities, Research Culture and Start-up Activities Still Weak' The Star Online, 20 Nov 2009, available at http://biz.thestar.com.my/news/story.asp?file=/2009/11/20/business/514591&sec=business accessed on 8 Dec 2009.

> investment which will be required to develop the IP into a commercial product. There is no clear framework in the UK for IP negotiations to help the two sides balance their competing interests. Government, Research Councils and Funding Councils all devolve responsibility to universities to negotiate terms on a case-by-case basis".[792]

Since multidisciplinary, the issue of collaborative university research outside the written agreement is more complex in nanotechnology. The contract of employment and NDA in advance would be very significant.[793] In the absence of such agreements, it is difficult to determine the ownership in the collaborative works like nanotechnology.

In Australia, two important court decisions concerning the ownership rights at the university. In Victoria University of Technology v Wilson[794] Prof Wilson and Dr Feaver had developed an electronic trade exchange system and related software programs made during the course of their employment at the Victoria University of Technology. Subsequently, they together with Mr Craig Astil formed a company, MP3. The issue before the court was who had the right over the invention? In this case the court stated that the IP policy which governed entitlement to inventions was not enforceable because it was not effectively passed and promulgated. The court added that the mere use of the university time and resources was insufficient to confer the right of ownership to the university. The court also said that as to whether the invention belongs to the university depended on the nature of the research undertaken by the employee. The duty to do research does not alone to make the university own the invention.[795]

In University of Western Australia (UWA) v Gray[796] Prof Gray invented treatment of liver cancer using microsphere technology. This research was carried out during his working hours at the university. In the contract of employment it was stated that his duties were to teach, conduct examinations, supervise and organise research. He applied for patent on the technology and UWA claimed the invention belonged to the university since it was created during the contract of employment. In Australia, there was no equivalent provision to section

[792] HM Treasury, The Lambert Review of Business-University Collaboration, Final Report, Dec 2003, available at http://www.hm-treasury.gov.uk/d/lambert_review_final_450.pdf, accessed on 9 Jan 2010, at para 4.13-4.15.
[793] See 3.3.2.1.
[794] (2004) 60 I.P.R. 392.
[795] See also comment on this case in Monotti, at n.785 above.
[796] [2008] F.C.A. 498.

39 of the PA 1977 that governed invention made under the contract of employment. Under common law principles, in the absence of express terms, UWA had to rely on the implied term, that IP developed in the course of employment belongs to the university. French J rejected reliance on the implied term of the contract of employment. He said that in the absence of any enforceable express term, in the course of their research, the right of ownership belonged to the academic inventors. The decision by French J was upheld on appeal in the Full Federal Court which stated that Prof Gray had no duty to invent because his duties were to teach, undertake research and to organise research. Whether to invent or not is a matter of choice because Prof Gray had no obligation to perform duties from which invention might result. The Court also stated that there was no basis in implying into the contract of employment for the academic staff a duty not to disclose the result of research, even if such disclosure could destroy the patentability of an invention.[797]

Based on the court's decision, the disputes over IP ownership are becoming more contentious. Although a university may provide for entitlement of ownership on the basis of agreement, this does not always solve the problem. Hull observes that even with agreement in place, the potential for dispute should not be ignored especially in the areas of performance of the agreement or breaches of confidence or quality of work carried out.[798] He further states that there should be in principle be less scope of conflicts of the ownership of IPRs provided that the parties have defined what they bring to the project and anything new arising in sufficiently clear terms which give no room for further interpretation, so that a lengthy and costly action could be avoided.[799] In this regards, that is useful to examine the model that the university should adopt a clear ownership policy in their own organisation, though inevitably this research and inventions relates to future example of which is not known in advance. Monotti discusses two different models of extended ambit claims;[800] the first model is to reject the extended ambit claims and sustain the statutory and common law principle but in certain situations there may be need for specific agreements for ownership of

[797] See comments on this case by Monotti A L Australia: University of Western Australia v Gray – Patents (2010) E.I.P.R. N1; and Hull and Toutoungi, n.787 above.
[798] Hull J 'Ownership of Rights Created in Sponsored Academic Collaborations – A Note on the IDA, Statoil and Cyprotex Decisions' (2007) E.I.P.R. 6, at p.14.
[799] Ibid, at p.14; see also per Jacob J in "IDA v University of Southampton [2004] EWHC 2107 (Pat) and on appeal [2006] EWCA Civ 145; [2006] R.P.C. 21, at 579; The Lambert Report, n. 791, at para 3.34.
[800] These claims *"assert ownership over general classes of future intellectual property to which a university otherwise has no automatic legal right. These extended ambit claims are to be contrasted with individual agreements that an originator signs before commencing particular research"*, Monotti, n.785 at p.427.

the IP.[801] Accordingly, specific agreements of ownership can increase the certainty of ownership rights of IP, and the university will be more focused on what types of IP it wishes to own.[802] The second model is to consider that statutory and common law principle is not the only way to allocate the ownership but also to include extended ambit claims in all employment contracts to divert attention from employment duties alone.[803] Extended ambit claims would be very helpful to enhance the clarity of ownership in case that there was a dispute of the university ownership on the grounds that the creation of patented invention is outside the duties of employment, while the creator had been using university-owned IP.[804] These two models are significant for nanotechnology multidisciplinary research and ownership. For the first model, it gives the element of certainty in determining the ownership because it is specifically stated in the agreements; whereas for the second model, it gives some flexibility that employment duties are not the only means to indicate the ownership arising from the collaborative research. There are however, other considerations would be taken into account in determining the ownership. These models would only act as a guideline; there should not be standard models for ownership rights to all research institutes for nanotechnology. This is because, not only that the technology is different, but also different institutions involved with different team members or people. So, to adopt a standard model it would give unfair advantage to one another in the collaborative research. Instead, it may be suggested that the agreements should be drafted with a view to ensure that all parties/team enjoy an equitable share. In the UK, however, section 42 of the PA 1977 renders contract terms unenforceable if they diminish employee's rights over future inventions. However, as Jacob J stated, it may be better for the university to negotiate a contract which is more generous to the employee and enjoy certainty, rather than be locked into dispute.

### 4.5.2 Employee compensation scheme

Section 40 of the PA 1977 provides that an employee is entitled to a compensation award having made an invention for which a patent is granted where a patent is of *"outstanding*

[801] Monotti, n.785, at p.466.
[802] Ibid, at p.467.
[803] Ibid, at p.468.
[804] Ibid, at pp.468-469.

*benefit"* to the employer. After the amendment in 2004,[805] an employee is entitled to a compensation for not only that the patent, but also the invention that has been of outstanding benefit. In order for the employee to be awarded compensation, this provision requires that the invention has been granted a patent belongs to the employer taking into account the size and nature of the employer's undertaking and whether it is just for the employee to be rewarded.

This provision is silent of what constitutes "outstanding benefit" and it is difficult task to determine the meaning.[806] There was a view that this provision is of little practical value and has been seen as unattainable threshold for the employee who intends to rely on it.[807] It is not an easy task to determine what benefit has accrued as a result of patent because of *"marketing expertise, consumer fads, eye-catching design appeal and the opening up of new overseas markets"*.[808] Furthermore, it is a lengthy process for the patentable invention to be converted into sufficiently established products in a market place for it to be considered as having outstanding benefit.[809] The provision provides that the benefit means in the form of money and money's worth.[810] The benefit must be actual and not potential benefit.[811]

In British Steel's Patent[812] the court stated that outstanding benefit implies superlative and to be a correspondingly stiff test to justify for an award of compensation.[813] The size and nature of the employer's undertaking must be looked at the total benefit obtained against the turnover and profits of the employer's relevant business.[814] Here the benefit in monetary terms was no more than 0.01 per cent of turnover or 0.8 per cent of profits. The monetary

[805] It has been made through section 10 of Patents Act 2004; there is no similar provision in Malaysia.
[806] Howell C 'Compensation at Last for Employee Inventors: Kelly v GE Healthcare Ltd' (2010) J.B.L. 41, at p.47.
[807] Hobson N and Shafran T 'Kelly and Chiu v GE Healthcare Limited' (2009) E.I.P.R. 523, at p.523; see also Lee Y J and Langley M 'Employee's Inventions: Statutory Compensation Schemes in Japan and the UK' (2005) E.I.P.R. 250, at p.252.
[808] Chandler P A 'Employees' Inventions: Outstanding Compensation' (1992) J.B.L. 600, at p.602.
[809] Ibid, at p.601.
[810] Section 43(7) PA 1977.
[811] Stalberg, n.790, at p. 489; but after Kelly v GE Healthcare Ltd [2009] EWHC 181 (Pat); [2009] RPC 12 Ch see below.
[812] [1992] R.P.C. 117.
[813] Ibid, at 122; see also Memco-Med's Patent [1992] R.P.C. 402, at 414.
[814] [1992] R.P.C. 117, at 126.

benefits are in the form of net benefit, that is all costs relating to invention's or patent's commercialisation or protection are to be deducted.[815]

In GEC Avionics Ltd Patent[816] the court stated that the word "outstanding" was something out of ordinary and not such as one would normally expect to arise from the results of the duties for which the employee was paid for.[817] The court also stated that the benefit needed to be looked at in the total context of the employer's activities to see whether it was outstanding.[818]

The court was reluctant to define "outstanding" in Memco-Med's Patent[819] on the basis that *"court will recognise an outstanding benefit when it occurs"*.[820] The court stated that it would be impossible to define this relative concept. The finding that a patent was of "vital importance" to the employer was also found to have been insufficient to amount to an "outstanding benefit".[821]

The cases above were not successful. Thus, it was viewed that the right for statutory right of the compensation scheme *"was more theoretical than real"*[822] and was considered to be *"a dead letter"*.[823]

The cases mentioned above were decided before section 40 was amended. Kelly v GE Healthcare Ltd[824] concerned the two patents granted for two inventions on successful products called "Myoview". The amounts of £1.5m in compensation were granted to two inventors from their former employer. The court examined that the two patents granted for the invention used in Myoview were of "outstanding benefit. The court assessed the benefit

[815] Ibid, at 124; see also Bently and Sherman *"investment of resources and effort required by the employer to move the invention from initial conception to practical, profitable reality"*, n.211, at p.570.
[816] [1992] R.P.C. 107.
[817] Ibid, at 115.
[818] [1992] R.P.C. 107, at 115.
[819] [1992] R.P.C. 403.
[820] Ibid, per Aldous J at 414. In this case the size and nature of the employer's undertaking is depending on circumstances of the whole or a division of the employer's business.
[821] Ibid, at 417.
[822] Aplin and Davis, n. 742, at p.628.
[823] Grubb, n.620, at p.393.
[824] [2009] EWHC 181 (Pat); [2009] R.P.C. 12; See case comment on this by Hobson and Shafran, n.807; Howell, n.806; Odell-West A 'Kelly v GE Healthcare Ltd: Employee Innovation in Health Care: Deciphering Ownership and the Alchemy of "Outstanding Benefit" (2010) E.I.P.R. 449.

to the employer of the patents were £50 million and 3 per cent would be a fair share to be awarded to the employees i.e. £1.5 million. The benefit considered in this case was that the patent protection *"running many years into the future"* which would have the effect of achieving the corporate deals.[825] Floyd J tried to clarify *"the collection of vague terms"* and stated that outstanding means *"something special"* or *"out of ordinary"* and more than *"substantial", "significant"* or *"good"*.[826] According to Floyd J, to be outstanding *"it must be something out of ordinary and not such as one would normally expect to arise from the results of duties that the employee is paid for"*.[827] Thus in this case, the patents were of outstanding benefit to the employer Amersham taking into account the size and nature of the undertaking. The benefit of patent protection was not limited only to profits from sales because the Amersham's having a patented blockbuster radiopharmaceutical was a major factor in achieving corporate deals. In this way, according to the court, the patents helped to transform Amersham, and were of outstanding benefit.[828]

Advocates argue that although the claims are still rare under the compensation statutory compensation scheme, nevertheless, the schemes ensure that companies maintain their internal arrangement to reward contribution made by their employees.[829] From the standpoint of the employer, it was argued that the statutory compensation scheme is undesirable because the employee's salary is sufficient for all requisite duties, and to compensate the employee would mean that he would get double payment.[830] Whereas, the employee might argue that the profits gained by some of his inventions far beyond the level of payment received from his employer.[831] It was viewed too that the claim for compensation is likely to be brought by the ex-employee rather than the existing employee.[832] This is very important as Howell pointed out that *"having a reputation as someone who brings such a claim may irretrievably harm your future prospects in the job market in seeking employment"*.[833] As far as academic

[825] [2009] EWHC 181 (Pat); [2009] R.P.C. 12, at 391.
[826] Ibid, at 374; Floyd J admitted that this section was difficult to interpret and apply, at 372-273.
[827] Ibid, at 374.
[828] Floyd J [2009] EWHC 181 (Pat); [2009] RPC 12, at 374, at para 150.
[829] Available at the UK Patent Office, 'Consultation on the Proposed Patents Act (Amendment Bill) available at www.patent.gov.uk/about/consultations/responses/patact/enforcement.htm accessed on 3 April 2010.
[830] Chandler, n.808, at p.600.
[831] Ibid, at p.600.
[832] Von Falck A and Schmaltz C 'University Inventions' (2005) I.I.C. 912.
[833] Howell, n.806, at p.53; see also Lee and Langley, who state that by bringing claims for compensation to court would appear that the employees would jeopardize their positions, or future promotion or employment prospects in the company, n.807, at p.253.

employees are concerned, and related to their nature of the work, they *"can rarely expect financial rewards"*.[834] Furthermore, there is little evidence to say that those countries which have adopted a compensation scheme successfully would produce higher inventive activity than those countries which do not have the statutory compensation scheme.[835] If the reward is granted on an individual basis, the researcher would be reluctant to share ideas to work collaboratively thereby stifling innovation and reducing creativity.[836]

The provisions of section 40 are likely to be even more problematic to determine which inventions or patents have "outstanding benefit" where there is team work, not only within one company, but across of different teams from different companies and institutions. This is because the compensation awarded is linked to the individual inventions or patents, and the existence of research teams can create difficulty in determining who actually contributed what in terms of the relative size and individual contribution.[837] Furthermore, the success of an invention also depends on R&D, because there are many stages of developing an invention to be put into the market place.[838] Therefore, rewarding those employed inventors would be unwise decision without rewarding those who might contribute after an invention to its commercial success.[839] Moreover, the individual researcher would be reluctant to share his idea with other researchers because compensation will be granted only to employed inventors. It is rather impossible for a nanotechnology researcher to work alone. For that reason, rather than to have to rely on a compensation scheme, it is desirable to adopt contractual agreements between employee and employer, in the forms of rewards schemes in a monetary basis such as salary increments, bonuses, share options; or a non-monetary basis such as career progression, greater autonomy in a research project or opportunity to work with high-calibre fellow professional that equitably reflect the contribution of all employees towards the success of an invention.[840] It was also argued that the reward should be left to the employer who could assess the contribution of the researchers and developers in term of

[834] Stallberg, n.790, at p.503; see also Monotti and Ricketson, n.408, at p.156; Bently and Sherman, n.211, at p.568.
[835] Phillips and Firth, n.769 at p.112.
[836] Howell, n.806, at p.42.
[837] Lee and Langley, n.807, at p.255.
[838] Company R&D projects normally involve team efforts where a researcher's inventive activity builds upon the work of colleagues, Merges R P 'The Law and Economics of Employee Inventions' (1999) 13 Harv. J. L. & Tech. 1, at pp.20-21.
[839] Lee and Langley, n.807, at p.255.
[840] Ibid, at p.255.

salary, bonuses or promotion, without having named them as individual inventors.[841] This argument is very significant in the context of nanotechnology to adopt contractual agreements between employer and employee in determining what sort of rewards scheme that are appropriate to the success of nanotechnology invention.

Thus the UK statutory compensation scheme does not provide a good framework for nanotechnology as this scheme is designed for individual inventors, whereas, in nanotechnology invention is team-based and collaborative. What is important is that, it should give some flexibility in the contract, as argued by Lee and Langley that contractual agreements are *"a sounder solution"* than statutory compensation scheme as the decision makers are more familiar inside the industry or the technology concerned, and this is fairly wise to optimise the incentive and reward.[842] Merges suggested four types of employer-based award scheme; (a) implicit career-path progression for significant inventions; (b) bonuses for significant inventions; (c) output-based bonus schemes and (d) schemes based on individual employee contribution and valuation of the invention.[843] Furthermore, as Grubb pointed out, the statutory provision could pose a problem on the basis that even the term 'outstanding benefit' were to be redefined or interpreted;[844] (a) if the invention was kept in secret as know-how, or patent was refused because of prior art, the compensation would not be paid no matter how important the invention was; (b) "outstanding benefit" regards to the size of the company, where large companies because of different departments involved were less likely to get the compensation from those in smaller companies; (c) the compensation is due only from the employer at the time the invention was made, and in case that the employer sells the business, the employee has no claim against the new owner.

## 4.6 Defences for patent infringement

In principle, patent does not allow any unauthorised use of a patented invention. Once the patent has been granted, the owner has exclusive rights to exercise over the invention. If someone exercises the rights without the permission of the rightful owner, he is said to

[841] Howell, n.806, at p.42.
[842] Lee and Langley, n.807, at p.255.
[843] Merges, n.838, at p.45.
[844] Grubb, n.620,at pp.393-394.

commit an act of infringement. However, this may not always be the case in certain situation the act done, for example by the use of patented invention in the experiment or the person has already used the invention prior to the grant of patent may not constitute infringement. Thus, the right holder of the patent would be limited of his rights to exercise over the patent. This section examines defences for patent infringement under patent law.

In Malaysia, this limitation of the rights[845] includes experimental use,[846] prior use,[847] implied licence to repair,[848] parallel import,[849] government use[850] and Malaysia also has compulsory licensing.[851] However, this thesis will not discuss of all of these limitations. Implied licence to repair depends on whether the invention is a product or process. In nanotechnology, the invention often concerned on the process[852] rather than product, therefore, implied licence to repair may seem impossible to apply. Implied licence to repair means that repairing of nanoscale product falling short of remanufacture or remaking it: United Wire Ltd v Screen Repair Services.[853] Again, at nanoscale there is little scope for this either. Parallel imports are also product specific. For government use,[854] it could be argued that nanoscale does not seem to be different from other inventions in this regard. Therefore, this thesis only focuses on defences which are potentially especially relevant and or problematic to be applied to nanotechnology patent i.e. experimental use defence and prior user rights.

### 4.6.1 The experimental use defence

The legal development of the scope of experimental use defence has significantly different in different jurisdictions. Some countries (like Malaysia and UK) have provided through

[845] Section 37 PA 1983.
[846] Section 37(1) PA 1983.
[847] Section 37 (2) (ii) and section 38 PA 1983.
[848] This is developed through case law whereby the user of patented article would have an implied right to repair and use of the article without commits an act of infringement. See the scope of implied licence to repair in Solar Thomson Engineering Co Ltd and Anor v Barton [1977] 17 R.P.C. 537.
[849] Section 58(A) PA 1983.
[850] Section 84 PA 1983.
[851] Section 48 PA 1983.
[852] For example the production process of carbon nanotubes in many different variants by IBM such as "a hollow carbon fiber having a wall consisting essentially of a single layer of carbon atoms", US Patent No 5424054.
[853] [2001] R.P.C. 24.
[854] Art 31 TRIPS refers "other use" in the footnote as the use other than that allowed under Art 30 of TRIPS, and this may include government use or the use by the third parties authorized by the government, Gervais, n.222, at p.381.

statutory provision;[855] whilst the other countries has adopted the common law principle through judicial creations (such as Australia and the US). This gives the indication that the application of the scope of experimental is flexible, and to some extent uncertain.[856] Legal commentators have also observed that experimental has been "ill-defined"[857] and other has emphasised that *"although the experimental use exemption is widely recognised"* nevertheless *"its metes and bounds are not clear, and its existence presents legal difficulties"*.[858] In a different jurisdiction, particularly US, discussion for the scope of experimental has attracted great concern.[859] Before the decision in Madey v Duke University[860] it has been emphasised that the scope has never been given a proper definition in the US law and *"this vaguely defined doctrine is becoming less satisfactory"*.[861] Eisenberg observed that the scope of experimental is still uncertain:

> "it is difficult to discern the scope of this exception with any precision, inasmuch as experimental use becomes an issue only in patent infringement actions ... within this universe, the experimental use defense has been frequently raised, but almost never sustained. Nonetheless, courts have consistently recognized the existence of an experimental use defense in theory, although the defense has almost never succeeded in practice".[862]

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[855] Originally common law based and enacted in statutory form. See classic example of common law principle of exception in Fearson v Loe (1878) 9 Ch D 48; Proctor v Bayley and Son (1889) 6 R.P.C. 106.

[856] Karp J P 'Experimental Use as Patent Infringement: The Impropriety of a Broad Exemption' (1991) 100 Yale Law J. 2169, at p.2172.

[857] Cornish W R 'Experimental Use of Patented Inventions in European Community States' (1998) I.I.C. 735, at p.752.

[858] Gilat D *Experimental Use and Patents*, IIC Studies, Vol. 16 (Weinheim: VCH, 1995), at p.3.

[859] See for example, Mueller J M 'The Evanescent Experimental Use Exemption from United States Patent Infringement Liability: Implications for University and Non-Profit Research and Development' (2004) 56 Baylor L. Rev. 917 states that the lack of statutory provision under the US patent law causes the industries to outsource the research and development at the foreign countries, and suggests for the general experimental use exemption for patent infringement, at p.972; Mueller J M 'No "Dilettante Affair": Rethinking the Experimental Use Exception to Patent Infringement for Biomedical Research Tools' (2001) 76 Wash. L. Rev. 1, suggests for the US to adopt "liability-rule" model to compensate the patent owner in the form of "royalty-through approach" for unauthorised used of the patented research tools, where accessing to the research tool is difficult, at p.10; Rai A K 'Regulating Scientific Research: Intellectual Property Rights and the Norms of Science' (1999) 94 Northwestern U. L. Rev. 77, proposing a broader scope for the experimental use defence to reduce transaction and creativity costs, at p.139. However, the court's ruling in Madey v Duke was actually narrowed its scope in the university context.

[860] 307 F.3d 1351 (Fed. Cir. 2002).

[861] Eisenberg R S 'Patents and the Progress of Science: Exclusive Rights and Experimental Use' (1989) 56 Univ. Chi. Law Rev. 1017, at p.1020; see also Merges R P and Nelson R R 'On the Complex Economics of Patent Scope' (1990) 90 Colum. L. Rev. 839, which state that *"the defense of "experimental use" can be involved by one accused of infringement ... but the precise contours of the defense, which is derived solely from case law, are unclear"*, at p.866, n.118.

[862] Eisenberg R 'Patenting Research Tools and the Law' (1997) Intellectual Property Rights and Research Tools in Molecular Biology 6, National Academy Press, available at http://stills.nap.edu/htm/property/2.html; see also Eisenberg, n.861 at p.1018. This is to qualify of what Eisenberg comments before Madey that the scope of experimental use defence is uncertain. See also the COA for the Federal Circuit in Roche Products Inc v Bolar Pharmaceutical Co Inc 733 F.2d 858 (Fed. Cir. 1984) that research exemption was referred to as "truly narrow"

In the US, Madey related to research tools. Madey an ex-professor of Duke University (Duke) sued Duke for patent infringement for using his two patents on equipment used in the laboratory. Duke contended that being non-profit and educational institutions alleged the defence for experimental use applied because it was used for non-commercial and educational purposes. The Federal Circuit laid down a principle that the exception was only applied for *"amusement, to satisfy idle curiosity, or for strictly philosophical inquiry"*. It was further stated that Duke was a major research university, purely scientific in nature and not for commercial purposes, but they still contribute to the university's legitimate business objectives. Under Madey experiments on or about the invention are covered, but not experiments using the invention as a research tool. The decision in Madey is important although this study is aimed to discuss more closely the position in the UK (as persuasive for Malaysia) and Malaysia. Gowers mentioned that the experimental use defence is still unclear as what 'use' means; normally uses in relation to the subject matter of a patent are generally covered, and uses relating to different subject matter are not covered.[863] The uncertainty is due to the case law being so limited, and this uncertainty would fear the researchers for infringing a patent and being sued.[864]

Nanotechnology is perceived as the next technological revolution in the 21st century and the development of nanotechnology may be similar to the development of biotechnology in the 1980s and 1990s. During that time, biotechnology was not really transformed into the final products, but instead it covered basic laboratory materials and process, known as research tools.[865] Reflecting the development in the biotechnology where experimental has been considered as of great importance, Burk and Lemley observe that it is *"more likely to be applied in industries where reproduction and testing of products are necessary parts of the product development process"* and further state that *"experimental use as a defence to*

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experiments conducted to obtain regulatory approval for pharmaceutical products were not within experimental use exception because they *"have definite, cognizable, and not insubstantial commercial purposes"*. This case inspired the European Union to introduce exception for clinical trials aimed of obtaining regulatory approval of human pharmaceutical products, as known as Bolar exemption: Directive 2001/83 [2001] OJ L311/67 as amended by Directive 2004/27 [2004] OJ L136/34.

863 There is definition of what is in relation, and what is different from the subject matter, and genes technologies fall within both categories, , H M Treasury, Glowers Review of Intellectual Property (2006) at 4.5 (Gowers).

864 Ibid, at 4.6.

865 Feit I V 'Biotechnology Research and the Experimental Use Exception to Patent Infringement' (1989) 71 J. Pat. & Trademark Off. Sco'y 819, at p.819. In biotechnological, for example research tools has been referred as *"those patented tools used in development of new biotechnological or pharmaceutical products that do not themselves physically incorporate the tool"*, Mueller, n.859, at p.14.

*infringement is likely to be particularly important where it is difficult or impossible to evaluate a product or design around a patent without reproducing the product itself"*.[866]

Research tools in nanotechnology are important, such as atomic probe microscopy, or scanning probe microscopy or carbon nanotubes, which act as basic building block for future research and development. Therefore, experimental use in nanotechnology will be very important, as with biotechnological invention; without it dynamic technological development may be impeded. Furthermore, nanotechnology research needs to be inventing around or improving of patented inventions. Added to this, in nanotechnology things may become complex because of patents being owned by different patentees. Although a defence of private and non-commercial use may support pure academic research, it is unlikely to be helpful in industrial and collaborative work, seen as important by interviewees. On the basis of biotechnology context, and the unique characteristics underpinned nanotechnology, the scope of experimental should be given a proper interpretation, so as to avoid unjustified application of the defence for nanotechnology research invention. The statutory provision of experimental use is shown in the Table 4.1 below.

**Table 4.1: Statutory provision of experimental use defence**

| **Provision** | **Infringement** | **Not infringement** |
|---|---|---|
| Section 37(1) PA 1983 | Acts done for industrial and commercial purpose | Acts done for scientific research |
| Section 60(5) PA 1977[867] | Acts otherwise than for private and non-commercial purposes – section 60(1), (2) and (5)(a) see below | Acts done privately and purpose are not commercial<br>Acts done for experimental relating to the subject matter of the invention. |

[866] Burk D L and Lemley M A 'Policy Levers in Patent Law' (2003) 89 Va. L. Rev. 1575, at p.1648; see also Cook T 'A European Perspectives as to the Extent to Which Experimental Use, and Certain Other, Defences to Patent Infringement, Apply to Differing Types of Research', A Report for the Intellectual Property Institute, (London: Bird & Bird, July 2006), at p.122; Eisenberg R S 'Proprietary Rights and the Norms of Science in Biotechnology Research' (1987) 97 Yale L. J. 177 who states the importance of experimental use defence for biotechnological invention because *"the experimental use doctrine offers a potential mechanism for reconciling the patent monopoly with the interest of the research community in building upon prior discoveries through subsequent research"*, at p.230.

[867] This exception is from Article 27(b) of the CPC which exempts *"acts done for experimental purposes relating to the subject matter of the patented invention"*.

### 4.6.1.1 Scientific research and experimental purpose

In Malaysia, the exception applies only to acts done for scientific research and not for industrial or commercial purposes, whereas in the UK the word used is "experimental purposes". Whether the "scientific research" is equivalent to "experiment" or not, the case law decided in the UK is of interest to in Malaysia as judicial authority is so sparse.

The issue came before the court to in Monsanto v Stauffer[868] Falconer J drew the line between "reasonable trial and experiment", and in stressing that allowable experiments must be confined to things done on small scale, he came close to drawing the line what was "non-commercial." However, the approach was explored further in the COA. Dillon LJ rejected the argument made by defendant that "experiment" has been given a special treatment under Common law. Accordingly, the word "experiment" is only ordinary word or everyday language and which has never been a term of art under the law. Dillon LJ made a distinction between trials which were experimental and those which were in truth a matter of amassing statistics to further commercial exploitation.[869]

The clear principle established in this case is that it is not an act of infringement if the act done to discover something unknown, or to test whether something known to work in a specific condition will work differently under different condition. The court added that the scope of experimental use does not apply in order to demonstrate that the product works to a third party or to amass information to satisfy them. Furthermore, Dillon LJ stated that the words "for experimental purposes" are not limited only to a laboratory or glasshouse. But the subject matter of experiments depend upon the nature of the product, as in Monsanto concerning herbicides or compositions to stimulate the growth of the plant, it would be an experiments to see if results obtained in the laboratory or glasshouse could be achieved in natural conditions in the open air where the product will have to be used.[870] Dillon LJ further considered that whether experiment or not depended upon the facts of each case, and can include experiments designed with a commercial end in view. Nevertheless, the distinction

[868] [1985] R.P.C. 515.
[869] Ibid, at 538-539.
[870] Ibid, at 537.

was drawn between trials which were experimental and those which were in truth a matter of amassing statistics to further commercial exploitation.[871]

This decision is in accordance with the wording of the section 37(1) of the PA 1983.[872] The word "scientific research" is similar to the meaning of "experiment" which is to find new facts, but not to demonstrate old facts. Thus, in nanotechnology context, scientific research could include experiments or research to discover something like aerogel using rice husk or to find out whether this rice husk to make aerogel works at nanoscale range, or a new use of carbon nanotubes as to they are stronger or lighter.[873] It may be that commercialisation of research results would require a voluntary or compulsory licence.

The principle in Monsanto has been expanded further in Smith Kline & French Laboratories Limited v Evans Medical Limited[874] where Aldous J agreed and stated that acts done for experimental purposes included experiments with a commercial end in view and the purposes must relate to the claimed subject matter of the patent.[875]

The German Federal Supreme Court considered an experimental use exception in Clinical Trials I.[876] The Germany Federal SC concluded that Patent Act exempts all experimental acts as long as they serve to gain information and to carry out scientific research into the subject-matter of the invention, including its use. This included the utilization acts for experimental purposes undertaken with the subject-matter of the invention to discover the effects of a substance or possible new unknown uses. It did not matter also whether experiments are used only to check the statements made in the patent or else to obtain further research results, and whether they are employed for wider purposes, such as commercial information.[877]

[871] [1985] R.P.C. 515, at 538-539.
[872] Azmi, n.607, at p.417; furthermore, as in common law rule of the exception that included experimental activities exempted from patent infringement, for example in Frearson v Loe (1878) 9 Ch D 48, at 66.
[873] Interviewee C.
[874] [1989] F.S.R. 513.
[875] Ibid, at 523-524.
[876] [1997] R.P.C. 623.
[877] Ibid, at 638-639; this slighly broader approach may reflect the lack of compulsory licensing provisions.

It was also observed in Clinical Trials II[878] that the Germany Federal SC that clinical experiments with a genetically engineered pharmaceutical will always be based on commercial considerations. The intention that is an activity begun and carried out for research purposes cannot be categorised as infringement merely on the basis of the fact that the results of the research will not solely serve research purposes but also will serve commercial purposes as well. An activity is rather exempted and therefore permissible if it is oriented towards clearing up uncertainties with regard to the object of the patented invention or bringing out new discoveries about said object, provided these activities with research purposes relate to the object of the patented invention.[879]

Whether the use of the invention was for experimental purposes, but mixed with other purposes, has been considered in Corevalve Inc v Edwards Lifesciences AG.[880] The issue was whether Corevalve had a valid experimental defence because where valves were supplied to selected hospitals and cardiologists were trained to use them. The court held that the permitted use of the invention was for experimental purposes, a difficulty arose if it had mixed purposes, and it would be a necessary to consider the defendant's preponderant purpose. Corevalve preponderant purposed were threefold: (1) to establish confidence in their product within the relevant market; (2) to generate immediate revenue of a substantial character; and (3) to gain information about clinical indications and, possibly, future modifications to be made to the physical structure of the device in the light of experience. The court held that purpose (3) was not Corevalve preponderant purpose, and there was an infringement.

Based on cases above, this study strongly argues that the word "scientific research" in Malaysia is equivalent to "experiment" in the UK law. Malaysia should adopt a similar approach when deciding whether the acts done for scientific research as in for experimental purposes. Scientific research, which may be basic or applied[881] or may include experiments carried out to find new facts, to discover unknown facts but not demonstrate to the third party that the invention works, and include experiments with commercial end in view. As the

[878] [1998] R.P.C. 423.
[879] Ibid, at 438-439.
[880] [2009] EWHC 6 (Pat); [2009] F.S.R. 8.
[881] See for definition in Loughlan P 'Of Patents and Professors: Intellectual Property, Research Works and Universities' (1996) E.I.P.R. 345, at p.346; also Eisenberg, n.866, at p.230.

German court held that, experiment constitute to gain the information and to carry out scientific research into the subject matter of the invention including its use is also persuasive. Experiment also includes checking statement made in the patent or to obtain further research results relating to the invention or for a wider research purposes including commercial information relating to the invention. If the purpose is mixed other purposes, the court considers the preponderant purposes of the conduct.

#### 4.6.1.2 Acts done for industrial or commercial purpose

It is clear that infringing acts are done for "industrial or commercial" purposes. In Smith Kline & French Laboratories Limited v Evans Medical Limited[882] Evans claimed that their experiment was done for private and non-commercial purpose to produce evidence for amendment proceedings. However, the experiment provided useful information which could have commercial. Aldous LJ considered that the court is required to consider the purpose of the alleged infringing act and then decide whether that purpose was commercial or not. The difficulty arises to determine acts done primarily for purposes which are not commercial, but having a commercial benefit. In this case, Evans contended the only purpose of their experiment was private, but admitted that in carrying out those experiments they may have acquired information which would be of commercial use to them. The court has to consider what the purposes of the acts whether commercial or non-commercial and this was a subjective test. If there was a dual purpose, there would be infringement. If, however, all the purposes were not commercial, the fact that knowledge gained could and might be of commercial benefit would not preclude the act from falling within the exception and therefore, was not an infringement. As observed in Mosanto and Clinical Trials I, the commercial nature or commercial intent of an activity does not, within reason affect the assessment of whether or not it is undertaken for *experimental* purposes. In Clinical Trials II, it was observed that commercial orientation does not from the outset turn the experimental activity into an impermissible infringement.

[882] [1989] F.S.R. 513

#### 4.6.1.3 Experimental purposes relating to the subject matter of the invention

In Smith Kline & French Laboratories Limited v Evans Medical Limited[883] Aldous LJ has rejected the argument that the words "relating to the subject matter of the invention" should be construed narrowly with the intention to exclude experiments directed to the commercial exploitation of the invention. Aldous LJ considered the decision in the Canadian Supreme Court in Micro-Chemicals Ltd v Smith Kline and French Inter-American Ltd[884] that the experimental activity relating to subject matter of the invention was *"a limited experiment to establish whether the experiment could manufacture a quality product commercially in accordance with the specification of a patent"*.[885] Aldous LJ summarised that section 60(5)(b) involves acts done for experimental purposes, which may include the act done with a commercial end in view; and the acts must have a real and direct connection with the claimed subject matter.[886]

How to determine the subject matter of the invention was decided in Auchiloss and Anor v Agricultural and Veterinary Supplies Limited and Ors[887] where the court examined that *"the subject matter of the invention must be ascertained from the patent as a whole"*.[888] In Germany, the Federal Supreme Court in Clinical Trials I[889] has concluded that the experiment must itself relates to the subject matter of the invention, but the defence did not permit the invention in question to be used within the framework of an experiment relating to different subject matter. The Court pointed out that:

> "since the Patents Act excepts from the effect of the patent, without other limitation, all acts for experimental purposes relating to the subject matter of the invention, the permissibility of such experiments cannot depend on further purposes for which they are undertaken ...".[890]

In Clinical Trials II, the exception applied regardless of the purpose for which these results would ultimately be used. As the exception provides a broader scope of the concept of experiment, the provision requires that the experiment must be related to the object of the

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[883] [1989] F.S.R. 513.
[884] (1971) 25 DLR 79, at 89
[885] [1989] F.S.R. 513, at 522..
[886] Ibid, at 523.
[887] [1997] R.P.C. 649 (Pat); [1999] RPC 397 (CA).
[888] Ibid, at 406.
[889] [1997] R.P.C. 623.
[890] Ibid, at 645.

patented invention and *"it follows from this that the object of the invention must itself be the object of the experimental activities for the purpose of obtaining results"*.[891]

These two cases (Clinical Trials I and II) establish the principle the experiment is exempted from patent infringement although with the commercial aim, and this commercial aim does not prohibit the operation of the true experimentation. This broader principle is narrowed by the restriction provided under second limb i.e. that the experiment must relate to the subject matter of invention.[892] These decision from the German Federal Supreme Court is perceived as the direction that to be followed in the European Community.[893]

It is interesting to note that much of the concern of exception arises in the context of patents to research tools, for example in protecting various discoveries relating to gene sequences or biological receptors.[894] It is inevitable that almost every research activity involves the use of research tools and provided that such use is a tool for researching into something different it will not be covered under the exception in the UK/Europe.[895] Eisenberg observes that using an invention for its intended purpose and experimenting on it is consistent with the principle of patent law in balancing the rights of the parties involves and points out that *"if the public had absolutely no right to use the disclosure without the patent holder's consent until after the patent expired, it would make little sense to require that the disclosure be made freely available to the public at the outset of the patent term"*.[896] In Australia, there was recommendation made by the Australian Government Advisory Council on Intellectual Property[897] of following the European wording of the exception as well as the TRIPS which relates to "do not unreasonably conflict with the normal exploitation of a patent".[898] Cook argues that this reflects the concern on research tool patents, and observes that this concern failed to consider the critical role in context of the "in relation to the subject matter of the

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[891] [1998] R.P.C. 423, at 431.
[892] Cook T 'A European Perspectives as to the Extent to Which Experimental Use, and Certain Other, Defences to Patent Infringement, Apply to Differing Types of Research', A Report for the Intellectual Property Institute, (London: Bird & Bird, July 2006) at p.29.
[893] Ibid, see also Cornish, n.857, at p.753.
[894] Cook, n.892, at p.125.
[895] Ibid, at p.126.
[896] Eisenberg, n.861, p.1017.
[897] Advisory Council on Intellectual Property "Patents and Experimental Use" Oct, 2005 available at http://www.acip.gov.au/library/acip%20patents%20&%20experimental%20use%20final%20report%20final.pdf, visited on 5 February 2012 (ACIP).
[898] Ibid, at p.61.

invention" as in the European provision.[899] Cook suggests that whether experimentation on or experimentation using the research tool, it would be better to consider a particular research tool in issue, rather than research tools as a class.[900] Thus, according to Cook, if patented research tools are an impediment to research, rather than amend the exception defence, he suggests to follow the Swiss model by the introduction of compulsory licence of the use only of patented biological research tools.[901] The advantage of this approach is that it would not apply to the manufacture and supply of the research tools by competitors of the research tool patentee, and by the actual use of the research tool it would not deprive the research tool patent of value.[902]

#### 4.6.1.4 Act done privately

The scope has been observed by the court in Smith Kline & French Laboratories Limited v Evans Medical Limited.[903] In this case the patentees owned three patents relating to drugs known as cimetidine. Evans, one of the applicants for licences, purported to carry out experiment to one of the patent, i.e., on polymorph patent. The patentees claimed for infringement. In determining whether the act done privately under section 60(5)(a) of the PA 1977, Aldous LJ stated that:

> "This word [privately] appears to me to be used as the opposite of "publicly" and to be used in the sense of denoting that the act was done for the person's own use. This constructions of the word "privately" is consistent with the rest of the subsection which provides that even if the acts are done privately in the sense of for the person's own use, there will be infringement if the acts are done for commercial purposes".[904]

The principle that can be derived from this case was that, the "act done privately" and with commercial purposes will not be covered. This is equally reflected to the conjunctive "and" used under section 60(5) (b) PA 1977. To determine that the "act done privately" is exempted from patent infringement, the defendant must show the act done was not for commercial

[899] Thus, Australia excludes from the scope of the defence the normal exploitation of research tools inventions, but the defence applies to any other invention such as research into a research tool invention in order to understand or improve on it because it is not such normal exploitation, Cook, n. 892, at p.127.
[900] Ibid, at p.127.
[901] Cook, n.892, at p.127.
[902] Ibid.
[903] [1989] 1 F.S.R. 513
[904] Ibid, at 517-518.

purposes. Cook observes "private and non-commercial use" is actually attracted of little debate because it entails no difficulty to interpret.[905] Whereas in Malaysia "acts done for industrial or commercial purposes" arguably means that any private acts which are not deemed not to be acts done for industrial or commercial purposes are covered under the exception. Thus, private acts or public acts for research or educational purposes will be exempted from infringement; so long they do not have predominantly industrial or commercial purposes. However, Gowers suggested that the used of "private" is problematic and insufficient especially in the universities context as they are increasingly conducting research in collaboration with other organisations, and was concerned that publicly funded research may not qualify for the exception.[906] Moreover, in today's situation, it is difficult to find the purely academic institution without commercial involvement.[907] This is true especially for nanotechnology that almost always arises in the university's research collaborations using publicly funded research and the investments are huge in nanotechnology development[908] thus "private" may be difficult to satisfy and it is unlikely that the acts will not involve the element of industrial or commercial purposes.

#### 4.6.1.5 The approach of for experimental nanotechnology

What could be the most appropriate approach for experimental nanotechnology? The right balance of the interested parties needs to be struck, so that it encourages commercial benefits and also promotes technological progress.[909] Based on practices, the trend of scope of experimental use defence has adopted the narrow structure, i.e. that exemption only for 'purely' experimental activity.[910] However, this situation is less relevant in the current

[905] Cook, n.892, at p.18.
[906] Gowers, n. 863, at 4.10.
[907] Bor F 'Exemptions to Patent Infringement Applied to Biotechnology Research Tools' (2006) E.I.P.R. 5, at p.12; The emphasis of changing university's structure from purely academic to commercialization, see for example in Sani R 'Commercialising Research to Boost Innovation' 10 August 2009, News Straits Times, available at http://technu.nst.com.my/Current_News/techNu/Monday/TechTalk/20090810102007/Article/index_html; Abdul Rahman O' Varsities Get Transformation Message' 19 August 2011, available at http://e.nst.com.my/nst/articles/17mar/Article/art_print, visited on 9 March 2012.
[908] Views from all interviewees.
[909] Maebus S B and Radomsky L 'The Nanotech IP Landscape: Increase Patent Thickets will Drive Cross-Licensing, 2005 Lux Research Inc', available at http://www.foley.com, accessed on 12 Jan 2012.
[910] Di Cataldo V *The Experimental Use of the Patented Invention: A Free Use or An Infringing Use?* in Prinz zu Waldeck und Pyrmont W et al., (eds) *Patents and Technological Progress in a Globalized World* (Munich: Springer, 2009), at p.88.

situation of research institutions like universities. This has been pointed out by Cornish, who emphasises that nowadays trends of the research are not merely focused on the academics, but the structure has moved to a more commercialised oriented, including the collaborative commercial research.[911] Some commentators, for example Eisenberg warns that too narrow interpretation for the experimental exemption might block the development of a new technology and too broad scope of the application of the defence might cause the industries to rely on secrecy rather than patent protection.[912] She emphasises that the balance of the interested parties such as the research user, the public and scientific community need to be taken into consideration to promote the knowledge and *"without an experimental use defense, it is possible that no one would be able to build on the inventor's discovery until the patent expired"*.[913]

Reflecting Eisenberg view, Article 30 of the TRIPS provides criteria for granting the defence, which states that:

> "Members may provide <u>limited exceptions</u> to the exclusive rights conferred by a patent, provided that such exceptions <u>do not unreasonably conflict with a normal exploitation of the patent</u> and <u>do not unreasonably prejudice the legitimate interest of the patent owner, taking account of the legitimate interests of third parties</u>".

The scope of Article 30 is difficult to determine; it resembles Article 9(2) of the Berne, which is a kind of three steps test for copyright.[914] Article 30's three criteria (as underline above) are cumulative.

It is arguably that it is limited exception under Article 30 that the rights for the patentee's is only allowed to be curtailed under specific circumstances for experimental purposes.[915] The "normal exploitation" refers to that an exception is not allowed if the exploitation is likely to have a considerable importance.[916] Thus, for example a research tools in the normal

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911 Cornish, n.857, at p.752.
912 However she admits that it is impossible to avoid of these potential problems entirely, Eisenberg, n.866, at p.224.
913 Ibid, at pp.224-225.
914 Gervais, n.222, at p.380. Article 9(2) of the Berne states that *"it shall be a matter for legislation in the countries of the Union to permit the reproduction of such works in certain special cases, provided that such reproduction does not conflict with a normal exploitation of the work and does not unreasonably prejudice the legitimate interest of the author"*.
915 ACIP, n. 897, at p.21.
916 Gervais, n.222, at p.240.

exploitation includes acts done for experimental purposes, and exception would need to exclude from its scope.[917] The word "taking into account of the legitimate interests of third parties" may seem to broaden the scope of exception than that under Berne.[918] This legitimate interest means that conforming to or sanctioned to or authorised by law or principle.[919] Acts done for research, experimentation or education purposes relating to the invention without having industrial or commercial element will be covered under Article 30 since it is unlikely to be unreasonably prejudiced the interest of the patent owner.

In determining the appropriate scope of the experimental use defence for nanotechnology, it is desirable to observe various approaches for the scope of the defence to be applied, as follows:

(a) narrower scope - restrictive and consistent with the function of the patent law.[920]
(b) broader scope - to encourage the progress of the technology.[921]
(c) balance the interest of the competing policies – liberal approach where the effect of the experimental activity on the incentives policy is minimal, and strict approach where the experimental of a patented inventions would only contribute small to a progress of the research.[922]
(d) amend the exception – to clarify research exception to facilitate experimentation, innovation and education modelling Swiss model of research exception.[923] The clarification is important to enable researchers to examine, learn from and improve upon inventions.[924]
(e) flexible approach – This serves the purpose in encouraging improvement to patented inventions and the law needs to be flexible to adapt with new technologies and

[917] ACIP, n.897, at p.21.
[918] Gervais, n.222, at p.380.
[919] Ibid, at p.240.
[920] Karp, n.856, at p.2170.
[921] Feit, n.865, at p.822.
[922] Gilat, n.858, at p.17.
[923] Gowers, n. 863, at para 4.12; Swiss model of research exception reads as follows: The effects of a patent do not extend: (a) to acts undertaken in the private sphere for non-commercial; (b) to acts undertaken for experimental and research purposes in order to obtain knowledge about the object of the invention, including its possible utilities; in particular all scientific research concerning the object of the invention is permitted; (c) to acts necessary to obtain marketing authorization for a medicament according to the provisions of the law of 15 December 2000 on therapeutic products; (d) to the use of the invention for the purpose of teaching in teaching establishments; (e) to the use of biological material for the purposes of selection or the discovery and development of a plant variety; (f) to biological material obtained in the field of agriculture which was due to chance or which was technically unavoidable.
[924] Ibid, at para 4.11.

uses.[925] The exception should not have too broad which would deprive the whole value of patents, nor should be too narrow because there are other solutions that are potentially targeted the specific issues and business practices such as competition law remedies, compulsory licensing, or compulsory licensing tailored to the use only certain research tool as modelled from Swiss approach.[926]

Having informed of the advantages and disadvantage of too broad and too narrow scope of the exception, this study strongly argues that the scope for exception should be applied flexible to nanotechnology. The reason being that since nanotechnology is still new, emerging and multidisciplinary - narrowing the scope would impede the development of nanotechnology research development, whilst broadening the scope would deprive the value of the patent.[927] Furthermore, the principle of exception has to consider the interest of the parties (the patentee, the researcher and the public) in line with the aim of patent law in promoting the development of the technology, as exemplified in Clinical Trials I[928] and Clinical Trials II.[929] Since Malaysia exception does not mention in "relation to the subject matter of invention" this may provide better position to nanotechnology i.e. any scientific research would be covered under the exception as long as it does not have the industrial or commercial purposes.

### 4.6.2 Prior user right

The novelty is destroyed by prior disclosure of the invention to the public. However, prior to the patent filing, other than the applicant himself, there might be other person who has already making, using or keeping the invention secretly. This person, if he carries the act in good faith and has made a serious preparation to use the invention, may use the defence of

[925] Bor, n.907, at p.14.
[926] Cook T 'Responding to Concerns about the Scope of the Defence from Patent Infringement for Acts Done for Experimental Purpose Relating to the Subject Matter of the Invention' (2006) I.P.Q. 193, at p.220; the application of compulsory licensing and competition law helps to prevent unethical consequences from the abuse of a research tool patent right, Royal Society, "Keeping Science Open: The Effects of Intellectual Property Policy on the Conduct of Science' (2003) available via www.royalsoc.ac.uk/policy/index.html.
[927] As Eisenberg observes *that "an excessively broad research exemption could eliminate incentives for private firms to develop and disseminate new research tools, which could on balance, do more harm than good to the research enterprise",* n. 862 above.
[928] [1997] R.P.C. 623, at 643.
[929] [1998] R.P.C. 423, at 435.

prior user rights. This situation allows the prior user right to legally continue the exploitation of the invention which would normally an infringing act.[930] In applying the defence, the interested parties involvement must be maintained, that the right granted to continue the use of the invention will not jeopardise the rights of the patentee and at the same time to preserve the interest of the prior user.

Having said this, prior user right has been referred to as *"in the middle of the imaginary trade-secret-patent spectrum"* because it recognises to choose trade secret commercial use in substitution of a patent right with an acceptable limitation on the risk.[931] Nanotechnology may involve this more on the process side,[932] prior use of a process is more likely to remain secret than, say, the manufacture of a patented product. Thus, the scope of prior user right may become more problematic for process inventions.[933]

#### 4.6.2.1 Statutory protection

Compared to other litigations, although most countries have the provision of prior user right,[934] it has been observed that prior user rights rarely are litigated.[935] This may lead to *"double-barrelled assumption"* that either the clauses are not important therefore the case

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[930] Kupferschmid K M 'Prior User Rights: The Inventor's Lottery Ticket' (1993) 21 A.I.P.L.A. Q. J. 213, at 216; by definition there must be commercial, otherwise private and non-commercial come into where it is available.

[931] Monotti A L 'Balancing the Rights of the Patentee and Prior User of an Invention: The Australian Experience' (1997) E.I.P.R. 351, at p.352

[932] For example Byrne states that patent on process is difficult to enforce, unless the patented process is implement by special equipment, or used on an industrial scale or identifiable in the end product, Byrne N 'Why Patent an Invention?' (1990) 2 Intellectual Prop. in Bus. 13, at 14.

[933] For example Harriel K 'Prior User Rights in a First-to-Invent Patent System: Why Not? (1995-1996) 36 IDEA 543, at p.559 states that generally prior user rights focuses on processes rather than products.

[934] See for example Neukom J U 'A Prior User Right for the Community Patent Convention' (1990) E.I.P.R. 165, at p.165; this article is pre-TRIPS. Previously in the US, it was a different landscape due to first-to-file;, the status of secret prior use has been criticized as unsatisfactory and confusing, Takenaka T 'Rethinking the United States First-to-Invent Principle from a Comparative Law Perspective: A Proposal to Restructure S.102 Novelty and Priority Provisions' (2002) available at http://houstonlawreview.org/archive/downloads/39-3_pdf/takenaka.pdf accessed on 29 June 2010; but recently President Obama has signed the new American Invention Act to adopt first-inventor-to-file to harmonise US patent system with the rest of the world, see Takenaka T 'Harmony with the Rest of the World? The American Invent Act' (2012) J.I.P.L.P Vol. 7, No.1, 4, at p.5.

[935] See for example Kupferschmid, n.930, at p.233; see also Neukom which gives the number prior user rights litigation in France and West Germany, at n.934, p.166; See also Osterborg L 'Towards a Harmonised Prior User Right within a Common Market System' (1981) 12 I.I.C. 447 states that in 1960s and 1970s, only four cases involving prior user right in France, and in Italy there was no cases on prior user rights because Italy adopted prior user right in their provision in 1979, at pp.456-458.

arise is little, or the clauses do not properly work and therefore fail to work as significant role of the defence.[936] Furthermore, the provision of the prior user right is still ambiguous.[937] However, this does not necessary means that the prior user rights are not important. Prior user rights are significant in safeguarding the investment made by the prior user and developing local industries[938] because the absence of the prior user right as pointed out by Neukom *"effectively penalises domestic industry vis-a-vis foreign competitors by deciding against it"*.[939] This is because on the basis of fairness, prior user rights will ensure that their investment will not be destroyed when the patentee patented his invention.[940] In terms of economic theory justification, Harriel argues that if the prior user is prevented from continuing his commercial effort, this would unlikely stimulate his individual motivation and hinder the commercial viability of the activity.[941]

The international protection for prior user right is protected under Article 4B of Paris which reserves the right to the domestic legislation to make provision concerning prior user rights. This provision granted the right acquired by the third parties before the date of the first application that serves as the basis for the right of priority. This right granted to the person to continue the infringing activity commenced before the priority date. It is argued that Article 30 of the TRIPS also covers prior user rights.[942]

In Malaysia, prior user rights refer that at the priority date of the patent application, the person in good faith has made serious preparations towards making the product or using the process which is the subject of the invention claimed in the application.[943] The right of prior user includes the right to exploit the patented invention. The right is qualified by the proviso which states the product made or the process made by the person in Malaysia has the territorial effect. This safeguards the local right from local infringement, and this is not

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[936] Strobel S 'Prior User Rights: Introductory Comments, Fourth Biennial Patent System Major Problems Conference' (1994) IDEA: J.L&T, 207, at 210.
[937] See for example Cohen S and Davies I 'Section 64 of the UK Patents Act 1977: Right to Use Begun before Priority Date' (1994) E.I.P.R 239, at p.239.
[938] Monotti, n.931, at p.352.
[939] Neukom, n.934, at p.140.
[940] For an extended view of argument for and against prior user right, see Kupferschmid, n.936, at pp.217-236.
[941] Harriel, n.933, at p.555.
[942] Garrison C 'Exceptions to Patent Rights in Developing Countries' (2006) UNCTAD-ICTSD Project on IPRS and Sustainable Development' Issue Paper No.17 available at http://www.unctad.org/en/docs/iteipc200612_en.pdf accessed on 29 June 2010.
[943] Section 38(1)(a) PA 1983.

explicit in the UK.[944] The rights shall not be assigned or transmitted except as part of the business of the person concerned.[945]

In the UK, section 64 of the PA 1977 provides that where a patent is granted for an invention, a person, in the UK before the priority date of the invention does in good faith an act which would constitute an infringement if it were in force.[946] Alternatively, the person makes in good faith effective and serious preparation to do such act, has the right to continue to do the act, but the right does not extend to granting a licence to another person to do the act.[947] If the act was done or the preparations were made in the course of business, the person is entitled to the right may authorise the doing of act by any of his partners for the time being in the business and he may assign the right or transmit the right to any person who acquires the part of the business in the course of which the act was done or the preparations were made.[948]

#### 4.6.2.1.1 Acting in good faith of making the product or using the process

Although the provision is silent as to the meaning of good faith, nonetheless there is not problematic to determine whether the act is in good faith or bad faith. For example, if the prior user has independently obtained the information and has created the invention, he is said to act in good faith. However, if he is unlawfully or fraudulently obtained information, for example by way of breach of confidence he is acting in bad faith. To determine good faith or bad faith is rather complicated when the research involves a team. This is particularly important for nanotechnology invention, if one or more has left the team, good faith may be difficult to prove. In Kakkar v Szelker[949] the two research units from England and Swedish had jointly collaborated research project on anticongulant materials. In this case it was showed that a team member had filed a patent without the others. The court had no jurisdiction to determine the constructive trust claims involving a team because the patent

[944] See also in the context of traditional knowledge, prior user right has been recognized with respect to the territory which benefits the indigenous people on their local markets, Ullrich H 'Traditional Knowledge, Biodiversity, Benefit-Sharing, and the Patent System: Romantic v Economics?' EUI Working Paper Law No 2005/07 available at http://papers.ssrn.com/so13/papers.cfm?abstract_id=838107 accessed on 29 June 2010.
[945] Section 38(2) PA 1983.
[946] Section 64(1)(a) PA 1977.
[947] Section 64(1((b) PA 1977.
[948] Section 64(2)(a) (b) PA 1977.
[949] [1989] EPOR 184.

was proceeding in the EPO. Thus, in a team member like nanotechnology research projects, as this case expounded, it is very difficult to determine the element of good faith.

#### 4.6.2.1.2 Serious preparation of making the product or using the process in Malaysia

The judicial interpretation of this limb is very limited.[950] There is no meaning provided of the words "serious preparation". The prior user must show that he has made "serious preparation"; and whether sufficient for him to show that he has in possession of the invention?[951] This is not the case since serious preparation requires more than a mere possession of the invention. Therefore, mere attempt to solve a certain problem or mere knowledge of an invention are insufficient to invoke prior user right defence.[952] In nanotechnology, serious preparation may include huge investment in buying the appropriate tools such as AFM or STM. These nanotechnology research tools are important to measure the surface and the quantities of electrical, magnetic and chemical properties of the products or processes. Serious preparation in nanotechnology may also include the methods of fabrication and characterisation of materials, such as using top-down and bottom-up approach to construct advanced products at the atomic precision. The cost incurred, the time spent, and preparing for such exploitation should be taken into consideration in determining whether the act is serious preparation.[953] In case of developing aerogel from rice husk serious preparation would include anything related to the physical or technical preparation such as making and buying the relevant equipment to be used as nanoscale or developing and using silica from rice husk. Another example in lab-on-chip analysis for DNA, serious preparation includes making and buying the relevant nanoscale tools and equipment which might be related to the medical or getting the materials ready for example by matching the DNA sample.

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[950] See for example Cohen and Davies, n.937, at p.240.

[951] For example Osterborg points out that under France law, prior user right arises by merely possessing the invention, n.935, at p.448.

[952] Kupferschmid, n.930, at p.237, cited Brown-Bridge Mills Inc v Eastern Fine Paper Inc, 700 F.2d 759, 765-766, 217 U.S.P.Q. 651, at 657 (5th Cir. 1983) that requires for the actual reduction of the invention into practice. This often involves the physical construction of the invention and testing of the invention to determine its intended purposes.

[953] With similar view, see Kupferschmid, n.930, at pp.249-250.

Under UK law, it requires that the prior user has made *"serious and effective preparations"* to do *"an act which would be infringing if it was carried out after the grant of patent"*. This means that if before the priority date, any non-commercial activities may not be able to invoke the prior user right defence to commercialise later, unless and otherwise he can prove that he has made effective and serious preparation of the acts. However, since there is no such provision under Malaysian law, it is not prevented the defendant to rely on the prior user right if his prior non-commercial use to be transformed into the commercial use later.

The court's decision on serious preparation can be seen in Helitune Ltd. v Stewart Hughes Ltd[954] which concerned a patent related to a method of detecting the degree of unbalance of helicopter rotor blades using an "active system". In this case the defendant alleged that he had carried out acts before the priority date of the patent and had made serious and effective preparation to do such acts, therefore was entitled to continue the acts under the defence. The court rejected the defence because at the priority date of the patent the defendant was only developing passive tracking and was not making preparation to transform the tracker into a product. In determining what constitutes *"effective and serious preparation"*, Aldous J considered that:

> "At the priority date of the patent, the defendant had not sold an active tracker. It had, however, produced a prototype of an active tracker using a laser with a view to its further development. The position had not been reached where the defendant had decided to sell active trackers, and by the priority date its efforts were concentrated on producing a passive tracker. I do not believe the defendant had reached the stage of making effective and serious preparations to sell an active tracker, and, therefore, section 64 does not give it a defence to the action".[955]

#### 4.6.2.1.3 Exploitation of the patented invention

The exploitation of the rights includes in the case of product by making, importing, offering for sale, selling and using the product;[956] and in the case of process the exploitation includes using the process, and a product obtained by means of the process. The question arises here is

[954] [1991] F.S.R. 171.
[955] Ibid, at 208.
[956] Section 36(3)(a) PA 1983.

to what extent the scope of exploitation[957], including improvement or modification is allowed to the prior user? Aldous J in Helitune Ltd v Stewart Hughes Ltd[958] stated that the acts of infringing are only referred under section 60 of the PA 1977. Therefore, the person has the right to continue carried out the act although the product or process may be different to some degree. The court also stated that if the person used an infringing process, and after the priority date he has altered the process, this act did not amount to an infringement. In this case, the effective and serious preparations are not limited to the act of the same types, but it may extent to a different degree. In Helitune, it was suggested that *"the act even though to the product and process may be different to some degree"* would assume that it is significantly covered from macro-scale to the nanoscale. If this construction is correct, this suggest that prior user, say, a specific geometry at macro scale might be permitted under the defence to diversify into nanoscale. However, this act does not extend him to expand to the other technology as Laddie J determined in Lubrizol Corp. and anor v Esso Petroleum Co. Ltd[959] by stating that:

> "The act which the alleged infringer is entitled to continue to conduct by virtue of section 64(2) is the act which he was committing before the priority date. It is that specific act of commerce which he is entitled to continue. I have difficulty in accepting that by, for example, manufacturing product A before the priority date, he was thereby given a right to manufacture any product after the priority date. In my view, section 64 is intended to safeguard the existing commercial activity of a person in the United Kingdom which is overtaken by the subsequent grant of a patent. It is not meant to be a charter allowing him to expand into other products and other processes".[960]

## 4.7 Conclusion

This chapter examined the challenges that nanotechnology posed to the current patentability requirements. The mere down-scaling an invention into nano-size did not automatically confer patentability. However, nano-range was not only the size that matter, but the property has also changed, which could confer patentability. It set out that in nanotechnology, the person skilled in the art involved various fields according to the fields that they are working;

[957] The word "exploitation" may extent the right to a non-commercial nature which Kupferschimd argues that it is highly relevant to the university for its non-manufacturing nature, which should not be treated differently from larger corporations, n.930, at p.239. However, this contention is doubtful, since the current nature of the university has changed to promote for commercialisation.
[958] [1991] F.S.R. 171.
[959] [1992] R.P.C. 281, Hugh Laddie QC sitting as Patent Court Council.
[960] Ibid, at 295.

in team of individuals, it proved difficult to identify the correct individuals or teams. Nanotechnology could also potentially pose risk to the environment within the concept of morality and public order. This gave consideration to the patent office to weigh on the commercial exploitation and other aspects in considering whether the invention could be environmentally damaging.

The multidisciplinary and no commonly accepted terminology of nanotechnology led to the technical and administrative issues including classification and monitoring system. The patent office such as EPO and USPTO has introduced the tagging system for nanotechnology classification. It was recognised that the patent examiners were unable to understand nanotechnology. For this reason, the team approach should be adopted representing their different fields.

For joint ownership within a team of individuals, it was less problematic to determine the right of ownership of the invention, but not between different teams of people, and the agreement should be made in advance to clearly state the right of ownership. The issue became more pressing the contract of employment. It was suggested to state the ownership rights in the form of written agreement. In the absence of any agreement, the issue become even more complex in the collaborative works like nanotechnology. The statutory employee compensation scheme was seen undesirable because it was granted on the individual basis and it was difficult to determine "outstanding benefit" in team approach like nanotechnology.

This chapter concluded that experimental defence and prior user right are more problematic to be applied for nanotechnology. For experimental use defence, it was recognised that the flexible approach should be adopted in considering the emerging technology like nanotechnology to encourage commercial benefit and promote technological development. For prior user right, it was found difficult to identify the element of good faith and to determine effective and serious preparations of the acts.

# CHAPTER 5
# COPYRIGHT, TRADE MARKS AND DESIGNS PROTECTION FOR NANOTECHNOLOGY

## 5.1 INTRODUCTION

As discussed in Chapters 3 and 4, the law of confidence and patent law both provide important protection for nanotechnology. However, other IPRs may be applicable to nanotechnology,[961] including Copyright, Designs and Trade Marks. This chapter questions to what extent these forms of IP are applicable to nanotechnology and what problems are posed by nanotechnology.

## 5.2 COPYRIGHT AND NANOTECHNOLOGY

### 5.2.1 Introduction

Copyright protects a wide range of subject matter or 'works'. As regards nanotechnology, it has been suggested that a molecular architecture of nanotechnology may be protected under Canadian copyright law, though probably not as a sculpture or work of artistic craftsmanship, but may be as a work of architecture.[962] Works must be within categories of protectable subject matter specified under Malaysian Copyright Act 1987 (CA 1987) and UK Copyright Designs and Patents Act 1988 (CDPA 1988). They must also meet the requirement of originality and expression in material form. This section examines:

(a) are nano-creations "works"?

(b) are nano-creations artistic or literary works?

(c) could nano-structures in two dimensional designs protect three-dimensional nano-structure objects?

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[961] Interviewee C and D.

[962] see Abe K L 'Nanotechnology Law: The Legal Issues', paper presented at the 2005 ICE Technology Conference, Edmonton, 8 November 2005) at http://www.fasken.com/web/fmdwebsite.nsf/AllDocSearch/3BD4F7125D39AD5B852570BB0080ABCD/$File/NANOTECHNOLOGY.PDF, accessed on 26 October 2009; the same author in http://www.slideshare.net/lisaabe/nanotechnology-law-the-legal-issues, accessed on 14 April 2012.

### 5.2.2 International attitudes of protection for nano-creations

Article 2(1) of the Berne Convention for the Protection of Literary and Artistic Works[963] 1886 (Berne) reads:

> "The expression 'literary and artistic works' shall include every production in the literary, *scientific* and artistic *domain,* whatever may be the mode or form of its expression, such as books, pamphlets and other *writings*; ... works of *drawing*, painting, *architecture [included only since the Berlin Act of 1908], sculpture*, engraving and lithography; photographic works to which are assimilated works expressed by a process analogous to photography; works of *applied art*; illustrations, maps, plans, *sketches* and *three-dimensional works* relative to geography, topography, architecture or *science. [emphasis added]".*

Could a nano-creation be a "production" or "work" in the context of Berne? "Production" has never been defined but it seems that the work must come into existence before the copyright protection is granted.[964] At least in general nano-structures presuppose a "production in the scientific domain". Berne applies to *all* productions related to literary, scientific and artistic domains. Gervais observed that the non-exhaustive list was progressively broadened,[965] and this contention does not make it impossible to include nano-creations that related to writings, drawings, architecture, works of applied art, sketches and three-dimensional works relative to science.

Schricker has also stated *"it does not seem totally superfluous to try to develop some ideas about copyright protection for scientific creations"*[966] but goes on to say that *"strengthening the copyright position of scientific works seems far from feasible and even appears anachronistic"*.[967] The position is described by Ricketson in the following terms:-

> "The boundaries propounded here as to what is to be protected are broad but nonetheless distinct-namely "productions in the literary, scientific and artistic domain". While the adjective "scientific" is somewhat mysterious, it seems that it was not intended to extend to such things as inventions and discoveries--the province of patents--but rather as a

[963] 1971 revision with 1979 amendments.

[964] Ricketson S and Ginsburg J *International Copyright and Neighbouring Rights: The Berne Convention and Beyond* (Oxford: OUP, 2006), at para 8.03.

[965] Gervais, n.222, at p.222; the list acts only illustrative part of the literary, artistic and scientific domains, Ricketson and Ginsburg, n.964, at para 8.01.

[966] Schricker G *Protection of Scientific Creations Under Patent and Copyright Law* in Prinz zu und Pyrmont W et al (eds) *Patents and Technological Progress in a Globalised World: Liber Amicorum Joseph Straus* (Berlin: Springer, 2009), at p.60.

[967] Ibid, at pp.63-64.

> description to capture works relating to scientific matters or of a scientific character (as in the listed examples of "illustrations, geographical charts, plans, sketches and plastic works relative to geography, topography, architecture or science").[968]

This suggests that at least the scientific works mentioned may protect some aspects of nanotechnology. However, there are several stumbling blocks for nanotechnology in copyright. First, copyright law may not protect scientific creations if they are mere ideas or abstractions without further elaboration,[969] for example mere ideas about structures for carbon-nanotubes, dendrimers, or DNA motors.

Article 9(2) of TRIPS states that *"copyright protection shall extend to expressions*[970] *and not to ideas, procedures, method of operations or mathematical concepts as such"*. As it relates to scientific productions, TRIPS only excludes the ideas "as such", which could give WTO Member States certain discretion in dealing with scientific creations.[971] Based on this discussion, Berne and TRIPS do not expressly exclude protection for nano-works; however, with new creations we may expect some new questions as regards to the availability and scope of copyright protection.[972] It will be assumed that since there is no clear provision to exclude the protection of "nano-works", the creation of "nano-works" may be protected under existing copyright laws if the work is original.

Secondly, a "work" needs to be identified under national laws. This could either be the nano-structure itself, or drawings or writings relating to it; to this we turn next.

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[968] Ricketson S 'Threshold Requirements for Copyrights Protection under the International Conventions' (2009) W.I.P.O. Journal 51, at p.54; See further Ricketson and Ginsburg, n.964 at para 8.06.

[969] Schricker, n.966, at pp.61-62. All of these scientific ideas, theories or common terminology must be expressed because they are highly useful in scientific works, Gienas K 'Scientific Works: Another Dimension of Copyright Protection' (2008) J.I.P.L.P. Vol 3, 801, at p.80. In Anya v Wu [2004] All E.R (D) 413, Dr Anya claimed that the defendants without acknowledging him as the author of the original ideas had published papers, in breach of the, original right of attribution. Lewison J struck out the claim and examined that the purpose of the moral rights were concerned to the attribution of the author and were not grant any credit for anyone providing an intellectual "assist". On appeal Neuberger L.J emphasized that pure scientific ideas behind scientific papers are not protectable under copyright law [2004] EWCA Civ 755, at para 8; See comments on this case at http://ipkitten.blogspot.co.uk/2004/02/no-moral-rights-for-non-authors.html; and http://www.mwe.com/info/news/euroip0304.pdf , both accessed on 14 April 2012.

[970] The "expression" may include all forms of expression and may be synonym to the "literary and artistic works" under the Berne, Gervais, n.222, at p.222.

[971] Schricker, n.966, at p.62.

[972] Gervais, n.222, at p.221.

### 5.2.3 Nano-creations

Different types of original work are protected provided they are within the categories specified in the Malaysian and UK Copyright Acts,[973] as well as meeting the requirements of originality and expression in material form.[974] Copyright-protected works include literary, artistic, musical and dramatic and other works such as sound recordings, films, broadcasts, and performer's rights.[975] The presumption can be made that the categories of work most relevant to nanotechnology are artistic and literary works. It is argued that, although these two categories may be relevant, protection may be very difficult to establish.

#### 5.2.3.1 Nano-creations in artistic works

The various types of artistic work include graphic work, photograph, sculpture or collage, work of architecture, and work of artistic craftsmanship.[976] There is no clear meaning of what constitutes an "artistic work". It has been suggested that the words should be construed according to their ordinary meaning, mainly produced for aesthetic quality.[977] The term "artistic" should be defined to include something that is visually significant which the public wish to acquire because of its visual appearance[978] as evidenced in Interlego AG v Tyco Industries Inc[979] where drawings were held not to be original artistic works because there was no visually significant alteration or modification to earlier drawings. Therefore, as compared to literary works, artistic works are viewed and appreciated in a visual sense.[980] This may seem problematic to apply to nanotechnology, although nano-structures may be rendered visible through use of imaging apparatus. Whether nano-creations are works of architecture, artistic craftsmanship, sculpture and graphic works, are discussed below.

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973 It was held in Creation Records v News Group Newspapers [1997] E.M.L.R. 444 that photo shoot scene was not within any recognised category of work; the categories indicate that the works are protectable type, Pila J *'Copyright and its Categories of Original Works'* (2010) O.J.L.S. 229, at p.242.

974 For interesting observation whether fixation is always required for material form see Adeney E *Unfixed Works, Performers' Protection, and Beyond: Does The Australian Copyright Act Always Require Material Form?* (2009) I.P.Q. 77; but since nanostructures materials are material this may not be relevant.

975 Section 7(1) CA 1987; Section 1 CDPA 1988.

976 Section 3 CA 1987; section 4(1) CDPA 1988.

977 Azmi I M 'Slurry Pump and the Obscurity of Artistic Works' (1994) E.I.P.R. 123, at p.125 further suggests that any works under artistic works category must be characterized as artistic within the fine arts sense.

978 See for example, Torremans, n.200, at p.188; Laddie H et al *The Modern Law of Copyright and Designs* 3rd edn (London: Butterworths, 2000), at p.195.

979 [1989] A.C. 217 at 266.

980 Ricketson and Ginsburg, n.964, p.436; see also Colston and Galloway, n.217, at p.305.

#### 5.2.3.1.1 Nano-creations in works of architecture

In nanotechnology, are molecular or atomic structures protectable as architectural works under copyright? The example could be the architectural designs of nanotubes, or buckyball. A work of architecture includes a building or a model for a building.[981] The "building" includes any fixed structure or part.[982] Architectural plans, drawings, models are protected under copyright law.[983] As mentioned above, molecular architecture of nanotechnology may be protected under Canadian copyright law.[984] Berne does not define what constitutes "work of architecture". Ricketson and Ginsburg consider it is not confined to buildings but extends to other structures that are fixed to the ground such as monuments, arches, fountains, and steps.[985] The work of architecture may also be a "fixed structure" which may be carried out on site or erected and fixed there, any fixed structure may include for example such as a landscape garden.[986]

Although the phrase 'irrespective of artistic quality' in section 3(a)/4(1)(a) does not apply to architectural works under 3(b)/4(1)(b), it has been suggested that works of architecture do not require "fine art quality" [987] or "aesthetic judgment"[988] in order to qualify for copyright. The main problem, however, is the requirement that the structure be "fixed". If this means "of fixed shape", then nano-structures would qualify. However, if it means "fixed to the ground", as indicated by Ricketson and Ginsburg i.e. "non-portable", then architectural copyright would not be available for nano-structures. The editors of Copinger & Skone-James on Copyright note of the UK CDPA 1988 that, *"the word fixed was intended to distinguish protected structures from those which were not intended to be protected, such as moveable engineering structures (e.g. a ship): Hansard , HL Vol.493, col.1071."*[989] It was held in Burge v Swarbrick[990] that a boat was not a work of architecture.

[981] Section 3 CA 1987; section 4(1)(b) CDPA 1988.
[982] Section 4(2) CDPA 1988; section 3 CA 1987.
[983] Ricketson and Ginsburg, 964 at p.441.
[984] See n.962 above.
[985] Ricketson and Ginnsburg, n.964, at p.442.
[986] Laddie H al., n.978, at p.194.
[987] Ibid, at para 4.28.
[988] Garnett K et al. *Copinger and Skone James on Copyright*, 15th edn, (London: S&M, 2005), at para 3-64.
[989] Ibid, para 3-63, n.7.
[990] [2007] H.C.A 17; [2007] F.S.R 27(Australia).

In ordinary architecture the plans and models are much smaller than the building. Would it matter if plans for nano were at normal scale, much bigger than the work of nano-architecture? If by using visualising tools, it may have the potential to be protected under the works of architecture. If nano-structure is not a work of architecture, then there would be protection for the plans as ordinary drawings, but the scope of that protection would be limited by section 51 and 52 of the UK CDPA 1988 and section 13A and 13B of Malaysian equivalent. The better view is probably that nano-creations are not works of architecture because of the requirement of fixed sructure (fixation has its own special meaning in copyright).

#### 5.2.3.1.2 Nano-creations in works of artistic craftsmanship

It is the most difficult task for the court to define artistic craftsmanship.[991] Commentators say that the public should wish acquire it because of visual appearance.[992] Example works of artistic craftsmanship include hand-painted tiles, stained glass, pottery and product of high class printing, bookbinding, cutlery, needlework and cabinet making.[993] Is artistic quality required? Although the Acts are silent on artistic quality, the inclusion of "artistic" indicates that some artistic element is needed.[994]

The HL in George Hensher Ltd v Restawile Upholstery (Lancs) Ltd[995] decided that both elements of "artistic" and "craftsmanship" are important. The judges came up with different elaborations (as discussed below) as applied later in Merlet v Mothercare[996] where Walton J decided that the work must be a work of art and the designer's intention was important.

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[991] Dworkin G *United Kingdom* in Stewart S M (ed) *International Copyright and Neighbouring Rights* 2nd ed (London: Butterworths, 1989), at p.493; Torremans, 200, at p.189; see also Thomson J 'Works of Artistic Craftsmanship: What is Happening in this "Formidable Area of Complexity" (2010) E.I.P.R. 113, at p.114; the difficulty in defining 'artistic' has caused great difficulty at national and international level, Sterling J A L *World Copyright Law* 2nd ed (London: S&M, 2003) at p.259.
[992] Laddie et al. n.978, at p.195; it requires manual dexterity which leads the public to acquire not because of its functionality, but because of its visual appearance, Torremans, n.200 at p.192.
[993] Dworkin, n.991, at p.493.
[994] See also Azmi, n.977, at p.126; Torremans, n.200, at p.189.
[995] [1976] A.C, 64.
[996] [1986] R.P.C. 115.

However, what sort of artistic quality is relevant in nanotechnology? Based on the court's decisions in Hensher and Merlet, the maker must consciously intend to create a work of art as emphasized by Lord Reid, Lord Morris and Lord Kilbrandon. The nano-work should be intended to give pleasure, satisfaction, emotional or intellectual value in the eyes of the public as contended by Lord Reid. Furthermore as expounded by Lord Simon, for a nano-work to be artistic, special training, skill and knowledge is needed for the production of work. Lord Morris suggested that to be called "artistic" something additional and different is required, but did not elaborate on what was necessary. Lord Morris further added that the work must be viewed and judged in an objective way. Lord Kilbrandon argued that since "artistic" is common speech, it requires no interpretation by experts, or opinion of the public at large and it is for the judge to determine whether the object falls within the scope of common meaning of the word. For nano-structures, therefore, experts including scientists, technologists or lab technicians may not be helpful in determining whether the nano-works are artistic. In determining what constitutes "craftsmanship", Viscount Dilhorne stated that the work of craftsmanship is something made by hand and not in mass production – this would be fatal for protection of nano-structures and stated that the presence of distinctive features of shape, form and finish would suffice to make the work "artistic". Lord Simon however, stated that there is no requirement to equate "craftsmanship" and "hand-crafted", which means that this would not disqualify the work as an object protected under law. Thus, as nano-structures are always produced by the help of machines, this is of particular relevance to nanotechnology. The phrase of "work of artistic craftsmanship" according to Lord Simon *"implies a manifestation of pride in sound workmanship – a rejection of shoddy, the meretricious, the facile. ... the craftsmanship – not the work itself – must in addition be artistic"*.[997]

However the Australian High Court has taken a different view in Burge v Swarbrick[998], which concerned the "plug" from which a mould for a boat hull could be derived. In this case the Court considered that in determining whether a work is artistic craftsmanship, it did not depend on the beauty or aesthetic appeal of the work, but *"the determination turns on assessing the extent to which the work's artistic expression, in its form, is unconstrained by*

[997] 1976] A.C. 64, at 89, and gave example of craftsmanship which was not artistic for instance a cobbler, a dental mechanic, a pattern-maker, a boilermaker, a plumber, a wheelwright and a thatcher, at 94.
[998] [2007] H.C.A. 17.

*functional considerations"*.[999] The Court further determined that the expression "artistic craftsmanship" was not incompatible with machine production thus, a prototype like a plug might be considered as "work of artistic craftsmanship".[1000] The Court emphasized that there is "*freedom of design choice*"[1001] and "*a real or substantial artistic effort*"[1002] of the maker in devising the work of artistic craftsmanship. [1003] Thus, if nano-structures are to be considered as works of artistic craftsmanship, the freedom of the maker to create the designs must be unconstrained by functional consideration, which is likely with nanotechnology.

The New Zealand High Court in Bonz Group (Pty) Ltd v Cooke[1004] gave the meaning that the craftsman is *"a person who makes something in a skilful way and takes justified pride in his workmanship,"* whereas an artist *"is a person with creative ability who produces something which has aesthetic appeal"*.[1005] Thus, to constitute artistic craftsmanship it must combine work of the craftsman and artist; Tipping J observed *"if two or more people combine to design and make the ultimate product I cannot see why that ultimate product should not be regarded as a work of artistic craftsmanship"*.[1006] The approach of creative ability and aesthetic appeal as in Bonz was adopted by Evans-Lombe J in the UK in Vermaat (t/a Cotton Productions) v Boncrest Ltd (No.1).[1007] He stated that designs for patchwork bedspreads and cushion covers did not exhibit the element of creativity, although they may be pleasing to the eye. Both cases demonstrate that different persons could produce the artistic element and the craftsmanship; so long there is a link between the two. In Shelley Films Limited v Rex Features Limited[1008] the plaintiff claimed copyright infringement in costumes, prostheses and film set. The plaintiff claimed that the costumes and set as works of artistic craftsmanship, and the prostheses as sculpture or alternatively work of artistic craftsmanship. The court held that there was significant artistic and creative objective in the costumes and therefore copyright existed in respect of the work of artistic craftsmanship. As regards to film set, the court distinguished Merlet (judged in isolation of the baby, mother and the garment) but held

[999] [2007] H.C.A. 17, at 83.
[1000] Ibid, at 59-61.
[1001] Ibid, at 75.
[1002] Ibid, at 52.
[1003] Ibid, at 59-61.
[1004] [1994] 3 N.Z.L.R. 216.
[1005] Ibid, Per Tipping J, at 223.
[1006] Ibid, at 223.
[1007] [2001] F.S.R. 5.
[1008] [1994] E.M.L.R. 134.

copyright could exist in the set made from numerous components if *"imaginatively conceived and implemented overall as a work of artistic craftsmanship"*.[1009]

It is clear under UK law that nano-creations work are not artistic craftsmanship as observed under Hensher and Merlet where the intention of the designer is given more significant and the production made by hand. In Australia, the position is different where the extent of the designer's artistic expression is unconstrained by functional consideration, this will be a problem for nanotechnology although artistic craftsmanship not being incompatible with machine production may provide a generous treatment for nano-creations. New Zealand and now the UK has combined the element of creative ability and aesthetic appeal which may be relevant for nanotechnology since nano-creations involve a team of individuals.

#### 5.2.3.1.3 Nano-creations in sculpture

"Sculpture" has involved different articles for example plaster shapes of toasted sandwich maker[1010] or a wooden model Frisbee used to make mouldings for plastic Frisbee.[1011] But "sculpture" may not include for example plasticine models for dental impression trays[1012] or the collection of different objects around a swimming pool,[1013] or functional manufacturing moulds.[1014] In identifying whether helmets worn by characters in a film were "sculpture", the SC in Lucasfilm Ltd v Ainsworth[1015] upheld the decision of Mann J[1016] and the COA[1017] by stating that the helmet being used as prop was purely utilitarian in function for the purpose of the film production, and therefore was not "sculpture."[1018] It is difficult to argue after Lucasfilm that nano-creations are "sculpture" in the UK since utilitarian functions of the work are not covered. The position highlighted in Lucasfilm is likely to be followed by the courts in Malaysia.

[1009] [1994] E.M.L.R. 134, at 143.
[1010] Falconer J in Breville Europe v Thorn EMI [1995] F.S.R. 77, at 94.
[1011] Wham-O Manufacturing Co v Lincoln Industries Ltd [1985] R.P.C. 127, at 157.
[1012] J & S Davis (Holdings) v Wright Health Group [1988] R.P.C. 403.
[1013] Creation Records v News Group [1997] E.M.L.R. 44.
[1014] Metix (UK) Limited v G H Maugham Ltd [1997] F.S.R. 718.
[1015] [2011] UKSC 39; [2012] 1 A.C 208.
[1016] [2009] F.S.R. 103, at 121.
[1017] [2010] Ch 503, 79 and 80.
[1018] [2011] UKSC 39; [2012] 1 A.C 208, at 44.

### 5.2.3.1.4 Nano-creations in graphic works

Graphic works include painting, drawing, diagram, map, chart or plan; engraving, etching, litograph and woodcut[1019] irrespective of artistic quality. Copyright protects, for example sketches for dress designs,[1020] and the drawings of exhaust pipes,[1021] indeed any drawings and plans (for example architect's plan or sketches for buildings); plans and drawings for "nano-strcutures" may be considered as graphic works. However the protection does not extend to reproducing the nano-structures themselves, as discussed below. For this, the SC in Lucasfilm has recognized that the design and copyright law in the UK provides for the *"graduated range of protection"* for three-dimensional objects.[1022]

### 5.2.3.2 Nano-creations in literary works

Section 3(1) of CDPA 1988 defines "literary work" as *"any work, other than a dramatic or musical work which is written, spoken or sung..."*. Literary works also include tables or compilations, other than a database; a computer program; preparatory design material for a computer program; and a database.[1023] Section 178 of the CDPA 1988 defines "writing" to include any form of notation or code, whether by hand or otherwise and regardless of the method by which, or medium in or on which, it is recorded, and that "written" shall be construed accordingly. Examples of literary works where the protection was granted were examination papers,[1024] five-letter "Liber Code" for sending messages,[1025] football pools coupons[1026] and television programmes.[1027] Peterson J stated that "literary works" are those *"expressed in print or writing, irrespective of the question whether the quality or style is high"*.[1028] However, literary work did not exist for an invented word like "EXXON" because it did not provide *"information, instruction or pleasure of a literary kind"*,[1029] or song

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[1019] Section 3 CA 1987; section 4(2) CDPA 1988.
[1020] Bernstein v Murray [1981] R.P.C. 303.
[1021] British Leyland v Armstrong [1986] R.P.C. 279.
[1022] [2011] UKSC 39; [2012] 1 A.C 208, at para 48.
[1023] Section 3 CA 1987 instead provides a long list of what literary work includes novels, plays, dramas, letters, reports, lectures, tables or compilations, computer programs, etc.
[1024] University of London Press Ltd v University Tutorial Press Ltd [1916] 2 Ch 601.
[1025] D P Anderson & Co Ltd v Liber Code Co [1917] 2 K.B. 469.
[1026] Ladbroke v William Hill [1964] 1 W.L.R. 273.
[1027] Independent Television Publications Ltd v Time Out [1984] F.S.R. 64.
[1028] University of London Press Ltd v University Tutorial Press Ltd [1916] 2 Ch 601, at 608.
[1029] Exxon Corpn v Exxon v Exxon Insurance Consultants International Ltd [1982] Ch 119, at p.88.

titles[1030] or the printed tables at the front of the diary as common knowledge[1031] and individual command names and collection of complex command in a computer program.[1032] The discussion of literary works for biotechnology may provide some insight for nanotechnology at least to the general proposition that creations at nanoscale could be "works".

A literary work in DNA molecule may arise in the form of presentation in text-form such as the four letter ATCG[1033] alphabet of a DNA sequence, each letter denoting one nucleotide in DNA, and the 20-letter alphabet for the amino acids of proteins.[1034] The string of letters may qualify for copyright protection as a literary work, and the text may exist in different form for example electronic.[1035] The written message provides a significant link in the information chain that leads from a naturally occurring substance to a commercial product, and thus has the potential for copyright protection.[1036] However, to be protectable as literary work, the law requires certain minimum of elaboration of structure and a certain minimum length of message, not, for example, a short sequence of a few letters used to design probes for gene library screening.[1037] There is little judicial guidance on how synthesised molecules of DNA could be protected in the UK, and thus it was considered that the protection is of limited.[1038]

There is no doubt that the elucidation of a DNA or protein sequence involves a very substantial skill and labour that may satisfy the originality requirement.[1039] Although some may argue that the work might not be original because it is copied from nature, this may be

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1030 Francis Day v Twentieth Century Fox [1940] A.C 112; but newspaper headlines were given copyright protection in Shetland Times v Jonathan Wills [1997] F.S.R. 604 as substantial part of the articles. Now see Infopaq International A/S v Danske Dagblades Forening [2010] F.S.R. 20 that the "data capture process" reproducing an extract of 11 words are regarded as "reproduction" within Article 2(a) Directive 2001/29/EC on the harmonization of certain aspects of copyright and related rights in the information society [2001] OJ L167/10 (Infosoc Directive).

1031 Cramp v Symthson [1944] A.C. 329.

1032 Navitaire Inc v EasyJet Airline Co [2005] E.C.D.R. 17.

1033 The four bases that make up DNA: adenosine, thymine, cytosine and guamine.

1034 Karnell G W G 'Protection of Results of Genetic Research by Copyright or Design Rights' (1995) E.I.P.R. 355, at p.355; it is a long piece of string in four types of different shaped bead and each of this bead representing a nucleotide, Peeters M and Hird S 'UK Protection for Recombinant DNA – Exploring the Options' (1991) E.I.P.R. 334, at p.334.

1035 Karnell, n.1034, at p.355.

1036 Laddie et al,n.978, at pp.1708-1709 (2011).

1037 Ibid, at pp.1709-1710 (2011).

1038 Peeters and Hird, n.1034, at p.334; there was no court's decision on the copyright protection for DNA sequences, Karnell, n. 1034, at p.355.

1039 Laddie et al, n.978, at p.1710 (2011).

rejected as the originality resides if further independent, useful labor, knowledge and judgment have been dedicated on its creation.[1040] Copyright is capable of subsisting in a scientific record consisting of a series of a letter or other character symbolising the sequential of DNA, proteins and similar constructs found in molecular biology and the recorded sequence is of sufficient length.[1041] Therefore, the extent to which the record is original or not depends on whether the structure recorded was wholly elucidated from nature or whether it was the result of the author's skill and labour.[1042] The infringement may occur when the molecule whose structure has been elucidated from nature by reproducing in writing the elucidated sequence of the molecule, but it is not by making a molecule to that sequence.[1043]

Although nano-creations could learn from DNA, the argument of DNA molecule as a literary work to be applied to nanotechnology is not strong enough to support the view that nanotechnology could be considered as a nano-structure literary work. This is because, unlike DNA molecule, nano-creations do not appear in a string like DNA with written message to be considered as "literary works". Furthermore, there is difficulty in proving infringement. Equally, based on laws and cases, there are not many suggestions that copyright is available for the DNA, particularly because of its functional nature. Thus, the only comfort from the DNA case is that the commentators envisage that copyright may operate at nanoscale.

#### 5.2.3.3 Reproduction of two-dimensional of nano-creations to three-dimensional objects

In Malaysia, prior to the Copyright (Amendment) Act 1996 "artistic work" was defined to include two dimensional work of paintings, drawings, etchings, lithographs, woodcuts, engravings and prints, and three-dimensional works related to geography, topography, architecture or science.[1044] It is an infringement of copyright to make a three-dimensional object from a two-dimensional artistic work, and to make two-dimensional work to a three-dimensional object. The questions whether drawings were capable to be protected as 'artistic works" and whether three-dimensional products of two-dimensional drawings were eligible

[1040] Laddie et al, n.978, at p.1710 (2011), at p.1710.
[1041] Ibid, at p.1711.
[1042] Ibid, at p.1711.
[1043] Ibid, at p.1701.
[1044] See for example the view which states that the old definition of 'artistic works' under old Copyright law has been criticized as being unwarranted, Lim H G 'Copyright in Functional Drawings? The Linatex Case and British Leyland Revisited/ [1994] 1 M.L.J. xc, at p.xc.

to be protected under section 3 of the CA 1987, were considered in Peko Wallsend Operations Ltd & Ors v Linatex Process Rubber Bhd.[1045] In this case, the plaintiffs were the Australian-based companies which designed, manufactured and distributed "slurry pump" worldwide. The plaintiffs contended that defendant's copying, reproducing or manufacturing any slurry pump's parts or mould by way of reverse engineering was an infringement of the plaintiff's copyright to such parts and moulds and the three-dimensional form of the plaintiff's slurry pump parts and moulds. In this case the issue was whether engineering drawings were 'artistic works' capable of being protected under the CA 1987.[1046] The HC rejected the defendant's argument that engineering drawings have no artistic quality and do not qualify to be protected under copyright law under section 7 of the CA 1987. The Court held that the works were protected irrespective of their quality and the purpose for which they were created. The definition under section 3 does not qualify the type of drawings eligible for protection and the provisions are wide enough to cover engineering drawings, therefore, engineering drawings are included under definition of artistic works. Siti Norma Yaakob J stated that:

> "Parliament must have intended to extend the scope of the protection to cover all types of drawings, regardless of their quality and purpose of their creations."[1047]

Thus, according to this case copyright in "artistic works" includes engineering drawings i.e. the two-dimensional and it has been extended to cover the three-dimensional products which have been reproduced from the engineering drawings. The decision triggered the copyright amendment in Malaysia to delimitate between copyright and design law.[1048] Section 13A and

[1045] [1993] 1 M.L.J. 225. The decision in this case has attracted considerable academic discussion, see for example Azmi, n.977 above; Khaw L T 'Recent Amendments to Malaysian Copyright Law' (1997) E.I.P.R. 81; Khaw L T 'Copyright Law in Malaysia: Does the Balance Hold?' [2004] 31 J.M.C.L. 23; Sangal P S 'Malaysian Copyright Law under Revision: Why and How?' [1997] I C.L.J. Iviii; Khaw L T *Copyright Law in Malaysia* 3rd ed (Petaling Jaya, LexisNexis: 2008), Chapter 3; Lim, n.1044 above.

[1046] In UK before the amendment of Copyright Act 1988, under Copyright Act 1956 it was held that the copyright existed in the prototype furniture and design drawings in LB Plastic Ltd v Swiss Products Ltd [1979] R.P.C. 551, and the HL decision in British Leyland Motor Corp v Armstrong Patents Co Ltd [1986] R.P.C. 279 in which copyright was asserted in drawings of the car exhaust pipe.

[1047] [1993] 1 M.L.J. 225, at 233. The similar approach has been adopted in Goodyear Tire & Rubber & Anor v Silverstone Tire & Rubber Co Sdn [1994] 1 M.L.J. 348 where the court accepted that the copyright protects two-dimensional and extend to the three-dimensional works.

[1048] Section 7(5) CA 1987 for example provides that copyright should not exist for any design which is registered under any law relation to industrial design; section 7(6) CA 1987 states that copyright protection ceases to exist for a design which is capable of being registered but which has not been registered once the article has been reproduced more than 50 times by an industrial process. The copyright protection is lost once the non-registered has been reproduced industrially; the amendment has curtailed the role of copyright in industrial process and functional articles as decided under Peko's case would no longer be protected, Sangal, 13B of CA 1987 and CDPA 1988 equivalent section 51 and 52 will be given more discussion.

Section 13A of CA 1987 provides that it is not an act of infringement of copyright to make of any article to a design document or model recording or embodying a design for anything other than artistic work or a typeface. Under this section, "design" is defined to mean that the design of any aspect of the shape or configuration (whether internal or external) of the whole or part of an article, other than a surface decoration.[1049] A design document is referred as any record of a design, whether in the form of a drawing, a written description, a photograph, data stored in a computer or otherwise.[1050] This section reflects the CDPA 1988, section 51.[1051] Therefore, case law under section 51 of the CDPA 1988 is persuasive in Malaysia. This section states that the design must be "for" something. The design in the design document or the model must have been created as a step toward or as a part of the process of producing an article based in the design that is for the subsequent production of another article.[1052] What constitutes "design" and "design document" was discussed in Mackie Designs Inc v Behringer Specialised Studio Equipment (UK) Ltd & Ors[1053] where the plaintiff, claimed the literary, alternatively the artistic copyright in circuit diagrams for an electrical equipment mixer. It alleged that the defendant had analysed mixer and its circuits to produce a "net list" of the components and their interconnections. The questions were (a) whether the circuit diagrams were design documents within the meaning of section 51 of the CDPA 1988; (b) if so, whether the defendants had a defence to copyright infringement under section 51. It was held that the circuit diagram was a design document within the meaning of the Act and it did not have the appropriate UK connection to qualify for unregistered design

n.1045, at p.lxvi; Khaw, argues that the amendment of the provision has created a *"minefield of uncertainties for design owners"*, n.1045, at p.107. But now section 7(6) has been deleted with new amendment in 2010.

[1049] Section 13A (2) CA 1987.

[1050] Ibid.

[1051] In the words of Pumfrey J in Mackie Designs Inc v Behringer Specialised Studio Equipment (UK) Ltd & Ors [1999] R.P.C. 717 stated that *"copyright protection was no longer to be available to what can be compendiously described as ordinary functional commercial articles. This principle applies to all industrially produced articles...",* at 723.

[1052] Laddie H et al., n.978, at paras 59.30-59.38.

[1053] [1999] R.P.C. 717; see also BBC Worldwide v Pally Screen Printing [1998] F.S.R. 665 it was held that it was not an infringement of the famous TV programme characters "Teletubbies" to be printed on various items such as T-shirts; Lambretta Clothing Ltd v Teddy Smith (UK) Ltd [2005] R.P.C. 6 stated that the reproduction of design such as colorways for sweater was protected under under section 51; Flashing Badge Co Ltd v Groves [2007] E.W.H.C. 1372 (Ch); [2007] F.S.R. 863, it was held that the extent of section 51 does not applied to design for surface decoration of badges.

right. The defendant had copied the plaintiff's circuit board, in the form of a 'net list', thus they had copied an article made according to the design and the defence under section 51 applied. The defendants' net list and circuit diagrams did not thus infringe the plaintiff's copyright.

Based on the above section, unless nano-creation is itself an artistic work, copyright in drawings and plans for it will therefore not be infringed by reproducing the nano-structure. Section 13B is similar to section 52 of the CDPA 1988 which provides that where artistic work has been exploited by making an industrial process, articles falling to be treated for the purpose of this section seen as copies of the work. In relation to an artistic work copying means the making of a copy in three-dimensions of a two-dimensional work and the making of a copy in two dimensions of three-dimensional work. The limitation provided under section 13A and 13B suggests that it is very difficult to protect the artistic design which has been applied industrially in Malaysia. Malaysia could follow the lead in the UK to protect the artistic design by the route of unregistered design, as discussed in the next section below.

## 5.3 TRADE MARKS AND NANOTECHNOLOGY

### 5.3.1 Introduction

Special tools, such as STM in case of forming IBM letters, have been used to manipulate the atoms to place marks on nanoscale devices.[1054] In another example, a team from Monash University has created Electron Beam Lithography instrument that managed to write or mark nano-sized objects or surfaces to a size less than 10nm.[1055]

Thus it is possible to mark products at nanoscale, though visualisation techniques such as AFM and STM are needed to perceive them. Macro marks, for example on packaging, can be used to signify the source of nano products or services. Thus trade mark law is relevant. The main legal issues examined here are:

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[1054] See n.76.

[1055] Press Release, A Giant Step for Nanotechnology' 30 September 2009, at http://www.monash.edu.au/news/newsline/story/1504 accessed on 1st Oct 2009.

(a) whether marks at nanoscale be considered as “marks” or “signs”;

(b) can TM protects the shape of nano-creations; and

(c) whether the use of “nano” word marks on product which contain (or do not contain) nanoparticles give rise to distinctiveness and deceptiveness problems.

### 5.3.2 Nanoscale marks

Can marks at nanoscale be considered as “marks” or “signs” under TRIPS, Malaysia and UK/EU law, and if so, how are they classified? Article 15 TRIPS reads:

> “Any sign, or any combination of signs, capable of distinguishing the goods and services of one undertaking from those of other undertakings, shall be capable of constituting trade mark. Such signs, in particular words including personal names, letters, numerals, figurative elements and combinations of colours as well as any combinations of such signs, shall be eligible for registration as trademarks. Where signs are not inherently capable of distinguishing the relevant goods or services, Members may make registrability depend on distinctiveness acquired through use. Members may require as a condition of registration, that signs be visually perceptible”.

TRIPS requires the sign to be distinctive. It is generally accepted that if the sign lacks distinctiveness, it does not mean that the protection is excluded if the sign has acquired distinctiveness through use.[1056] There is no limit of signs that are protected, and the definition of signs covers a very broad range.[1057] The member states may also provide that the signs are visually perceptible. Thus, TRIPS allows but does not require the exclusion of non-visually perceptible marks from registration, as in smell and sound marks.[1058] There is a clear difference of “visually perceptible” under the TRIPS and EU law (TM Directive and TM Regulation) because EU demands the sign to be capable of distinguishing and to be “represented graphically”, whilst the TRIPS demands that the sign be distinctive and “visually perceptible” only as an optional extra.[1059] Accordingly, the wording under the TRIPS renders the meaning to be either; (a) a sign may not be registered if it cannot be

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[1056] Correa, n.580, at p.177; Tritton G et al *Intellectual Property in Europe* 3rd ed (London: S&M, 2008)

[1057] Gervais, n.222, at p.266.

[1058] Ibid, at p.267, n.306; Tritton, n.1056, at p.236; Phillip J *Trade Mark Law: A Practical Anatomy* (Oxford: OUP, 2003) , at p.65 Blakeney M ‘The Impact of the TRIPS Agreement in the Asian Pacific Region’ (1996) E.I.P.R. 544, at 548.

[1059] Phillips, n.1058, at p.65.

seen;[1060] or (b) a sign may be registered where it can be seen or not provided it is visually supported with description to educate the consumer of the nature of the mark.[1061]

Clearly, the intention of TRIPS is to require member states to protect marks that are visually perceptible. However, TRIPS does not prevent non-visually perceptible marks to be protected (as in case of smell and sound) if they are distinctive in character. This may include nano-marks, although they are not visually perceptible, but they are capable of distinguishing. The discussion below examines whether nanoscale marks are protected under Malaysia and UK/EU law.

The law that governs trade mark registration in Malaysia is the Trade Marks Act 1976 (TMA 1976)[1062] and Trade Marks Regulations 1983.[1063] Both came into effect on 1 September 1983. Section 3(1) of the TMA 1976 defines 'mark' to include a device, brand, heading, label, ticket, name, signature, word, letter, numeral or any combination thereof.[1064] The definition of "mark" is very wide but not an inclusive and open definition.[1065] Unlike TRIPS and EU law, Malaysian law does not use the words "any sign" to indicate even wider scope.[1066] The definition of "mark" under the TMA 1976 is related to the visual characteristics of goods, or the presentation of goods and services to serve the function of a trade or service mark.[1067] This is because, applying the rule of "ejusdem generis", all the listed marks have the same character i.e. are visually perceptible. Thus, according to the TMA 1976 many non-traditional signs that cannot be classified as "marks" are excluded from registration. By contrast, many countries including the UK have adopted a wider scope of interpretation that any sign can be registered if it is capable of being represented graphically.[1068] The above definition particularly emphasises visual perception which makes it difficult for Malaysian law to be applied to nanotechnology, as nanotechnology cannot be

[1060] As the position in Malaysia, discussed below.
[1061] Phillips, n.1058, at p.65, as for example the position in UK/EU.
[1062] For the legislative history, see Kwang T B *Trade Mark Law and Practice in Malaysia* (Kuala Lumpur: Butterworths Asia, 2001), pp.1-15.
[1063] PU (A) 355/1983.
[1064] The same section defines "trade mark" as mark that is *"used or proposed to be used in relation to goods and services for the purpose of indicating or so as to indicate a connection in the course of trade between the goods and services"*.
[1065] Kwang, n.1062, at p.53; contrast of section 1 of the UK Trade Marks Act 1994 of the words "in particular".
[1066] Azmi, I M *Trade Marks Law in Malaysia* (Petaling Jaya: S&M Asia, 2004), at p.2.
[1067] Kwang, n.1062, at p.54.
[1068] Azmi, n.1066, at p.2.

seen by the naked eye. Therefore, the study focuses more on the meaning of "sign" under the UK/EU trade mark law. However, since TRIPS is permissive of non-visible marks as argued above, it does not assist in displacing the "ejusdem generis" rule.

In the UK, the passage of the Trade Marks Act 1994 (TMA 1994) is to implement the EU Trade Marks Directive (TMD).[1069] The Community Trade Mark (CTM) was also introduced.[1070] Section 1(1) of the TMA 1994 and its EU equivalents refer to "trade mark" as any sign including words (including personal names), designs, letters, numerals, or the shape of the goods and their packaging, provided that they are capable of being represented graphically and capable of distinguishing goods and services of one undertaking from those of another.[1071] The law offers no discrimination for registration of any signs, only that they have to perform certain requirement prescribed under the law[1072] that there must be a sign; that the sign has to distinguish between goods and services and that the sign is capable of being represented graphically. Accordingly, the word "sign" comprises a broad expression[1073] which indicates "*anything which can convey information*".[1074] The failure to comply would render the sign invalid for registration, for example marks which are devoid of any distinctive character.[1075] Although the examples of sign given in the TMA 1994 indicates that the sign should be "visually perceptible", nevertheless this does not mean that non-visually perceptible mark will be excluded, such as in smell[1076] and sounds,[1077] so long as the

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[1069] First Council Directive 89/104/EEC of 21 December 1988 to approximate the laws of the Member States relating to trade marks. Now replaced by consolidated version the Directive 2008/95/EC of 22 October 2008, OJ L 299/25.
[1070] Council Regulation (EC) 40/94 of 20 Dec 1993, now replaced by consolidated version, Council Regulation (EC) No 207/2009 of 26 February 2009 OJ L 78/1.
[1071] See also Article 2 TMD; Article 4 CTM. However the intention of the legislation is not to be an exhaustive list , Firth, A. et al., *Trade Marks: Law and Practice*, 2nd edn, (Bristol: JPL, 2005), at p.21.
[1072] Section 1(1) is read together with section 32(2)(d) TMA 1994.
[1073] Morcom C et al. *The Modern Law of Trade Marks* 3rd edn (London: LN, 2008) at p.53.
[1074] Jacob J in Philips Electronic NBV v Remington Consumer Products [1998] R.P.C. 283, at 298 *"I appreciate that this is extremely wide, but I can see no reason why to limit the meaning of the word. The only qualification expressed in the directive is that it can be capable of being represented graphically"*.
[1075]Section3 (1)(b) TMA 1994; Art 3(1)(b) TMD; Art 7(1)(b) CTM which *inter alia* provides other absolute grounds for registration. See the decision in Dyson Ltd v Registrar of Trade Mark [2007] 2 C.M.L.R. (14) 303 where the ECJ refused to grant registration of the transparent bin of a vacuum cleaner because it was mere property of the product and did not constitute a "sign" within the meaning of Art 2 TMD.
[1076] See for example Ralf Sieckmann v Deutsches Patent – und Markenamt [2003] R.P.C. 38; Vennootschap Onder Firma Senta Aromatic Marketing's Application [1999] E.T.M.R. 429.
[1077] See for example Shield Mark BV v Joost Kist (t/a Memex) [2004] R.P.C. 17.

mark is capable of distinguishing and it can be represented graphically. The broader definition of sign may include gestures and tastes[1078] as well as colours.[1079]

The position under UK/EU law provides a strong argument for nanotechnology to consider. Generally, the law treats non-visual marks the same as other marks, but they may differ in the requirement that they are capable of being represented graphically.[1080] Eligibility for protection of non-visible but perceptible marks such as smells and sounds provides a good consideration on how nanoscale marks may attract trade marks protection. Indeed, nanotechnology may help to deliver smell mark; nano-encapsulation methods are available for production of aromatic compounds in perfumes using nanoparticles such as gold-palladium.[1081] Nano-encapsulated fragrance may be embedded for example into textiles, shoes and other materials such as ceramics.[1082]

It has been regarded that it is unlikely for the smell to be represented precisely, and the problem may arise too for nano-marks, unless supported by some other form of representation.[1083]

The decision of the ECJ in Ralf Sieckmann v Deutsches Patent – und Markenamt[1084] is important to consider for nano-marks. In this case the applicant sought to register a scent as trade mark for services in different classes under Nice Agreement and the description by the applicant that the sign is "*the pure chemical substance methyl cinnamate*" The sample of the scent has been deposited as *"balsamically fruity with a slight hint of cinnamon"*[1085] The

[1078] Bently and Sherman, n.211, at p.806.
[1079] See Libertel Groep BV v Benelux-Merkenbureau [2003] [2003] E.T.M.R. 63; [2004] F.S.R. 4, at 73.
[1080] Non-visual marks are also referred to 'non-traditional marks; they sometimes overlap with other IP rights such as utility patents, design patents and design rights, Firth A *Signs, Surfaces, Shapes and Structures – The Protection of Product Design under Trade Mark Law* in Dinwoodie G B and Janis M D, eds *Trade Mark Law and Theory: A Handbook of Contemporary Research in Intellectual Property* (Cheltenham, Northampton: EE, 2008) at p.499; MacQueen et al., n.622, refer them as 'unusual marks', at p.571.
[1081] Available at http://nanogloss.com/nanotechnology/applications-of-nanotechnology-in-perfumes/ accessed on 7 October 2011; a team of scientist from Lehigh University and Cardiff University have uncovered producing a cleaner method of producing spices and perfumes using gold-palladium for dental, medical and laboratory uses, available at http://www.physorg.com/news10337.html.
[1082] Available at http://nanogloss.com/nanotechnology/applications-of-nanotechnology-in-perfumes/ accessed on 7 October 2011.
[1083] See TM Manual Chapter 3 para 16.3.
[1084] [2003] R.P.C. 38; the principle of Sieckmann was later applied in Eden SARL v OHIM [2006] E.T.M.R. 14 concerning *"the smell of ripe strawberries",* at 188.
[1085] [2003] R.P.C. 38, at 688 para 13.

Court referred to Article 2 of the TMD on the question whether the sign which is not capable of being perceived visually may be represented graphically by description in words, or by way of chemical formula or by depositing a sample or by any combination of them. It was held that if the sign is not capable of being perceived visually, the graphical representation must satisfy seven principles that are: (a) clear; (b) precise; (c) self-contained; (d) easily accessible; (e) intelligible; (f) durable; (g) objective.[1086] The Court considered that the written description "balsamically fruity with a slight hint of cinnamon" fails to describe in clear, precise and objective manner and the deposit of an odour sample has not been regarded as graphically represented.

The non-visual mark was not excluded from trade mark registration so long as it could be represented graphically, although it challenging to satisfy the requirement "graphical representation".[1087] It is equally argued that although the requirements under Sieckmann have attracted criticism and doubt,[1088] nonetheless it would not necessarily prevent non-visual marks in nanotechnology to be represented graphically. As experienced in Sieckmann, the problem of satisfying the graphical requirement is likely to arise in nano-smell marks. Thus, the sign will continue to receive bar from registration, unless some of 'representation' can be devised possibly analogous to musical notation.[1089] Of course, many nanoscale marks will be scaled down version of ordinary visual marks rendered into quantum dots. Here the issue of perceptibility and trade mark function will be crucial.[1090]

The Trade Mark Registry Work Manual lists down the ingredient requirement for the sounds mark to be accepted that are; (a) to avoid sound marks to be examined as if it is word or device mark, the applicant has to state clearly that the mark is sound mark; (b) the graphical representation of the sign is showing by musical stave divided into measures and showing a

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[1086] [2003] R.P.C. 38, at 693 para 55.
[1087] See in Re John Lewis of Hungerford Limited [2002] R.P.C 28, 'the smell, aroma or essence of cinnamon" related to furniture is to be contrasted with the earlier decision of the "the smell of the fresh cut grass" in Venootschap Onder Firma Senta Aromatic Marketing's Application [1999] E.T.M.R 429. There may be doubtful as the capability of smell mark to be registered in the EU, see for example Burrell R and Handler M 'Making Sense of Trade Mark Law' (2003) I.P.Q. 388, at p.395.
[1088] The criteria set out in Sieckmann are likely very difficult to satisfy although it is not the intention of the court to rule the possibility of registering olfactory marks, Turner-Kerr P Trade Mark Tangles: Recent Twists and Turns in EC Trade Mark Law' (2004), E. L. Rev. 345, at p.346; see also MacQueen et al. n.622, at p.572; the difficulties also arise in term of the practical matter of intelligible recordal, Morcom et al, n. 1073, at p.55; see also Phillips, n.1058, at p.156-157.
[1089] Ibid, para 16.3.1
[1090] See n.76; n.106; n.258 and 5.3.6.

clef, musical notes and rests, indicating relative value, and sharps, flats, and naturals.[1091] It was argued that when the issue of graphical representation was discussed, and some discussion was misdirected, forgetting the purpose and functions of trade marks.[1092] However, for nanotechnology, it could be argued similar to sounds mark that there is no bar for protection if the marks are represented graphically.

Other non-visual marks that are interesting discussion for graphical representation are colours mark. It is observed that it is likely challenging for single colour mark to acquire registration.[1093] In Libertel Groep BV v Benelux-Merkenbureau[1094] the applicant sought to register an "orange" colour in relation to the communication equipment and services in Classes 9 and 35 to 38. The Court referred to Article 3(1)(b) of the TMD on whether specific colour per se could have a 'distinctive character'. The Court applied the seven principles of Sieckmann. The Court argued that mere sample of colour does not sufficiently satisfy the criteria under Sieckmann and colour could deteriorate over time.[1095] As regards distinctive character, the Court stated:

> "A colour per se, not spatially delimited, may, in respect of certain goods and services, have a distinctive ... The latter condition cannot be satisfied merely by reproducing on paper the colour in question, but may be satisfied by designating that colour using an internationally recognised identification code".[1096]

Thus to overcome the problem of graphical representation of colour or to identify specific colour, the practice is to refer to an international recognised classification for example Pantone®, RAL and Focoltone® as well as RGB profile to verify the electronic image of the colour.[1097] As experienced in shape marks (discussed below), a certain colour may be refused registration because of the policy consideration that it should be freely available to anyone to use, and unless it can be proved that the colour has acquired distinctiveness through its use.

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[1091] Manual TM, Chapter 3, para 16.4.
[1092] See Advocate General Ruiz-Jarabo Colomer observation in Sieckmann observed that the object of a trade mark is to enable consumers to identify goods and services by their origin and quality, at 492-492.
[1093] See McCutcheon J 'How Many Colours in the Rainbow? The Registration of Colour Per Se under Australian Trade Mark Law (2004) E.I.P.R. 27, at p.27, n.14; also Turner-Kerr, n.1088, at p.350.
[1094] [2003] E.T.M.R 63
[1095] Ibid, at 814 and 818.
[1096] [2003] E.T.M.R 63 at 819
[1097] TM Manual Chap 3, 16.1.1.

The rule of "graphically represented" in Sieckmann that applies to non-visual marks may be applied equally for nanotechnology. A study conducted in the EU trade mark system[1098] found that the majority of the user associations viewed that the requirement of "graphical representation" was outdated and asked for a more liberal approach for representation in non-traditional marks, and suggested the need to change the wording of the law, however the legal security being maintained.[1099] It has been proposed that "graphical representation" should be removed from the basic definition of the signs and instead it should appear in a separate paragraph that signs may be registered if they are represented in a manner that satisfies the requirements of registration.[1100] If the purpose of the proposal is to allow for a more liberal approach for the requirement of graphical interpretation, this contention could provide an interesting argument for nano-marks. The requirement of graphically representation may be satisfied, for example, colours by adhering to the international recognised colour code,[1101] or sonograms[1102] in sound mark or chromatograms[1103] in smell mark. If the liberal interpretation is allowed, and as argued by Phillips of the technological advancement,[1104] the graphical representation of nano-marks may be represented by other means.

Proper representation of the sign is also significant to identify it for an infringement case.[1105] Section 10(4) of the TMA 1994 and Article 9(2) of the CTM provide the activities which constitute use of a sign for the purpose of infringement. The listed activities are non-exhaustive and the use of the sign for infringement purposes is to be given a broad meaning.[1106] This is because, the use includes other than by way of graphical representation as stated under section 103(2) of the TMA 1994, and would include oral use as in smell and

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[1098] Study on the Overall Functioning of the European Trade Mark System, Max Planck Institute for Intellectual Property and Competition Law, Munich, 15 Feb 2011, accessed via ec.europe.eu/internal_market/…/20110308_allensbach-study_en.pdf visited on 19 March 2012 (MP Study).

[1099] Ibid, at para 2.9

[1100] Ibid, at 2.15

[1101] Libertel, [2003] E.T.M.R 63, at para 37; MP Study, n.1098, at para 2.5.

[1102] There is no evidence any ECJ decision that rely on sonograms to present sounds graphically, and sonograms without musical notes are accepted in OHIM in accordance of Rule 3 of the Implementing Regulation, if the representation in the form of a graphic representation together with a sound file of the sound itself, MP Study, n.1098, at 2.7.

[1103] There is no evidence in the ECJ decision rely on this too, MP Study, n.1098, at 2.8

[1104] As argued by Phillips that to some extent with the development of technological advancement the requirement of graphically represented could be challenged, n.1058, at p.66

[1105] Keeling D et al. *Kerly's Law of Trade Marks and Trade Names* 15th edn (London: S&M, 2011), at para 14-010

[1106] Ibid, at para 14-011

olfactory cases, and other form of use which is not capable of unaided human perception such as use as a keyword in an internet referencing service.[1107] The same argument may be made in case of nanoscale marks. Thus, signs need not be "visible", but the sign need to be perceptible in use. For example nanoscale marks of manipulated 35 xenon atoms to form IBM letters.

### 5.3.3 Nano products and classification

In the current classification scheme of goods and services, for example in the Nice Classification[1108] there is no specific class that refers to nanoscale goods and services. However, for example Class 1, 4 or 7 are general enough to cover nanoscale marks. In this regard, can one use bulk classification, for example Class 1 for chemicals used in industry, if nano-mark is on individual components? This assumption may be correct by analogy with colour marks, as evidenced from Blue Paraffin Trade Mark.[1109] In this case, the applicant had been selling blue-dyed paraffin and in the mind of public, had become associated with the applicant. The applicant applied to register under the name BLUE PARAFFIN (BP). The opponents opposed registration on the ground that they had continuously sold paraffin under their trade mark name Token Blue (TB) and the registration of BP would unfairly prejudice them and their customers in the lawful conduct of their business in the marketing and sale of paraffin as TB. They also argued that the mark was not distinctive and not adapted to distinguish. Whitford J stated that there may have been other blue coloured paraffins sold prior to the date of application for registration. The words BP or the word "blue" alone was accepted as being distinctive. The extent to which distinctiveness was established as at the date of application was distinctiveness for all practical purposes. Whitford J further argued that there was no reason why anyone should want to colour paraffin blue except for the purpose of benefiting from the appellant company's reputation. The word BP had no direct reference to the character of Paraffin, as the nature of Paraffin is colourless. The word "blue" served to distinguish the appellant's goods from others'. On appeal Buckley LJ considered that no other trader could have any reason to dye paraffin in blue except for the purpose of

[1107] Ibid, and refer to Google v Louis Vuitton and Others C [2010] E.T.M.R. 30, at para 69.
[1108] Nice Agreement Concerning the International Classification of Goods and Services for the Purpose of the Registration of Marks, Sept 28, 1979 (NC).
[1109] [1977] R.P.C. 473.

benefitting from the applicant's company reputation, therefore no other trader could have any proper occasion to use of the word "blue" to describe their own product. In dismissing the appeal, Buckley LJ stated that the words BP possess at least to some extent an inherent aptitude to distinguish the paraffin of the applicant's company and was registrable.

Applying the rule in this case by analogy to the nanoscale marks, the class of goods available for all traders is the paraffin, and if they produced paraffin in different colours, and distinguishable, the different colours in relation to paraffin is registrable. By analogy, if mark is on individual components, one may use the bulk classification for example chemicals in relation to nanotechnology.

### 5.3.4 The shape of nano-creations

In nanotechnology, there are various shapes that may be available, for example the tubular shape of nanotubes either in single, double or multi-walled shapes. The shape of goods or their packagings are eligible for registration if it indicates origin to the average consumer.[1110] However, in certain situations, consumers are unlikely to associate the shape with the origin of the particular trade's goods.[1111] Shapes may vary from one particular sector to the other, and a particular shape may be perceived as trade mark in one particular field and but not in another.[1112] Basic geometric shapes will not be noticed by consumers and will not capable of distinguishing.[1113] For example a soap bar shape in a rectangular parallelepiped with rounded edges that is commonly used for soaps will not enable the relevant public to distinguish immediately of the trade origin.[1114]

[1110] Bongrain's Application [2005] RPC (14) 306 (CA); Betafence Ltd v Registrar of Trade Marks [2005] EWHC 1353 (Ch). (Deputy Judge Floyd QC); for example consumer identify the origin of the car's grille although there are a lots of available by the existing models, as in DaimlerChrysler Corp v OHIM [2003] ETMR 87
[1111] Henkel v OHIM [2004] ECR I-1725 (para 52)
[1112] Bently and Sherman, 211, at p.825
[1113] Ibid, at p.825
[1114] CFI in Procter & Gamble v Office for Harmonisation in the Internal Market (Trade Marks and Designs) [2003] E.T.M.R. 43, at 558; the average consumer for nanotubes is more than one such consumer, see further at 5.3.7.

To be protected, the shape should not exclusively falls within the statutory exclusion and have a distinctive character. The express limitation of the shape marks protection is provided under section 3(2) of the TMA 1994[1115] which reads:

A sign shall not be registered as a trade mark if it consists exclusively of –

(a) the shape which results from the nature of the goods themselves

(b) the shape of goods which is necessary to obtain a technical result or

(c) the shape which gives substantial value to the goods

Although the test for distinctiveness is similar as applied to other marks,[1116] it is very unlikely consumers associate the function of shape marks as indication of its origin. This in itself, could mean not only that the applicant has to show that the mark is distinctive but that he also has to concern himself with what the message a sign conveys 'is', and most importantly how the consumer perceives the mark.[1117]

Among the earlier rulings of shape marks was a case concerning the registration of shape marks for non-alcoholic beverage under the old Trade Marks Act 1938. Lord Templeman viewed that *'a bottle is not a mark'*.[1118] Nevertheless, it was ruled that three-dimensional marks are not explicitly excluded from the trade mark registration.[1119] However, it has been perceived as problematic to treat the shape registrable as trademark.[1120] The reasons for objections on the registration of shapes as trade mark are because (a) shapes of goods and their packaging cannot act as signs for the purpose of trade mark and it is difficult to prove distinctiveness; (b) the concern that if the trade mark protection is granted for the shapes it

[1115] Article 3(1)(e) of the TMD; Article 7(1)(e) CTMR; there is no provision concerning shape marks in Malaysia TMA 1976.

[1116] Discussed above in colour, smell and sound marks.

[1117] Burrell et al, n.1087, at p.147, further state that consumers need to be 'educated' in order for them to associate and understand shape as a badge of origin, without which the sign lack distinctiveness, at p.153.

[1118] Re Coca-Cola Co [1986] 1 WLR 695, at 698; See for instance Unilever Ltd's (Striped Toothpaste No.2) Trade Marks [1987] R.P.C. 13. See Franzosi, M, 'What is Trade Mark? – A Challenge to the House of Lords', (1987) E.I.P.R 63 who rather disagreed with the decision of his Lordship and stated that a practitioner should not question whether a certain shape or design is or not a container but whether it is sign or not a trade mark which could be perceived from different point of view, at p.63.

[1119] For example, see Unilever Ltd's (Striped Toothpaste No.2) Trade Marks [1987] R.P.C 13; Lego Juris A/S v Mega Brands Inc [2007] E.T.M.R. 11, where the Community Office (OHIM) refused to register the shape of the lego bricks under Article 7 (1) (e) of the CTMR, and now ECJ has ruled on LEGO [2010] ETMR 63. However, there is an action under common law of passing-off available for shape marks, for example see Reckitt & Colman Products Ltd v Borden Inc (1990) 1 W.L.R. 491.

[1120] See Firth A et al. 'Shapes as Trade Marks: Public Policy, Functional Considerations and Consumer Perception' (2001), 23 E.I.P.R 86, at p.98; Torremans, 200, at p.382; Burrell et al., n.1087, at p.139.

may potentially lead to overly broad protection;[1121] (c) the protection granted might overlap with other IPRs for example designs law, copyright and patent.[1122] This perpetual monopoly created by shape marks could vitiate the legitimate interest of the consumers to access to the designs and shapes.[1123] However, this does not mean that shape marks or their packaging are excluded from trade mark protection.[1124]

The effect of statutory interpretation has given the scope of shape marks registration to be treated narrowly because of the words *"signs which consists exclusively"*.[1125] Although there are many possibilities of the statutory interpretation, however Firth suggests that this subsection could satisfactorily mean that the sign consists exclusively of the shape of the goods or their packaging without any other element such as word or logo other than features of the shapes and this shape for which the registration is sought conveys one of "forbidden" meaning covers under subsection (a), (b) and (c) regardless whether it conveys other meaning.[1126] This effect is to treat shape as non-registrable despite distinctiveness.[1127] The effect of the word "exclusively" under section 3(2) (a) (b) (c) denotes that if some features of the mark fall outside the exclusion then the mark is registrable.[1128] The interpretation of this subsection has been confirmed by the ECJ in Henkel KgaA v Deutsches Patent-und Markenamt.[1129]

For the purpose of this study, discussion focuses more on limb (a) and (b) of section 3(2). Limb (a) concerns the 'nature' of the product itself. This shape may be determined by the

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1121 Registration can be renewed repeatedly for example the existence of the Red Triangle Logo for beers was first registered as a trademark under the UK law in 1st January 1879 and it is still in force.

1122 Burrell at al., n.1087, at p.144; Dutfield G and Suthersanen U *Global Intellectual Property Law* (Cheltenham: EE, 2008) at p.145.

1123 Sanders A K 'Some Frequently Asked Questions about the 1994 UK Trade Mark Act' (1995) E.I.P.R. 67, at p.67; Dutfield and Suthersanen, n.1122, at p.145.

1124 Consumers for example in the US come to realize and associate shape marks with particular traders, Burrell et al, n.1087, pp.140-143.

1125 Helbling T 'Shapes as Trade Marks? The Struggle to Register Three-Dimensional Signs: A Comparative Study of UK and Swiss Law' (1997) I.P.Q. 413, at p.431. Foliard-Monguiral A and Rogers D 'The Protection of Shapes by the Community Trade Mark' (2003) E.I.P.R. 169, at p.169.

1126 Firth gives possibility of different interpretation of the method of construction of this section and this interpretation is consistent with the rules of grammar and syntax and excludes other non-shape element from being subjected under section 3(2), n.1120, at pp.91-92

1127 Ibid, at p.91

1128 Burrell et al, n. 1087, at p. 161; Phillips v Remington [1998] R.P.C. 283, at 304 *"if any feature of the shape which is not trivial does not fall within one of the exclusions, the exception do not apply"*.

1129 [2005] E.T.M.R 45, at 582.

function of the goods.[1130] This could also debar a symbol of goods, which may include the whole goods or part of it.[1131] The court ruled that the purpose of this limb is to make shape available for use by the public at large.[1132] However, the interpretation of this limb has been argued where the applicant sought to register trade marks for "ice cream dessert products", a well-known "Wall's Viennetta", where it was argued that the limb applied only to naturally occurring shapes rather than artificially created shapes such as a "Viennetta".[1133] It was further suggested however that this section should be constructed in a very strict way and narrowly, because if not almost every shape will be excluded from registration.[1134]

Limb (b) concerns the shape of the goods which is necessary to obtain a technical result. The operation of this subsection is perceived as complementary to the principle of the patent system.[1135] This exclusion does not mean that all goods which produce a technical result will be refused registration, but only extend if *'significant'* aspects of the shape to the achievement of a technical result.[1136] The exclusion of the shape which necessary to achieve technical result is given preference over the distinctive character. In interpreting whether the shape solely achieve the technical result, Jacob J in Phillips v Remington[1137] concluded that the shape in the case consisted exclusively of a shape which is necessary to obtain a technical result.

On Appeal, Aldous LJ commented that:

> "The subsection must be construed so that its ambit coincides with its purpose. That purpose is to exclude from registration shapes which are merely functional in the sense that they are motivated by and are the result of technical considerations. Those are the types of shapes which come from manufacture of patentable inventions".[1138]

He further concluded that:

> "the restriction on the effect of the words "which is necessary to obtain a technical result" is not overcome by establishing that there are other shapes which can obtain the same technical result. All that has to be shown is that the essential features of the shape

[1130] Sanders, n.1123, at p.68.
[1131] Firth, n.1120, at p.92.
[1132] Aldous J in Philips v Remington (1999) R.P.C. 809, at 820.
[1133] Societe des Products Nestle SA v Unilever Plc (Unilever Plc's Trade Mark Application [2003] R.P.C. 35 at 658; [2002] EWHC 2709 (Ch) Jacob J at 658.
[1134] Firth, n.1120, at p.92. Folliard and Rogers, n.1125, at p.169. Helbling, n.1125, at p. 431.
[1135] Sanders, n.1123, at p.68.
[1136] However, in practice all shapes of goods and packaging enjoy certain technical function, Helbling, n.1125, at p.427.
[1137] [1998] R.P.C. 283, at 309.
[1138] [1999] R.P.C. 809, at 821.

> are attributable only to the technical result. It is in that sense that the shape is necessary to obtain the technical result. To adopt the meaning suggested by Philips will enable a trader or traders to obtain registration of all the alternative shapes that were practicable to achieve the desired technical result. That would result in the subsection being given a meaning which would not achieve the purpose for which I believe it was intended".[1139]

As discussed above, shape marks are less likely to be registered because of difficulty in proving distinctiveness as the consumer may not associate the shape marks with the origin of the goods. Furthermore, allowing shapes to be protected, would give a potential monopoly to traders. To date, certainly, there is no position as to the protection of shape of nano-creation under Malaysian law. In the UK/EU position, probably the position would be that shape of nano-creations are unlikely to be protected because of the effect of limb (a) and (b) of the above provision, as normally nanotechnology arises because of its nature of the shape itself and the shape which is necessary to obtain a technical result. The functional characteristics of the shape marks may overlap with other IP rights, for example design right and patent law. Thus, arguing in light of nanotechnology which is mainly significant for its functional and technical characteristics, for example, function of carbon nanotubes, furthermore nano-shape marks are unlikely seen as indicating trade origin.

### 5.3.5 The use of word "nano"

Nowadays, there is popular use of the prefix "nano"[1140] and the use of the prefix could be descriptive or deceptive if the "nano" word is affixed to the goods or used for services that do not incorporate nanotechnology.[1141]

Consulting the UK Trade Mark Registry, there are various marks for products and services that incorporate nanotechnology, for example Termix Na.No for Combs and Hairbrushes;[1142] Nano Park for business management and leisure park;[1143] Nano Snowboards for clothing and

[1139] Ibid, at 821-822; and the decision was confirmed in the ECJ [2002] ETMR 81, at 974.
[1140] Interviewee C and gave example in Taiwan that the word "nano-marks" are popular used.
[1141] This is referred to "Nano-imposters", signifies the goods or services that used prefix "nano" but does not use or incorporate nanotechnology, Du Mont J J 'Trademarking Nanotechnology: Nano Lies and Federal Trademark Registration' (2008) 36 Am. IP. Law Ass'n Q.J. 147, at n.18.
[1142] Class 21 NC.
[1143] Class 35 and 41 NC.

snow boards;[1144] Baxi Nano for boilers;[1145] Swansea Nano S Swansea Nanotechnology scientific and technological services and development of computer hardware and software;[1146] Nano Safety for medical, veterinary, agriculture, horticulture, forestry services;[1147] Nano Silver for chemicals, building materials, paints, bleaching and pharmaceutical and veterinary preparations;[1148] Nano Silver Antibacterial Technology for hand tools, apparatus for lighting, heating, steaming and calculating and processing machine and equipments.[1149]

Section 3 of the TMA 1994 covers signs which do not fulfil the requirements of Section 1(1) and cannot be registered, and signs may be registered only with the evidence of distinctiveness acquired through use.[1150] The provisions preclude registration for signs which are devoid of any distinctive character, for descriptive signs and for generic signs which are customary in the trade.

The discussion of descriptive marks in case law is useful consideration for the use of the word "nano". In British Sugar Plc v James Robertson & Sons Ltd[1151] Jacob J has considered that a meaningless word or a word inappropriate for the goods concerned such as "North Pole" for bananas was distinctive, but a common laudatory word like "Treat" was devoid of any distinctive character in the absence of its use.[1152] In Procter & Gamble Co v OHIM (Baby Dry)[1153] the ECJ ruled that the combination of "baby" and "dry" was capable to be distinctive and was not simply descriptive in nature. The Court held that the descriptiveness must be assessed not only to each word separately but also to which they form part. The Court viewed that although the word "baby" and "dry" may form part of expression in everyday language in relation to the nappies, however, their "syntactically unusual

[1144] Class 25 and 28 NC.
[1145] Class 11 NC.
[1146] Class 42 NC.
[1147] Class 16, 41, 42, 44 NC.
[1148] Class 1, 2, 3, 5, 19, 27 NC.
[1149] Class 8, 9 and 11 NC.
[1150] Article 3 of TMD; Article 7 CTM; and the example for this is "Magic Nano", Du Mont, n.1140, at p.153; see Libertel, [2003] ECR I-3793.
[1151] [1996] R.P.C. 281.
[1152] British Sugar Plc v James Robertson & Sons Ltd [1996] R.P.C. 281, at 306.
[1153] [2002] Ch. 82.

juxtaposition" is not a familiar expression in the English language to describe the nappies or their essential characteristics.[1154]

In OHIM v Wm Wrigley Jr Co (Doublemint)[1155] OHIM refused to grant the application to register chewing gum mint flavour called "Doublemint" on the ground it was descriptive. The CFI has referred to the decision in "Baby-Dry" and allowed the registration on the ground that "Doublemint" was not exclusively descriptive. The adjective 'double' was unusual when compared with other English words, such as 'much', 'strong', 'extra', 'best', 'finest' and when combined with 'mint' it had two distinct meanings (a) twice the usual amount of mint; (b) flavoured with two varieties of mint. 'Mint' is a generic term which could refer to spearmint, peppermint and other culinary herbs. However, ECJ has overturned the decision if at least one of its possible meanings designates characteristics of the goods and services concerned. The ECJ also stated that the registration of such signs should be refused because of policy consideration that signs and indications that relate to the characteristics of goods and services may be freely used by anybody.[1156]

As relates to nano-marks, the application to register two words "Nano Silver" for beds, mattresses, table covers, bed linen and pillow covers under Class 20 and 24 of the NC was rejected under Section 3(1) (b) and (d) of the TMA 1994 because the word "Nano Silver" has become customary in trade.[1157] The objection was mainly raised because the marks consist exclusively of the words "Nano Silver" being a sign which may serve in trade to designate the nature of the goods such as beds, mattresses, table and bed linens that contain nano silver. It was stated by the examiner that nano silver is important and widely used in electronics goods, clothing, textiles, medical products especially for killing bacteria and viruses. It was argued by the applicant that the words "nano silver" is "extremely unusual in the context of the goods identified" and stated that the marks refer to a "high tech" application of technology to non-technical goods and the average consumer be aware of this fanciful

[1154] Ibid, at 108.
[1155] [2004] E.T.M.R. 9.
[1156] See also Nichols v Registrar [2004 ECR I-8499 (AG Colomer, para 43).
[1157] In the Matter of Application No 2405309B; the examples of signs have already become generic include LINOLEUM, Yo-YO, ASPIRIN and CELLOPHANE, Bently and Sherman, at p.839; the word "Bravo" was refused registration because "Bravo" was seen by the relevant consumer as a word of praise, and not capable of distinguishing, Merz & Krell GmbH & Co [2000] ECR I-6959; If the consumer's perception of nanotechnology is growing the use of "nano" word marks are likely to become generic, see Du Mont, n.1140, at p.153.

application and would perceive the mark as an indicator of trade origin and not a descriptive reference to goods incorporating nano silver. The application was rejected because the word "nano silver" was widely used descriptively in trade in relation to types of the goods including woven and non-woven materials. Thus, the words "Nano Silver" in relation to beds, mattresses; table covers; bed linen and pillow covers is clear i.e. that the consumer would expect them to incorporate "nano silver". The average consumer would not consider "nano silver" denoting of trade origin and therefore registration was refused.

Applying the decided cases, the application to register word "nano" may give rise to the problem of descriptiveness or deceptiveness of the product and services. For example "Carbon Nanotechnologies" for carbon nanotubes or "Quantum Dot" for products or services that incorporated semiconductor nanocrystals,[1158] the application may be rejected for being descriptive because the consumer is unable to associate to trade origin. Similar contention can be made for the use of word "nano" for deceptiveness purposes, the registration may be refused since it confuses the public perception, and create uncertainty over nanotechnology.[1159] Due to policy consideration, the word "nano" should be kept freely available to anyone to use for appropriate services and products.

### 5.3.6 The average consumer in nanotechnology

The rule of "capable of distinguishing" must be assessed according to the eyes of the average consumer. The perception of the average consumer was viewed as crucial for assessing when a mark which was initially barred from registration under Article 3 (1) (b), (c) and (d) but would have acquired sufficient distinctiveness through use is to be registered.[1160] In judging whether a mark was devoid of distinctive character which had acquired its distinctiveness through use, the perception of an average consumer was deemed to be decisive.[1161] The rule for average consumer is that he is *"normally perceives a mark as a whole and does not proceed to analyse its various details"*.[1162] Thus, for example the distinctive character of a

[1158] Miller et al, n.32, at p.231.
[1159] Du Mont, n.1140, at p.164.
[1160] Koninklijke Philips Electronics NV v Remington Consumer Products Ltd [2002] E.T.M.R. 81, at 969-970.
[1161] Phillips Electronics NV v Remington Consumer Products Ltd [2003] R.P.C. 2.
[1162] Sabel BV v Puma AG, Rudolf Dassler Sport [1998] E.T.M.R. 1, at 8; Lloyd Schuhfabrik Meyer & Co. GmbH v Klijsen Handel BV [1999] E.T.M.R. 690, at 698.

sign which consists of shape of a product must be assessed in light of the presumed expectations of an average consumer of the category of goods or services in question who is reasonably well-informed and reasonably observant and circumspect.[1163] In assessing the misleading nature of the statement or description in question, the court may admit evidence of a consumer research poll or an expert's report to assist its judgment.[1164] However, the true fact is that the average consumer has little chance to make direct comparison between different products concerned but has to rely only on the imperfect recollection and consequently their level of attention is likely to vary according to the different categories of goods and services.[1165] Furthermore, where there is likelihood of confusion of different categories of goods or services, the perception of marks in the mind of average consumer plays a decisive role. The standpoint of the relevant public will be very important for the Registry and the Court for the purpose of determining whether a sign is registrable or not[1166] and for nano-marks, the relevant public may be scientists or technologists.

In assessing distinctiveness, national courts may take into account a range of factors, on the inherent characteristics of the mark including element of descriptiveness of the goods and services; its market share; intensive and long-standing use of the mark; amount of its investment in promoting the mark; the relevant section of the public which could identify the mark as badge of origin.[1167] It concluded that as a result *"it is not possible to state in general terms, for example by referring to given percentage relating to the degree of recognition attained by the mark within the relevant section of the public, when a mark has a strong distinctive character"*.[1168]

Normally, it is easier for the consumer to opt for visual marks which are attractive, unusual or appealing. However, if the signs are related to the non-visually perceptible, how do the relevant consumers 'see' that the signs are trademarks and identify their trade mark function?

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[1163] Phillips Electronics NV v Remington Consumer Products Ltd [2003] R.P.C. 2, at 26; Koninklijke Philips Electronics NV v Remington Consumer Products Ltd [2002] E.T.M.R. 81, at 969; see also Gut Springenheide GmbH, Tusky v Oberkreisdirektor des Kreises Steinfurt [1999] 1 C.M.L.R. 1383, at 1407; Lloyd Schuhfabrik Meyer Co. GmbH v Klijsen Handel BV [1999] E.T.M.R. 690, at 697-698.
[1164] [1999] 1 C.M.L.R. 1383, at 1407.
[1165] Lloyd Schuhfabrik Meyer Co. GmbH v Klijsen Handel BV [1999] E.T.M.R. 690, at 698.
[1166] For example in Libertel Groep BV v Benelux-Merkenbureau [2003] E.T.M.R. 63; [2004] F.S.R. 4 *"For the purposes of determining whether a colour per se is registrable as a trade mark it is necessary to take as a standpoint that of the relevant public",* at 74-75.
[1167] Lloyd Schuhfabrik Meyer Co. GmbH v Klijsen Handel BV [1999] E.T.M.R. 690, at 697.
[1168] [1999] E.T.M.R. 690, at 699.

There was always the case that the consumer perceives the sign as indicating the functions or characteristics of the goods rather than origin and it has been suggested that to overcome this situation is to educate the consumers first in order them to treat those sign as trade mark.[1169] This statement could be important for nanotechnology as the consumer may not perceive the mark as indicating trade origin, therefore, the information should be well educated to the consumer in order for them to appreciate nano-marks. The level of attention[1170] of an average consumer in nanotechnology is likely to vary depending on the products or services concerned, for example group of technologist, or scientist, or technician which dealt with nanotechnology. It is useful to categorise the average consumer based on nano-products of different types. For example, the IBM letters of nano-marks, the average consumer could be the lab scientists or the technologist that in particular involved in manipulating the atoms; or for shape of carbon nanotubes, the average consumer could involve more than one such consumer that could distinguish carbon nanotubes with different shapes, its functional and its technical function (this suggests that the shape will be functional therefore non-registrable); for Nano Silver, the average consumer could be the consumer in general, carefully handling and buying the products; nano-encapsulation smell for textiles and accessories, the average consumer could also be the consumer in general; for nano word marks for example Nano Snowboards, the average consumer would be the consumer of the goods in general; for other cosmetic products that enhanced with nano "word", the average consumer could be dermatologist; for certification and collective nano-marks, the average consumer could be the ordinary consumer or the buying companies that comply with the safety and environmental regulations.

[1169] McCutcheon, n.1093, at pp. 164-165.

[1170] Davis J *Intellectual Property Law* (3rd edn) (Oxford: OUP, 2008), at p.201, cited Procter & Gamble Co v Office of Harmonisation in the Internal Market [2004] E.T.M.R. 89, at 1205 where the COA decided that the level of attention in everyday consumer goods such as shape and pattern of washing machine and dishwasher tablets is not high, However, this view should be contrasted with the decision of the CFI in Doublemint's case [2004] E.T.M.R.9 that the numerous meanings of DOUBLEMINT were actually apparent to an average English speaker and for its very nature of having vague and fanciful meaning, it would not be so for the non-native English speaker, and therefore would not be descriptive.

## 5.4 DESIGNS AND NANOTECHNOLOGY

### 5.4.1 Introduction

Design protection is arguably available to protect nanotechnology features although the arguments experience some difficulties. The contention is that not only the nature of nanotechnology itself, and its suitability as subject-matter, but also the inherent nature of overlapping rights in the IPRs regimes as well as complexity in the design law protection itself, pose problems. The last point is exemplified in the practices of the UK design system that protects design within five different types - (a) UK registered design; (b) UK unregistered design right; (c) the Community registered design; (d) the Community unregistered design and (e) copyright law (especially for surface decoration).

In Malaysia, the protection of industrial design is provided under the Industrial Design Act 1996 (IDA),[1171] or under copyright law.[1172] The scope and protection of registered design law in Malaysia seems unlikely to protect nano adequately because of the "eye-appeal" requirement. Thus, the discussion on the position in the UK and EU Directive may provide relevant consideration for Malaysia. The creation of sui generis rights of Semiconductor Chips under unregistered right in UK law provides a good discussion for nanotechnology. The questions that are relevant here are; (a) do nanotechnology creations comprise "designs" within the meaning of design law?; (b) does the size of nanoscale creations pose problems for design law?; (c) is their (non) visibility fatal to design law?

Examples of design may be features or appearance of devices such as nano-bots,[1173] or nano-robotics systems in medicine,[1174] the functional design of orthopaedic devices for arms and joint replacement,[1175] the molecular design that mimicks nature called "bio-mimetic",[1176] and

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[1171] Act 552, has come into force on the 1st September 1999.
[1172] See 5.2.3.3.
[1173] Interviewee C.
[1174] See for example in Hamdi M and Ferreira *A Modeling and Characterization of Bio-Nanorobotic System* (Netherlands: Springer, 2010) at p.1.
[1175] Interviewee A.
[1176] Interviewee D.

the design of bio-compatible dendrimers (very large, tree-like molecules) for cancer diagnosis.[1177]

### 5.4.2 International protection for design law

Article 2(7) of Berne provides that it is at the discretion of Union members to determine the extent of the application and the conditions of protection to the works of applied art and industrial designs and models. If works have been protected as designs and models in the country of origin, they shall be entitled in another country to special protection afforded to designs and models. However, works will be protected as an artistic works if there is no special protection granted in that country.[1178]

Another international treaty which is important for the design protection is the Paris Convention for the Protection of Industrial Property (Paris).[1179] Article 1(2) of Paris recognises industrial designs as subject matter of protection under industrial property. There is no guideline of what constitutes 'industrial designs', their nature or conditions of protection; only it provides for the regulatory guidance in relation to the national treatment, priority of filing, marking requirement, grace period for renewal etc.[1180] Art 5*quinquies* requires merely that industrial designs "be protected in all countries of the Union".

TRIPS requires WTO member states to protect industrial design under Article 25 (1) which states that:

> "Member shall provide for the protection of independently created industrial designs that are new or original. Members may provide that designs are not new or original if they do not significantly differ from known designs or combinations of known design features. Members may provide that such protection shall not extend to designs dictated essentially by technical or functional considerations".

TRIPS provides no guideline on what constitutes the subject matter of industrial design nor is any reference be made to works of applied art and industrial designs,[1181] but rather it reflects

[1177] Cheng Y et al, n.252, at p.2673.
[1178] See 5.2.2 that "literary and artistic works" shall include every production in the literary, scientific and artistic domain.
[1179] March 20, 1883, as revised at Stockholm on July 14, 1967, and as amended on September 28, 1979
[1180] Suthersanen U *Design Law in Europe* (London: S&M, 2000), at pp.432-433, these regulatory guidance implicitly suggest for the registration based system for design protection.
[1181] Ibid, at p.437; see also Correa, n.229, at pp.260-261.

the mixed nature of industrial designs which is subject matter of industrial property and works of applied art which is protectable subject matter under copyright law.[1182] Industrial design is most often regarded as a form of protection that concerns the aesthetic appearance as applied to the useful object or article and whose purpose is appeal to the eye of the potential buyer.[1183] Furthermore, TRIPS does not specify any system of protection, either registered or unregistered, nor whether any examination is required.[1184] Members are only obliged to protect 'independently created' industrial designs that are new or original. The concept of 'independently created' is more of a subjective nature i.e. the design has been the creation of his own acts and not copied from the existing ones,[1185] whereas "new" is an objective element.[1186] The condition of "independently created" suggests copyright-type protection for industrial designs, but as long as the requirement of novelty is an alternative, the requirement is ambiguous–as long the design is independently created, it does not need to be new for it to be protected.[1187] However, the novelty requirement takes precedence over independent creation to the fact that the members are not obliged to protect independently created designs if it is not new.[1188]

It is unclear whether members could adopt both conditions i.e. new and original and whether they could adopt additional criteria.[1189] The criteria of novelty or original, due to the word

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[1182] De Carvalho N P *The Trips Regime of Trademarks and Designs* (The Netherlands: KLI, 2006), at p.395. Thus, the word "industrial designs" under the TRIPS includes all types of aesthetic, useful and functional designs, protectable subject matter as "works of applied art" or "works of artistic craftsmanship" protected under copyright and utility models, Dutfield and Suthersanen, n.1122, at p.167.

[1183] Gervais, n.222, at p.326 and further adds that this normally referred to visual ornament, characteristics of such an article or its external appearance.

[1184] Correa, n.229, at p.261; this is the choice of system of protection either upon registration, or through unregistered design right or through the copyright system, see Phillips J *Protecting Values in Industrial Designs* in Correa C and Yusuf A (eds) 2nd ed. *Intellectual Property and International Trade: The TRIPS Agreement* (London: KLI, 1998) at p.223.

[1185] Correa, n.229, at p.261;Gervais, n.222, at p.327; Suthersanen, n.1179, at p.397.

[1186] Suthersanen, n.1179, at p.437, queries that in what sense 'original' is different from 'independently created'. Independently created means that the design has been the creation of his own acts, not copied, Correa, n.229, at p.261; this would probably excludes a design that was copied or imitated existing ones, Gervais, n.222, at p.327.

[1187] De Carvalho, n.1182, at pp.396-397.

[1188] De Calvalho, n.1182, at p.397; the novelty concept does not make any reference whether to be absolute or local and this requirement varies between different countries, Correa, n.229, at p.262.

[1189] Suthersanen, n.1179, at p.437, for example the EC Design Directive 98/71/EC of the European Parliament and of the Council of 13 October 1998 on Legal Protection of Designs (Design Directive) and Amended Community Design Regulation, Council Regulation (EC) 6/2002 of 12 December 2001 on Community Designs (Design Regulation) requires a design to be novel and have individual character. In Bailey (t/a Elite Angling Products) v Haynes (t/a) RAGS) [2007] F.S.R. 10 in the Patent county Court concerned the alleged infringement of both a UK unregistered design right a Community unregistered design right (CUD). In considering the claim based on the CUD, Judge Fysh stated that *"Finally, according to the rubric to Article 4 of* 'or' rather than 'and' have been suggested as not cumulative;[1190] but these criteria could also be regarded as combination by the Member States.[1191] Musker strongly stresses that the requirement of new or original is only for the sake of general principle, *"that old or copied designs should not be re-monopolised, rather than as mandating particular ways of implementing the tests which achieve this result; otherwise, one would struggle to find any country in compliance with TRIPS".*[1192]

The Hague Agreement Concerning the International Registration of Industrial Designs was revised in 1999 to make it more user-friendly for common law and examination systems[1193]. At present neither Malaysia nor the UK are members, although the EU is. Under the 1999 Act, the Community Design system could be used as a starting point for Hague filing, alternatively an international application could be filed directly by a person with nationality, domicile, habitual residence or real and effective industrial or commercial establishment within the territory of a Contracting Party. Hague does not lay down substantive provisions, so could only be used if the laws of target states provided for protection of nano-designs.

The laws at the international level allow for various interpretations among Members – they may opt for design protection according to their own national laws through registration system, or unregistered system or copyright-like protection. The situation at the international level of protection has greatly contributed to (or at least allowed the continuation of) divergence in modes of protection. As relates to nanotechnology, similar argument as in copyright protection for nanoscale works can be made to the nanoscale design.[1194] Berne, Paris and TRIPS do not seem to exclude the protection of design at nanoscale, although they may not expressly include such design. Therefore, the assumption can be made that at the international level, there is no specific rule and the position is totally unclear whether member states should protect nanoscale design. Thus, it is a matter at the national law as to protect nanoscale design or not. As the research questions above highlight, the answers to all

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*the Regulation, novelty and the possession of individual character are threshold "requirements for protection"*, at 53.

[1190] Gervais, n.222, at p.327.

[1191] Phillips, n.1184, at p.223.

[1192] Musker D *Community Design Law: Principles and Practice* (London: S&M, 2002), at pp.23-24.

[1193] The Geneva Act was adopted by Diplomatic Conference on July 2, 1999. For texts, see http://www.wipo.int/hague/en/legal_texts/.

[1194] See 5.2.2.

three research questions are unclear as regards the international treaties, but there seems to be no impediment to protection at the national or regional level.

### 5.4.3 Complex nature of design protection

The complexity at the international level is mirrored in national laws. Different forms of protections emanate either in the IPRs generally or in the design protection regime itself.
What could be the correct IP approach protection for the design protection?[1195] The fact that various types of protection which could either exist in parallel or in cumulative ways is also responsible for further diversity in design protection.[1196] With the aim to approximate specific national laws concerning registered industrial designs between member states, the Design Directive was implemented. Further, with the aim of EC single market harmonisation, the Design Regulation created the Community registered design (CRD) and the Community unregistered design (CUD). Various national laws in Europe represented a number of approaches for design protection.[1197] The existing designs system has been described by Howe that *"the upshot is an area of law of labyrinthine complexity"*[1198] and 'design' as *"a slippery concept and operates in different fields of endeavour"*.[1199]
Potentially, design protection could overlap with other IPRs – such copyright,[1200] patent,[1201] trademarks,[1202] passing-off,[1203] breach of confidence[1204] and unfair competition.[1205] Cornish and Llewelyn emphasise that:

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[1195] For an extensive discussion of the "design approach" over purely copyright protection, see Kur A 'The Green Paper's "Design Approach" – What's Wrong with it?' (1993) E.I.P.R. 374.
[1196] Co-existing in parallel means that the design is protected under one regime in preference of another and cumulative protection means to allow for simultaneous or concurrent of two or more regimes, Correa, n.229, at p.258.
[1197] For a survey prior to harmonization of Design Directive of various aspects of designs law in selected European countries i.e. Benelux, France, Germany, Italy, Spain and UK see Firth A 'Aspects of Design Protection in Europe' (1993) E.I.P.R. 42 at pp.44-47.
[1198] Howe M *Russell-Clarke and Howe on Industrial Designs* 7th ed (London: S&M, 2005), at p. 2.
[1199] Firth, n.1197, at p.42.
[1200] For example designs may be embodied in copyright materials such as drawings, plan and blueprints, Torremans, n.200, at p.317. See also British Leyland Motor Corp v Armstrong Patents Co. Ltd [1986] AC 557; [1986] All E.R. 850.
[1201] The legislative wording of "aesthetic creation" under Article 52(2)(b) EPC was not intended to reduce the overlap between the patent with designs, but patents with copyright, thus gives advantage for the design to have double protection either patents or copyright, nonetheless triple protection is quite rare, Musker, n.1192, at p.76.
[1202] See decision in Phillips Electronics BV Remington Consumer Products [1998] R.P.C. 283. Logos and labels of trade mark may be eligible for design protection and the fears of unwanted overlap between designs and trademark would appear exaggerated - in Germany the problems of overlapping between designs and

> "intellectual property in industrial design occupies a midway point between patents and copyright, at the one pole, and trade marks at the other, but like the earth's equator, it is not easy to fix if you only have a compass".[1206]

This is similar to the exposition made by Suthersanen:

> "the subject of design protection enjoys a rather ambivalent status in the IP world, suffering jurisdictional encroachments under copyright, patent, utility model, trade mark and unfair competition laws".[1207]

Although it may be argued that it should be possible to define precisely the areas of industrial designs and artistry and patentable invention, there are indeed no defining lines and this could lead to many practical problems.[1208] Other instances - where functional designs can be protected under the designs right, this could inevitably overlap with patents and utility models, and shape designs could overlap with trademarks registration and unfair competition law.[1209] The wide conception of protectable subject matter demonstrates the difficulty of drawing the overall picture of design protection.[1210] The scope of protection, the subject matter, the requirement of protection, the term of protection vary considerably from country to country – some require absolute or local novelty, some require originality, some require aesthetic elements or distinctiveness of the designs.[1211]

The rules of design protection are uncertain as Franzosi states that:

> "the problems of legal protection of industrial design are not at all easy. The rules of law are different in different countries; differences are substantial because the laws are based on

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trademarks are said to have remained practically unknown, Kur A 'Protection of Graphical User Interfaces under European Design Legislation' (2003) I.I.C. 50, at p.60-61.

1203 See a decision in Benchairs v Chair Centre [1974] R.P.C. 429; and to be contrasted in Hodgkinson & Corby and Roho v Wards Mobility Services [1995] F.S.R. 169.

1204 See Carflow Products v Linwood Securities [1996] F.S.R. 424; Valeo Vision SA v Flexible Lamps [1995] R.P.C. 205.

1205 Hilty R M *The Law Against Unfair Competition and Its Interfaces* in Hilty R M and Henning-Bodewig F (eds) *Law Against Unfair Competition Towards A New Paradigm in Europe?* (Berlin: Springer, 2007), at pp.39-41.

1206 Cornish and Llewelyn, n.307, at p.567.

1207 Suthersanen, n.1179, at p.1.

1208 Morris A I and Quest B *Design: The Modern Law and Practice* (London: Butterworths, 1987), at p.2. Because of the hybrid nature of designs, it is difficult to classify either as an industrial work or as artistic work, Reichman J 'Design Protection and the Legislative Agenda' (1992) 55 Law and Contemporary Problems 281, at 287; and also Dutfield and Sutheranen state that the difficulty nature to categorise either as industrial work or artistic work, partly due to the ambiguity of the term 'design', n.1122, at p.167.

1209 Musker, n.1192, at p.75.

1210 Suthersanen, n.1179, at p.103.

1211 Correa, n.229, at p.258.

> different philosophies. The application of these rules is far from being certain. It might even be suggested that some decisions seem based more on chance than on logic or law".[1212]

The inherent complexities within design protection, and overlap with other IPRs would cause double complexities to be applied in nanotechnology due to its multiple fields and cross disciplines. It seems from the above discussion that design law complexity would be extremely problematic for nanotechnology, even if protection is available. Discussion below examines the design protection for nanotechnology under Malaysian, UK and its European counterparts.

### 5.4.4 Nano-creations design under Malaysian law

The law which protects industrial designs in Malaysia is the IDA and the Industrial Designs Regulation 1999. The meaning of 'design' under IDA is mirrored to the definition of design under the old UK Registered Design Act.

Section 3(1) of the IDA defines 'industrial designs' means features of shape, configuration, pattern and ornament applied to an article by any industrial process or means being features which in the finished article appeal to and judged by the eye. Section 3(1) excludes methods or principles of construction and features of shape or configuration of an article if they dictate solely by the function and depend upon the appearance of another article.

Under this section, industrial design is to protect the features of shape, configuration, pattern or ornament applied to an article by an industrial process.[1213] The industrial design also must

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[1212] Franzosi M 'The Legal Basis of Industrial Design: Unfair Competition as a Basis of Protection' (1990) E.I.P.R. 154, at p.154, and further states that there should be more than one principle of industrial property law available for the design protection, at p.156.

[1213] For example the pattern can be geometric, free, regular or irregular especially in the textile and wallpaper industries, whereas ornament normally applied to other article for decorative purposes especially in the pottery and ceramics industries, Abdul Jalil J Industrial Designs Law in Malaysia: Cases and Commentary (Petaling Jaya: S&M Asia, 2004) at p.20. In the UK under earlier Registered Designs Acts, see the meaning of these in Re Clarke's Registered Design: Clarke v Julius Sax & Co Ltd (1896) 13 R.P.C; Dover v Nurnberger Celluloid Waren Fabrik Gebruder Wolff [1910] 2 Ch 25; For an extensive meaning of 'industrial design' see for example Woodring C C 'A Designer's View on the Scope of Intellectual Property Protection' (1996) A.I.P.L.A. Quarterly Journal Vol 24, No. 2,3, and p.309, at pp.309-316.

be features which in the finished article that are appealed or judged by the eye.[1214] This is important to note that only industrial design that appealed to the eye could be registered, which means that the appearance of the registered design was a material factor in attracting consumer i.e. the article's appeal was seen to reside in its shape, pattern, or ornamentation.[1215] The protection also excludes the designs that depend upon the appearance of another article also known as "must-match". This provision is likely to reject the protection of spare parts because normally spare parts are functional in nature or must match in the case of bodywork spares. For this ground alone spare parts will be excluded under the Malaysian industrial design law, though they can be protected under copyright law and patent laws.[1216] However, this provision is of more general application, not limited to the spare parts only. Although the wide coverage of the definition of the designs, including two-dimensional and three-dimensional features, nevertheless, the requirement of 'eye-appeal' may seem problematic to be applied to nanotechnology. Thus, it appears that features of feature of shape, configuration, pattern or ornament applied to an article and judged by the eye require more for the visibility of the design. Furthermore, the law in Malaysia does not protect the design alone, but the design that applied to an article. The answer the above research questions is less likely to suggest that nanoscale creations are protected in Malaysia, particularly "eye appeal" requirement is fatal for each of them.

### 5.4.5 Nano-creations design under UK and EU law

UK registered design is protected under the Registered Design Act 1949 (as amended by the Copyright, Designs and Patents Act 1988 (RDA) and the Registered Designs Regulations 2001).[1217] With the amendment of the CDPA 1988 to exclude copyright protection from many designs under section 51, a new right was introduced, the unregistered design right. This right modelled the hybrid quasi-copyright type of protection with the intervention for the need of an automatic, short-term protection for both functional and non-functional three-

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[1214] The eye-appeal test was held in Redland Tiles Ltd & Ord v Kua Hong Brick Tile Works [1996] 2 M.L.J. 62, Per Abdul Aziz J, at 62.
[1215] Interlego AG v Tyco Industries Inc [1988] A.C. 217.
[1216] Abdul Jalil, n.1213, at p.72 and p.75.
[1217] SI 2001 No. 3949, which implemented Directive 98/71/EC; The Registered Designs Regulations 2003 SI 2003 No. 550 amended the Act in relation to Community Designs.

dimensional designs.[1218] The design does not need to be registered and the period of protection is shorter than the maximum for registered design or copyright protection, even under section 52. It is often seen as protecting three-dimensional design but configuration arguably can be in two-dimensional form.

Subsequently the Design Directive was introduced and implemented in the UK. The Design Directive is intended to harmonise the substantive laws of design protection among the member states and to overcome the problems of free movement of goods resulting from different level of protection in the member states.[1219] The EU has also introduced Community-wide protection under the Design Regulation for registered and unregistered designs.[1220] A single registration of the design is effective for all member states and is administered by the Office for Harmonisation of the Internal Market (OHIM) in Alicante. The substantive law of the Design Regulation is similar to the Design Directive.[1221]

There are certainly various types of protection of designs in the UK; the situation has been described as *"multi-layered, complex and lacking in logic"*[1222] and *"absurd maze."*[1223] Against this background Calls for Evidence and business surveys were conducted by the UKIPO in response to the Hargreaves report on the lack of evidence that design law supports business innovation, and whether there is a need to change the design law in the UK.[1224] What is clear from the responses to the Calls for Evidence is that there is no appetite for

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[1218] Suthersanen, n.1179, at p.233; Reichman J H *Universal Minimum Standards of Intellectual Property Protection under the TRIPS Component of the WTO Agreement*, in Correa C M and Yusuf A A *Intellectual Property and International Trade: The TRIPS Agreement* (eds) (2nd edn) (The Netherlands: KLI, 2008), at p.57 n.241.

[1219] Davis, n.1170, at p.315; Suthersanen, n.1179, at p.26; The harmonisation of the registered system among member states necessary for the smooth functioning of the internal market, see also Recital 1, 2 and 3 of the EC Design Directive; See also a commentary of the Design Directive as implemented, has resolved some major difficulties in the English law especially related to copyright and design regime, in Scanlan G and Gale S 'Industrial Design and the Design Directive: Continuing and Future Problems in Design Rights?' (2005) J.B.L. 91, at pp.93-111.

[1220] The aim of the Design Regulation is to achieve a unitary system by creating a two-tier systems of rights of the CRD and supplement by the CUD, Suthersanen, n.1179, at p.26; see also the Green Paper which states that the aim of registered design is to create certainty of what design merit for protection and what is not, and the introduction of unregistered was also to reduce the legal certainty, at para 4.3.9.

[1221] The scope and extent of protection of design under the Community Designs Regulation was found to be narrow in Procter & Gamble Co v Reckitt and Benckiser (UK) Ltd [2006] EWCH 3154 (Ch); [2008] F.S.R. 8; see case comment on this by Connor I 'The Design Trigger: Case Comment of Procter & Gamble v Reckitt Benckiser' (2007) E.I.P.R. 293; see also Brazell L 'Court Defines on Designs' (2007/08) Euro. Law 10.

[1222] Bently and Sherman, n.211, at p.612.

[1223] Cornish and Llewelyn, n.307, at p.598.

[1224] See 'IPO Assessment of the Need for Reform of the Design Intellectual Property Framework' December 2011, UKIPO, at http://www.ipo.gov.uk/hargreaves-designsassessment.pdf, accessed on 27 April 2012.

reducing the term of protection afforded by the UK unregistered design to three years to match Community unregistered design as this would reduce the protection currently available. Respondents also advise against a simple abolition of UK unregistered design right for the same reason. The meaning of design and its scope of protection under RDA, Design Directive and Design Regulation are very similar.

### 5.4.5.1 Nano-creations under registered design

The definition of design refers to the 'appearance' of the whole or part of a product. The word 'appearance' does not necessarily mean that the design has to be attractive or aesthetic.[1225] The question is what constitutes 'appearance'?[1226] In other words, given the nature of no requirement of eye-appeal, does the appearance of a product indicate that the visual perception is significant? According to Musker, given the ordinary meaning, the word 'appearance' refers to visual perception.[1227] Suthersanen, suggests that the word covers a wide interpretation to include any economic value that attached to the appearance of the product; and this 'appearance' implies any element which can be perceived by human senses for example the weight, flexibility of a product or the tactile impression.[1228] However, Suthersanen further argues that the word is unlikely to be extended to protect products characterised by its smell or sound that affect the aural or olfactory sense.[1229] Massa and Strowel state that the word 'appearance' means that the design may be part of the product which could either visible or tactile.[1230] This could mean that the appearance needs to be reasonably fixed, which is probably true for many nano-structures.

The Green Paper in assessing the 'appearance' refers it in general term which *"excludes those features of product which cannot be perceived by the human senses"*.[1231] Along the line, Recital 11[1232] of the Design Directive refers to protection of those *"features shown*

[1225] Musker, n.1192, at p.12; see Recital 14; see also Bently and Sherman, n.211, at p.628.
[1226]The concern of the "appearance of a product" has been made through Recital 10 of the Design Directive; see Recital 10.
[1227] Musker, n1192, at p.12.
[1228] Suthersanen, n.1179, at p.28.
[1229] Ibid, at p.29.
[1230] Massa C-H and Strowel A 'Community Design: Cinderella Revamped' (2003) E.I.P.R. 68; at p.71.
[1231] The Green Paper at 5.4.7.3.
[1232] See Recital 11.

*visibly in an application"* and Recital 13[1233] of the Design Directive refers to the *"informed user viewing the design"* regarding individual character. In nanotechnology, the 'informed user' of nano has visualising equipments such as STM and AFM. Commenting on the basis of these recitals, Musker strongly views that the 'appearance' should be given a wider meaning to include vision and touch.[1234] The same contention viewed by Franzosi in interpreting the 'appearance' means the aesthetic elements which may be perceived by the human eye or by the touch.[1235] Sykes opines that the definition of 'appearance' of the first reading would suggest that some features which must be perceptible visually/visual impression.[1236]

The question is whether the design needs to be visible to the eye? Or could it be include other features which may be perceived by other sense? There is no specific requirement that the design must be visible to the naked eye.[1237] For example, with the aid of visualizing device namely a computer, the design icon is of the important part of the appearance of the article which attracts people to buy.[1238] Earlier EU drafts excluded Semiconductor Chips from protection because of its invisibility, and now the exclusion was removed.[1239]

In answering the question as to whether this provision could include features which may not be directly perceived by the eye or touch – for example by using special tools like glasses and microscopes, Franzosi claims that the indicative nature of the list (lines, contours, colours, shape, materials and ornamentation) is likely to suggest that there is nothing to prevent from defining features which may be directly or indirectly recognised by human beings.[1240] This question is important for nanotechnology on the same stance that only

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[1233] See Recital 13.
[1234] Musker explains that Recital 11 is just a guideline to the normal practice of registering visual representation of the appearance of designs; whereas Recital 13 using the word 'viewing' is to be treated as an example rather than to limit it and strongly stresses that this interpretation is the most consistent with legislative history. However he adds that Recital 11, and possibly Recital 13 could be used to interpret "design" to restrict it to visible features, and visually assessed, n.1192, at pp.13-14.
[1235] Franzosi M in Franzosi M (ed) *European Design Protection: Commentary to Directive and Regulation Proposals* (The Netherlands: KLI, 1996), at p.4; see Recital 11 of the Design Directive.
[1236] Sykes J *Intellectual Property in Designs* (UK: LXB, 2005), at p.110.
[1237] See Dutfield and Suthersanen, n.1122, at p.167; Torremans, n.200, at p.324 nevertheless explains that by referring to Recital 14 and Recital 11 and "appearance" of design definition states that this is still concerned with the "look and feel".
[1238] See Per Jacob J in Apple Computer Inc v Design Registry [2002] E.C.D.R. 19, at 193.
[1239] Musker, n.1192, at p.17.
[1240] Franzosi in Franzosi, n.1235, at p.41.

special tools could be used to "see". Therefore, the invisibility of the design features or items at sub-visible scale can be considered 'products' under the Design Regulation and the "design" is not only limited to the features of shape visible only to the naked eye, thus, there is no reason for not protecting of the mere appearance of structures at the nanoscale.[1241]

However, as regards to the EU design law, Koschtial claims the presumption can be made that the design which can only be seen with the aid of technical tools will not be justifiable and therefore cannot be termed as 'visible' under the European law.[1242] According to Koschtial, the correct interpretation of the visibility is that *"visible to the average observer with ordinary effort. This means that one can demand that the observer uses glasses but not a microscope"*.[1243] This may not be true for nanotechnology since the average observer may be among experts including technologist with the ordinary effort (without having to go through the thorough lab testing or experiment for example), the design of nanoscale creation is 'visible' for them.

In answering the question whether designs can comprise features which are invisible or not completely visible to the human eye, Sykes states that the word "appearance" under registered design and Community designs does not suggest that the design or features have to be visible to the human unaided.[1244] Thus, Sykes strongly suggests that where the designs or features are so small that cannot be perceived by human senses unaided; they should qualify for the legal protection.[1245] This is a view to support for the protection of invisible designs like nanotechnology, although they cannot be perceived by the human senses, can be protected under the existing registered design law of the EU and its Member States.

The non-exhaustive list of characteristics covers a wide range of designs, as the Commission for the Green Paper (Green Paper) concluded that the definition of "design" should be broad to cover *"the two-dimensional or three-dimensional features of the appearance of a product ... which are capable of being perceived by the human senses as regards forms and/or*

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[1241] Jenkins, Protection of Microscopic and Nanoscopic Structures Through Design Registration, Patent Issues, Nanotechnology Special Edition, 2009, available at http://www.jenkins.eu/my-uploads/nanotech-special-edition-spring-2009.pdf, accessed on 15 Jan 2010, at p.3.
[1242] Koschtial U 'Design Law: Individual Character, Visibility and Functionality' (2005) I.I.C. 297, at p.310.
[1243] Ibid, at p.310.
[1244] Sykes, n.1236, at p.115.
[1245] Ibid, at p.115.

*colour."*[1246] The word 'capable of being perceived by human sense' clearly suggests that the appearance of the product must be perceived by the human sense, may include sight and touch (reinforced by the requirement for visibility in use of parts of complex products). This appears to be problematic for nano-design. In Lindner Recyclingtech GmbH v Franssons Verkstäder AB[1247] concerned a complex product as a machine for shredding and the component part was chaff cutter and which rotates and cut up the material inserted into the shredding machine. The appellant argued that the operator cannot see the operation of the step rotor in normal use because it was covered by the material to be shredded. The appellant also argued that while spinning, the step rotor cannot be seen properly. The Third BOA stated that at certain limited degree, the step rotor is visible in normal use. The BOA concluded that the provision of Article 4(2)(a) of the Community Design Regulation does not require that the component part has to be visible in its entirety.[1248] In Lindner it was suggested that visibility some of the time is enough, but nano-creation is visible none of the time unless it visualized with special tools.

Design right does not subsist in features of appearance of product which are 'solely dictated by technical function'.[1249] The purpose of the exclusion is to prevent technological innovation being hampered as provided under Recital 14 of the Designs Directive, and to ensure that the designers could not create a monopoly over the design.[1250] The words 'solely dictated by function' suggest that if there is the design freedom of choosing the features, means that the design is not dictated solely by its function and therefore, protected.[1251] The exclusion from protection of design features "dictated solely by technical function" may suggest problematic for nanoscale creations, as they normally involve technical function. The phrase 'solely dictated by function' appears in the Design Directive and Design Regulation, is similar to the RDA 1949 prior to EU harmonization. However, was originally interpreted differently from its earlier construction under UK law, particularly by the HL in

[1246] Green Paper on the Legal Protection of Industrial Design. Working Document of the Services of the Commission. III/F/5131/91 – EN, June 1991 at 5.4.7.1; available at http://aei.pitt.edu/1785/01/design_gp_1.pdf
[1247] [2010] E.C.D.R. 1.
[1248] Ibid, the Third BOA, at 8-9.
[1249] Section 1C(1) RDA; Article 7 of Designs Directive; Article 8(1) Design Regulation.
[1250] See Oren (Isaac) v Red Box Toy Factory Ltd [1999] FSR 785, at 14 and 15; see Lindner Recyclingtech GmbH v Frassons Verkstader AB [2010] E.C.D.R. 1, at 28.
[1251] Colston and Galloway, n.217, at p.496.

Amp v Utilux Pty Ltd.[1252] It was more generous interpretation to the Community design which was based upon so-called ‘multiplicity of forms’ which means that if more than one design could perform the technical function, each design would not be ‘solely dictated by function’. This concept has it root from French and German origin, and was endorsed by Advocate-General Ruiz-Jarabo Colomer in Phillips Electronics NV v Remington Consumer Products Ltd.[1253] This approach, which produced divergent results under trade mark law and design law, was followed in design cases in the UK (Landor & Hawa International Ltd v Azure Designs Ltd).[1254] However, doubt was been cast on this interpretation by Third BOA, OHIM in Lindner Recyclingtech GmbH v Frassons Verkstader AB.[1255] The BOA held that, despite the possibility that other designs could achieve the same technical result, the design was dictated solely by function in that, assessed objectively. The relevant of the product’s appearance were chosen exclusively to achieve functional performance rather than to enhance its visual appearance. In the BOA’s view, this interpretation was the correct one on both a literal and a teleological approach. Furthermore, the BOA referred to withdrawal by the French Courts from the multiplicity-of-forms analysis and while recognizing that good design combines form and function, and that Community design legislation explicitly does not require aesthetic merit or eye-appeal, but the BOA rejected the argument that purely functional designs were therefore protectable.[1256].

Based on Lindners’ ruling[1257] despite other design could have the possibility of achieving the same result, the design is said to have dictated solely of technical function. If the interpretation Lindner is correct, this would likely to exclude all possibility of protection for nanoscale creations. Thus, it could be argued that there is very little chance of registered design/Community design being available for nano-creations, as per Malaysia, and no further consideration will be given to the requirements for protection as registered designs, or unregistered Community designs. However, there is another route that could be possible to protect nano-creations as under UK unregistered design which relates to the technical features.

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[1252] [1971] F.S.R. 572 where the HL held that the product’s configuration was solely dictated by its technical function if every feature of the design was determined by technical consideration.
[1253] [2002] ECR I-5475.
[1254] [2006] EWCA Civ 1285.
[1255] [2010] ECDR 1.
[1256] [2010] E.C.D.R. 1, at para 34.
[1257] Applied in Dyson v Vax [2010] F.S.R. 39; [2011] EWCA Civ 1206.

### 5.4.5.2 Nano-Creations design under UK Unregistered Design

Section 213 (2) of the CDPA 1988 defines 'design' as any aspect of the shape or configuration (internal or external) of the whole or part of an article. The subject matter protection of unregistered design is also broad and protects functional and aesthetic features of shape and configuration.[1258] The protection granted under unregistered design is of comparatively shorter duration i.e. normally 10 years from the first marketing of articles with a maximum of 15 years from the creation for the design.[1259] Section 213 excludes the protection of a method or principle of construction and design right also does not subsist in features of shape or configuration of an article which enable article to be connected or placed against another article so that either may perform its function or are dependent upon the appearance of another article to form an integral part.[1260] Design right also does not subsist in surface decoration because it is protected under copyright law or registered design.[1261]

The provision is silent as to whether the design features must be visible to the naked eye. The High Court in Ocular Sciences Limited v Aspects Vision Care[1262] held that there was no reference has been made under the CDPA 1988 that the features must appeal to and are judged by the eye. The intention of the Act was to give the protection for the functional design. Laddie J stated that:

> "The eye may not be able to distinguish the shapes but that does not mean that they are not different. That being so, it seems to me that it is not possible to exclude detailed dimensional shapes on the ground that they are not designs. This does not mean that mere changes in scale produce different designs".[1263]

Similarly, in Fulton Co Ltd v Totes Isotoner (UK) Ltd[1264] noted that *"unregistered design right extends beyond the visually appreciable to other aspects of the design of an article"*.[1265] In other words, the design does not need to be visible to the eye. In nanoscale creations, the

[1258] A Fulton Co Ltd v Grant Barnett & Co Ltd [2001] R.P.C. 257; Landor & Hawa International Ltd v Azure Designs Ltd [2006] EWCA Civ 1285; [2006] ECDR 31; Dyson v Qualtex [2006] R.P.C. 769; see also Saez V M 'The Unregistered Community Design' (2002) E.I.P.R. 585, at p.585.
[1259] Section 216 CDPA 1988.
[1260] Section 213(3)(a)(b) CDPA 1988, so-called 'must-fit' and 'must-match' exclusions.
[1261] Section 213(3)(c) CDPA 1988.
[1262] [1997] R.P.C. 289.
[1263] Ibid, at 423.
[1264] [2003] EWCA Civ 1514; [2004] R.P.C. 16.
[1265] Ibid, at 311; it was observed too the design right was not limited to the design which appealed to the eye by Mummery LJ in Farmers Build Ltd v Carrier Bulk Materials Handlings Ltd [1999] R.P.C. 461 at 481.

design is not visible to the naked eye. Furthermore, the insertion of the word 'internal' features indicates that the design also needs not to have visual appeal.[1266] Moreover, small modifications which are invisible to the eye may give rise to design right, for example in the field of nanotechnology where the designs are occurred at a subocular level.[1267]

#### 5.4.5.2.1 Aspects of the shape and configuration

The 'design' under unregistered design right covers any aspect[1268] of shape and configuration that applies to the whole or part of an 'article'.[1269] A single article will normally embody not a single design right, but different design rights subsisting in the whole or part of every aspects of shape and configuration of the article.[1270] "Shape and configuration" usually refers to the three-dimensional features[1271] for example the rib of hot water bottle was configuration in Cow (PB) & Co Ltd v Cannon Rubber Manufacturers Ltd.[1272] It may be argued that features at nanoscale can be developed as feature of configuration rather than surface decoration.

In Sales v Stromberg,[1273] the court rejected argument and held that there is no reason for not accepting a simple shape a protectable design for an article. This case could provide a strong argument for nanotechnology that a known and simple geometry shape at nanoscale creations may be protected under design right. Furthermore, as discussed in Ocular Laddie J stated that there was nothing in the CDPA 1988 that indicates that a shape with detailed dimension was excluded from the design protection (although it may not be necessary). Therefore, as Laddie

[1266] Laddie et al., n.978, at p.2175.
[1267] Coulthard A and Bently L 'From the Commonplace to the Interface: Five Cases on Unregistered Design Right' (1997) E.I.P.R. 401, at p.402.
[1268] In A Fulton Co Ltd v Totes Isotoner (UK) Ltd [2003] EWCA Civ 1514; [2004] R.P.C. 16 Jacob LJ stated that "*but to my mind the notion conveyed by "aspect" in the composite phrase "design of any aspect of the shape or configuration of the whole or part of an article" is "discernable" or "recognisable"* at 311.
[1269] "shape" and "configuration" appeared in the law of registered designs prior to Design Directive harmonization.
[1270] Howe, n.1198, at p.186.
[1271] But does not necessarily mean that only three-dimensional designs will be protected, see for example Mackie Designs Inc. v Behringer Specialised Studio Equipment (UK) Ltd [1999] R.P.C. 717 Pumfrey J held that the design on components and interconnections on a printed circuit board was 'configuration. (the claim failed under copyright because of section 51 CDPA 1988 and under design right because the claimant was American and the design did not qualify for protection. The decision could be important if there are thin film of nano-products.
[1272] [1959] R.P.C. 347.
[1273] [2006] F.S.R. 7.

et al. provide examples that the shape of micro-engines which are small enough to be fitted in a living cell or the shape of a molecule which has been made to a particular shape are possible to be protected under the unregistered design right.[1274] They observe that *"if this is correct then logically it should be possible to protect the shape of all man-made articles whether large or small. If this is correct then logically it should be possible to protect the shape of a molecule which has been made to a particular shape".*[1275]

#### 5.4.5.2.2 Design for an article

Unregistered design right protects the design, rather than the article itself. The courts in the UK have emphasised that the law does not protect the article, but the design applied to which it relates to an article. For example in C & H Engineering v Klucznik & Sons Ltd[1276] and in Electronic Techniques (Anglia) Ltd v Crithley Components Ltd[1277] Laddie J noted that:

> "the design right provisions are not concerned with protecting particular articles but with protecting certain types of designs… This appears to emphasise that what the Act is concerned with is the design itself rather than the substrate on which it is recorded or to which it is first applied".[1278]

In Farmers Build Ltd v Carier Bulk Materials Handling Ltd[1279] Mummery LJ observed that "*design right does not, for example, subsist in a fork: it subsists in an aspect of the shape and configuration of the handle or the prongs of a fork".*[1280] The court of appeal examined that individual parts and combinations of parts of agricultural machines were all "articles" with a shape and configuration.[1281]

As argued by Laddie et al (in the passage quoted above at 5.4.5.2.1), there seems to be no problem to protect shape or configuration scaled down to the molecular level under

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[1274] Laddie et al., n.978, at p.2171.
[1275] Ibid, at p.2171.
[1276] [1992] F.S.R. 421, Per Aldous J at 428; see also case comment on this by Turner J 'A True Design Right: C&H Engineering v Klucznik and Sons' (1993) 1 E.I.P.R. 24, at 24.
[1277] [1997] F.S.R. 401.
[1278] Ibid, at 418.
[1279] [1999] R.P.C. 461.
[1280] Ibid, at 483; see also Scholes Windows Ltd v Magnet Ltd [2002] F.S.R. 10 - it was held that the definition of design does not incorporate the nature and purpose of the article itself or material structure of the article. Mummery LJ held at 180 that *"the property right is in the design of any aspect of the shape or configuration of the horn. It is not a right in the article itself. It is not a right in the idea of a particular construction, use or application of the article itself".*
[1281] See per Laddie J in Ocular Sciences Limited v Aspects Vision Care [1997] R.P.C. 289, at 423.

unregistered design right. This for example, may include features of shape or configuration of nano-bots or nanotubes. Although they are normally functional in nature, this is not a problem for UK unregistered design right. Nor does UK unregistered design protection require visibility to the eye as discussed above at 5.4.5.2. However, under design right, the design must be "for" an article. Laddie et al appear to assume that a man-made molecule is an article. The difficulty may arise to consider whether a nano-creation is indeed an "article". However, some interesting observations from semiconductor chip protection under modified UK design right could provide a significant consideration for nano-scale creation (discussed below at 5.4.5.3) and support the view that molecules and nano-creations could be 'articles'.

#### 5.4.5.2.3 Originality

The design right should be original to be protected. Section 213(4) of the CDPA 1988 states that a design is not 'original' if at the time of its creation, the design it is commonplace in the design field in question. The design is original if the design is not copied from the existing design as in Farmers Build v Carrier Bulk[1282], and in Fulton v Grant Barnett;[1283] and the author has expended sufficient skill and labour for the creation of the design.[1284] If the design is not similar to other designs, and it was not copied, the design is said not to be in commonplace.[1285] The word 'commonplace' has been highlighted by Laddie J in Ocular Sciences Ltd v Aspect Vision Care Ltd[1286] that:

> "any design which is trite, trivial, common-or-garden, hackneyed or of the type which would excite no peculiar attention in those in the relevant art is likely to be commonplace. This does not mean that a design made up of features which, individually, are commonplace is necessarily itself commonplace. But to secure protection, the combination must itself not be commonplace ... In many cases the run of the mill combination of well known features will produce a design which is itself commonplace".[1287]

[1282] [1999] R.P.C. 461, at 481.
[1283] [2001] R.P.C. 257, at 272 Per Park J that must have been consciously designed rather than arising accidently; but see Guild v Eskandar [2003] F.S.R 23 paras 44-56 recognising that accidental feature could contribute to originality of design because it was perpetuated on purpose, but holding in the circumstances that the design lacked originality.
[1284] Howe, n.1338, at p.201.
[1285] This is objective test to compare the design with earlier well known design in the design field in question at the time of its creation, Farmers Build v Carrier Bulk [1999] R.P.C. 461, at 482 per Mummery LJ; see also Bently and Sherman, n.211, at p.696.
[1286] [1997] R.P.C. 289.
[1287] Ibid, at 429 and stated that certain designs for contact lenses were commonplace, at 430.

This is because as Mummery LJ pointed out that it would be wrong to interpret 'commonplaceness' broadly because the purpose was to *"safeguard against situations in which even short-term protection for functional designs would create practical difficulties"*.[1288] Some may suggest that 'commonplace' may be *"akin to novelty"*.[1289]

The design which is commonplace in a design field will *"be ready to hand"* rather than something that *"has to be hunted for or found at the last minute"*.[1290] Therefore, this may include the old design if such design were still available for designers or members of the public to view it.[1291] As to whether the design is similar or in the same field, the court will examine it from the eyes of customer and not the designer who is an expert in the field.[1292] Comparing the design in question with designs in the same field, the closer the similarities are between the two, the more likely that the later design is in the commonplace.[1293] But, where similarities between the design and the existing one within the same field were a result of the fact that both designs were modelled on the human form, the court held that the later design was not commonplace, because of differences in details of the features.[1294]

Since nanoscale design is different in design field, i.e. based on size or property difference, the design may be considered as original either within the nano-structures itself, or between nano-structures and macro-structures. Design structures would be considered not commonplace as they are different in details of the features, and the property at nano-structures operates differently. Therefore, the customer, who is among the expert scientist and technologist, would regard nano-structures as original either within the nano-structures or between nano-structures to macro-structures.

[1288] Farmers Build v Carrier Bulk [1999] R.P.C. 461, at 481; see also Scholes Windows v Magnet [2000] F.S.R. 432, 443; Fulton v Grant Barnett, 273, at para 50 that commonplace to be interpreted narrowly rather than widely.

[1289] C & H Engineering v F Klucznik & Sons Ltd [1992] F.S.R. 421 at 428, Aldous J.

[1290] Ultraframe (UK) v Eurocell Building Plastics [2005] R.P.C. 36, at 60; see similar view that the Court of Appeal concerned that the design in the field at the time of creation of the design in issue in Scholes Windos v Magnet [2002] E.C.D.R. 196; [2002] F.S.R. (10) 172.

[1291] Bently and Sherman, n.211, at p.697; see the decision in Scholes Windows Ltd v Magnet Ltd [2002] F.S.R. 171, CA para 44 per Mummery LJ

[1292] Fulton v Totes [2003] RPC (27) 499, at 509; Scholes Windows v Magnet [2002] E.C.D.R. 196; [2002] F.S.R. (10) 172 at paras 49-50.

[1293] Bently and Sherman, hahan.211, at p.698.

[1294] Spraymiser Ltd & Snell v Wrightway Marketing Ltd [2000] E.C.D.R. 349.

### 5.4.5.3 Semiconductor chip protection

The pressure from the semi-conductor industries to protect integrated circuits led the US to enact sui generis protection of the semiconductor - the Semiconductor Chip Protection Act 1984[1295] for the protection of the original 'mask'[1296] work. Furthermore, semiconductor topography designs are required to be protected by the Treaty on Intellectual Property in Respect of Integrated Circuits; however this treaty has not yet received enough ratification to come into force.[1297] In 1986, the Council Directive on the legal protection of topographies of semiconductor products[1298] required member states to enact laws relating to semiconductor topography. In compliance with the Directive, the UK design protection of semiconductor topography was created under unregistered design right – by the Design Right (Semiconductor Topographies) Regulations 1989 (Semiconductor Regulations).[1299]

The integrated circuit (IC) gives effect to program instructions through a circuitry fixed on semiconductor material in layered form.[1300] The IC is an electronic circuit where the elements have been integrated into some medium in order for the IC to perform different functions i.e. to store information and to perform logical operations on the information especially in the computing industries.[1301] IC or chips are available on various applications such as computers, hi-fi sets, electronic management circuits for cars and timer circuits for washing machines.[1302] Interestingly, with the new applications, products and systems have boosted the growth of IC in the past and continue to develop for the future to enhance its

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1295 Pub L No 98-620, Title III, Stat 3347 (codified) at 17 USC 901-914, Supp II 1984).

1296 'mask' is a method of producing the circuitry on the surface of the chip, Cornish and Llewelyn, n.307, at n.94, at p.599

1297 Washington Treaty on Intellectual Property in Respect of Integrated Circuits, 26 May 1989. Pursuant to Article 3(1) requires that compliance of this Treaty to protect semiconductor topography, which states *"Each Contracting Party shall have the obligation to secure, throughout its territory, intellectual property protection in respect of layout-designs (topographies) in accordance with this Treaty"*.

1298 Council Directive 87/54/EEC of 16 December 1986 on the Legal Protection of Topographies of Semiconductor Products.

1299 SI 1989/1100, which revoked the Semiconductor Products (Protection of topography) Regulations 1987. As compared to the creation of sui generis protection under the Semiconductor Products (Protection of Topography) Regulations 1987, this 1989 is simply a design right created by the introduction of the UK CDPA 1988, Laddie et al, n.978, at pp.2244-2245; For a more discussion of the usefulness of the legislative approach to protect semiconductor topographies through specific design protection and the extent to which the legislative and its theoretical have served the practical purposes, see generally Karnell, n.1034, at pp.649-658.

1300 Cornish and Llewelyn, n.307, at p.598.

1301 Christie A *Integrated Circuits and Their Contents: International Protection* (London: S&M, 1995), at p.10. For more detail discussion of technological background of the integrated circuits, see at Chapter 1, and for more details elaboration of the functional and physical characteristics of integrated circuits, see at App. A.

1302 Laddie et al., n.978, at p.2237, n.1.

computing performance and speed, memory density and increasing functionality, which is possible by introduce a new structures that carry the silicon technology down to below 10nm feature sizes.[1303] This indicates that chips are nearly down to nanoscale, which may suggest that this model of semiconductor protection may be applicable to nanotechnology.

Similar to unregistered design right, semiconductor topography right protects against copying rather than conferring a monopoly rights.[1304] The requirement of original and not commonplace are applied also to semiconductor chip. However, the differences between unregistered design right and Semiconductor Chip is on the definition and the specific characteristics of semiconductor designs.[1305]

Regulation 2(1) of the Topography Regulations defines 'semiconductor topography'[1306] as: *"a design within the meaning of section 213(2) of the Act"* which is a design of either of the following:

(a) the pattern fixed, or intended to be fixed, in or upon –

(i) a layer of a semiconductor product, or

(ii) a layer of material in the course of and for the purpose of the manufacture of a semiconductor product, or

(b) the arrangements of the patterns fixed, or intended to be fixed, in or upon the layers of a semiconductor product in relation to one another

This strongly suggests that 'designs' within the meaning of section 213(2) generally include invisible designs at very small scale.

The Semiconductor Regulations also defines 'semiconductor product'[1307] as:

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1303 See for example Arden F 'Future Semiconductor Material Requirements and Innovations as Projected in the ITRS 2005 Roadmap' (2006) Materials Science and Engineering, Vol. 134, 104, at p.105; semiconductor chip feature is from 90nm, in Hunt and Mehta, n.38, at pp.282-283.

1304 Howe, n.1198, at p.371.

1305 Ibid, at p.371.

1306 Article 1(1)(b) of the Council Directive on the Legal Protection of Topographies of Semiconductor Products ((87/54/EEC) O.J. No L 24/36 (Topography Directive) defines "topography" as the 'topography' of a semiconductor product shall mean a series of related images, however fixed or encoded;

(i) representing the three-dimensional pattern of the layers of which a semiconductor product is composed; and

(ii) in which series, each image has the pattern or part of the pattern of a surface of the semiconductor product at any stage of its manufacture "an article the purpose, or one of the purposes, of which is the performance of an electronic function and which consists of two or more layers, at least one of which is composed of semiconducting material and in or upon one or more of which is fixed a pattern appertaining to that or another function"

Again, this identifies a very small semiconductor chip as an 'article' within the meaning of the Act, suggesting that nanoscale creations can also be 'articles'.

Regulation 2(2) of the Semiconductor Regulations requires the Regulations to be construed 'as one' with CDPA, except where the context otherwise requires and Regulation 3 provides that "in its application to a design which is a semiconductor topography", Part III CDPA (relating to design right) shall have effect subject to provisions which go to qualification, ownership and duration, rather than the underlying subsistence of design right. Many of these differences were required by the Directive and they do not undermine the general conclusion that design right applies to very small scale creations generally.

Interestingly, design right in the form of semiconductor topography right seems to cope well with chip design which is clearly "configuration" rather than "shape". It can subsist in an aspect of the three-dimensional pattern in the whole or part of a semiconductor product, and of the design of any part of the pattern applied to the whole or any part of an individual layer.[1308] Based on the Regulation above, semiconductor topography constitutes two types of designs i.e. the pattern fixed to a layer of a semiconductor product, and the arrangement of the pattern fixed in or upon the layers of a semiconductor product in relation to one another.

"Pattern" refers to the physical aspects of IC design/semiconductor topography that exist at the individual layer, whereas 'arrangement' refers to the physical aspects of IC design that exist at the multi-layer level.[1309]

[1307] Article 1(1)(a) of Semiconductor Directive defines "semiconductor product" as a 'semiconductor product' shall mean the final or an intermediate form of any product:

(i) consisting of a body of material which includes a layer of semiconducting material; and
(ii) having one or more other layers composed of conducting, insulating or semiconducting material, the layers being arranged in accordance with a predetermined three-dimensional pattern; and
(iii) intended to perform, exclusively or together with other functions, an electronic function.

[1308] Laddie et al, n.978, at p.2239.

[1309] Christie, n.1301, at p.33.

It has been said that the pattern which can exist "upon" a semiconductor layer poses difficulty because the manufacturing of semiconductor devices will normally involve the laying down of a pattern of metal conductors on the surface of the actual semiconductor chip to transfer current between the semiconductor devices, and between devices and the integrated circuit's external pins.[1310] The pattern that laid down on a surface is similar to a printed circuit board and this printed circuit board is within the definition of 'design' under unregistered design right.[1311] Other than "upon" a semiconductor layer, the issue becomes more problematic on the patterns which are "in" a semiconductor layer.[1312] This is because manufacturing semiconductor devices normally involves the "doping" of region of a crystal substrate with small amounts of impurities which create an excess of electrons or "holes".[1313] These regions according to Howe do not exist in the form of a physical shape of an article which can be seen and touched, but there is a configuration of different regions within a single physical article that are slightly different material.[1314] The Regulations assume that such configuration is referred to the internal materials, but not existing as an external tangible shape as has been implicitly inferred from the wording a pattern fixed "in" the semiconductor layer.[1315] Christies argues that since there is no limitation for the specific dimensions, both shape and configuration refer to the three-dimensional aspects of design,[1316] and therefore, the layout of a 'quantum' IC device would be included under the definition of design.[1317] This provides a good analogy for nanotechnology since there is no specific dimension mentioned. The meaning of the 'pattern' is the physical aspects of the integrate circuit design at the individual layer design, and the 'arrangement' is referred as the connection of the pattern at multi-layers; therefore, the physical aspects of integrated circuit is within the meaning of 'semiconductor topography' as long as the integrated circuits is a 'semiconductor product'.[1318] Furthermore, there is no requirement that semiconductor topographies have visual appeal, their only merit being in their layout to give efficient way of connecting the components.

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1310 Howe, n.1198, at p.372.
1311 Ibid.
1312 Ibid.
1313 Ibid.
1314 Ibid.
1315 Ibid.
1316 The definition of 'design' under section 213(2) CDPA 1988.
1317 Christie, n. 1301, at p.31.
1318 Ibid, at p.33.

The definition of semiconductor product refers to the 'article' which consists of two or more layers. Therefore, a single-layer article is outside the definition of the definition of 'semiconductor product'.[1319] The definition also includes that at least one of which of the layers of the product must compose a semiconducting material. Thus, semiconductor topography/IC made of a superconductor or a polymer is outside the definition.[1320] Semiconductor product is also defined to perform electronic functions, and a purely mechanical micro-machine would not come under the definition, but a hybrid optoelectronic optical processor would.[1321]

The discussion above of the design right protection for semiconductor gives very useful lesson for nanotechnology. Design right is deemed to be the appropriate mode of protection, despite the functional character of semiconductor topographies. The pattern and arrangement of the layers of a semiconductor product indicates that the semiconductor functions and design is in the internal features of the product. Thus, visibility of the semiconductor is not significant in order for the rights to arise. Furthermore, there is no specific dimensions mentioned which is useful analogue for nanotechnology. All of these suggest that unregistered design right is suitable for nanotechnology protection.

However, despite the advantages, the unregistered design may have the drawback. Currently its usefulness is limited because of the restrictive qualification provisions, as evidenced by Mackie designs[1322] where Pumfrey J observed that *"citizens of the United States of America are not entitled to design right under the CDPA unless habitually resident in the European Union or one of the comparatively limited list of qualifying countries"*.[1323] There has been talk of its abolition is alignment with EU design criteria,[1324] but in other jurisdiction, it was recommended to be adopted more widely, for example the US has special regime for boat huls and is thinking of introducing unregistered protection for fashion design. Thus, in

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[1319] Ibid, p.34; but this could be argued as it was suggested in Mackie Designs Inc v Behringer Specialised Studio Equipment (UK) Ltd [1999] R.P.C. 717 that a layer might be a 'configuration' like a circuit board, within the scope of ordinary design right.
[1320] Christie, n.1301, at p.34.
[1321] Ibid, at p.34.
[1322] Mackie Designs Inc v Behringer Specialised Studio Equipment (UK) Ltd [1999] R.P.C. 717.
[1323] Ibid, at 724.
[1324] See for example, IPO Assessment of the Need for Reform of the Design Intellectual Property Framework' December 2011, UKIPO, at http://www.ipo.gov.uk/hargreaves-designsassessment.pdf, accessed on 27 April 2012.

answering research question for unregistered design right, nanoscale creation comprises 'design' within the meaning of the design. There is no impediment to protect nanoscale creations, as exemplified in the Semiconductor Chip protection, and non-visibility of nano-creations are less likely to pose problem for the protection. Therefore, the approach of unregistered design in the form of Semiconductor Chip law is convincing and preferable as Semiconductor Chip would protect small functional and aesthetic element of design.

## 5.5 Conclusion

Nano-creations related to copyright, trademarks and designs are not expressly excluded nor included at the international level. This demonstrated that this subject matter of IPRs have the potential to be applied to nanotechnology. In copyright, it showed that nano-creations related to artistic and literary works are more relevant, but nevertheless because of technical and functional characteristic of nanotechnology, they proved to be less relevant for protection.

The list of marks under Malaysian law has demonstrated that they are related to the visual characteristics of the goods which gave indication that nano-marks cannot be protected in Malaysia. The word "signs" in the UK/EU law are wide enough to include invisible marks like nano-marks. The graphical representation has been tested to non-visually perceptible marks in colours, smell and sound, which could be useful for nano-marks. Furthermore, it was recognized that the meaning of sign for infringement demonstrated that the sign need not to be visible, but only perceptible in use. The classification of goods and services under NC has indicated that it capable to include nano-marks. It was further stated that nano-shape marks are less likely to be protected because of its technical character, unless the shape associated to the trade origin. The used of the word "nano" could give rise to the issue of descriptiveness and deceptiveness because consumers are unlikely to associate to the trade origin of the products or services.

The non-visibility of nano-creations has indicated that it was unfortunate to be protected under design law in Malaysia. Even in the UK/EU law, the protection provided under design is complex not only within different protection under design law itself but also overlapping rights with other IPRs. This proved to be even more complex in multidisciplinary like nanotechnology. Under UK registered design, the requirement that the design does not mean to be visible to the eye explained some favourable treatment to protect nano-creations. However, after Lindner, non-visibility and technical characteristics of nanotechnology proved to be less relevant to be protected under registered design/community. This gave consideration that, the protection provided under UK unregistered design right by way of Semiconductor Chip proved to be a good model for protection for functional and technical characteristics like nano-creations, especially for Malaysia to adopt.

# CHAPTER 6
# TERM OF PROTECTION FOR NANOTECHNOLOGY

## 6.1 Introduction

This chapter examines the respective terms of protection for the IPRs which seem realistically to apply to nano-creations. The question of term of protection is often inversely related to the scope or strength of protection, for example copyright has long term but comparatively weak protection, while patents have a shorter term and strong protection. There are limited literatures available for term of protection across the variety of IPRs in comparing to the IPRs itself. This chapter examines what order of magnitude of term of protection might be appropriate for nanotechnology, and whether a fixed term or a term depending upon time of launch is more apt?

## 6.2 Term of protection for law of confidence

Unlike the patent term of duration for twenty years protection, the duration of protection under the law of confidence continues as long as the information is kept secret. For example, the secret recipe of the carbonated drink Coca-Cola has been kept secret until now.[1325] For this protection to operate, reasonable efforts have to be made to keep the information secret, either through NDA or other measures such as using a secret code, or secret encryption and limiting access to the information.[1326] Nevertheless, it is hard also to maintain confidentiality in certain situations, for example when the technology is easily discovered through reverse engineering.[1327] Therefore, it is said that *"secrets leak out like water, even from the most secure organisations, and it is not always easy to put the genie back in the bottle"*.[1328] This is reflected in nanotechnology because not only is the technology complex and

[1325] See for example Sutton P J et al., 'Nanotechnology Licence Pitfalls' (2009) J.I.P.L.P., Vol. 4, No. 3, 176, at p.177; Norton, n.715, at p.41.
[1326] Other example such as secret access procedures and firewalls, use separate computer systems without the internet, or separate network access for sensitive information; label "confidential" for softcopy and hardcopy documents in Chaudhry R et al. 'Can Your Firm Keep Its Secret' (2008) Managing I.P. 109, at p.112.
[1327] Mars UK Ltd v Teknowledge Ltd [2000] F.S.R. 138; see also Freedman C 'The Protection of Computer Software in Copyright and the Law of Confidence: Improper Decompilation and Employee-Poaching' (2000) J.I.L.T., Vol.8, No.1, 25, at pp.28-36.
[1328] Monotti and Ricketson, n.408, at p.95.

multidisciplinary, but there are likely to be various parties involved in maintaining the secrecy of nanotechnology information. Complex technology like nanotechnology may have the advantage of being difficult to reverse engineer. But nevertheless, given the various parties involved in dealing with nanotechnology information, it may be very hard to maintain confidentiality with large numbers of confidantes,[1329] even with measures to control the information from leaking out. Thus, although capable in principle of protecting nanotechnologies for an indefinite term[1330] and preferred by interviewee B, confidentiality has the danger of sudden loss of protection. In practice it is rare for confidential to continue to have value more than ten years.[1331]

### 6.3 Patent term of protection

Patent protection depends upon disclosure, but is patent duration appropriate and effective for nanotechnology, since it is still emerging and developing? Twenty years' potential protection is provided under TRIPS. This section argues that, if the period of twenty years is too short for nanotechnology, Supplementary Protection Certificates (SPCs) as for pharmaceutical and plant products may be desirable, and questions to what extent do SPCs provide a good lesson for nanotechnology?

The question of what is the appropriate length of patent protection *"is a vexed one"*.[1332] This is because, some technologies, including nanotechnology takes a longer period to be made available to the public than others.[1333] TRIPS term of patent protection is the maximum of twenty years calculated from the filing date.[1334] In conforming to TRIPS, Malaysia and UK

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[1329] See Dunford & Elliot v Johnson & Firth Brown [1978] F.S.R. 143 where the disclosure of information was made to 43 per cent of the shareholders, and Lord Denning considered that *"This widespread use of the information drives a hole into the blanket of confidence: especially when that information is being used—or, shall I say misused—for the benefit of some potential shareholders, and not for the benefit of the others. So much so that it would not be reasonable that the stipulation for confidence should be enforced"*, at 148.

[1330] Some may claim that due to size structure, there is less likelihood of reverse engineering in nanotechnology, see for example Sutton et al, n.1325, at p.177.

[1331] Bird and Bird 'From Idea to Market-Place: An Introduction to UK Technology Law' (3rd ed) (1991), at p.10

[1332] Ang S 'Patent Term Extension in Singapore for "Pharmaceutical Products"' (2005) E.I.P.R. 349, at p.349

[1333] For example, interviewee C stated that the technology is still at the age of infancy in Malaysia and whilst interviewee D stated that nanotechnology will have to take a long time to develop in Malaysia.

[1334] Article 33 TRIPS.

adopted the maximum period of renewal of twenty years from the date of filing.[1335] The patent takes effect on the date in which the grant notice is published in the journal of the Patent Office.[1336] The period for twenty years' protection reflects the non-discriminatory provision of the TRIPS to apply to all technologies.[1337]

This period of twenty years applicable to all inventions has been referred by Christie and Rostein as *"one size fits all"*.[1338] According to them, in order to test whether the twenty years is fit for all inventions, the optimum duration of patent protection must be determined, and compared with the duration of protection provided by the current patent system.[1339] They argue that one size does fit all if the duration of protection provided by the current system is within the optimal duration, and not if there is substantial divergence between what is optimal in theory and what is provided in practice.[1340] After discussion on different economic theories of different variables and assumptions to determine the optimal duration, they observe that it is not possible to know exactly what the optimal duration is.[1341] From patent renewal data they observe that on average only 50% of patents survive eight years after grant and only 15% until the full standard duration.[1342] They found that there is some difference in renewal rates on different technologies – for high technology such as biotechnology, medical engineering and pharmaceuticals; patents tend to have the highest renewal rates, whereas in low-technology, the patent tends to be the lowest renewal rates.[1343] When comparing the features of optimal system of duration of patent with the current patent system, they conclude that the current system of patent protection of maximum 20 is matched with the optimal system because; (a) the twenty years of protection is greater than 8 years after the grant of

[1335] Section 35(1) PA 1983 or 15 years from the date of the grant of the patent whichever is longer; Section 25(1) PA 1977 and Art 63(1) EPC 2000; Whereas in some countries for example the US, the period is calculated from the grant of patent, Gervais, n.222, at p.404; But recently with the new amendment to include first-inventor-to-file in the US, the claimed invention is from effective filing date: America Invents Act, available at ://www.uspto.gov/aia_implementation/bills-112hr1249enr.pdf, visited on 17 March 2012.
[1336] Section 25 PA 1977.
[1337] Art 27(1).
[1338] Christie A F and Rotstein F 'Duration of Patent Protection: Does One Size Fit All'? (2008) J.I.P.L.P Vol. 3 No.6, 402 at p.402
[1339] Ibid, at p.402.
[1340] Ibid, at p.402.
[1341] Ibid at pp.404-405. Optimal duration or optimal patent length is modeled by equating the marginal social benefit with the marginal social cost of the patent over time, Lampe R and Niblett A 'The Economics of Patent Design: A Selective Survey' (2003) I.P.R.I.A Working Paper No 06/03 available at http://www.ipria.org/publications/wp/2003/IPRIAWP06.2003.pdf accessed on 17 Mac 2012.
[1342] However admit that this generalization does not differentiate between different industrial or technological sectors, Christie and Rostein, n.1338, at p.405.
[1343] Ibid, at p.406.

patent, and being longer than the optimal duration of protection; (b) the patentee has right to choose the duration of protection and the size of renewal fee increases over time; (c) the maximum duration of protection can be either increased or decreased based on case-by-case basis.[1344] Christie and Rotstein affirm the current system because the duration of protection provided is within reasonable bounds of the optimal duration of protection.[1345] Equally, the argument may be useful for nanotechnology that the maximum twenty years may be appropriate to protect and develop nanotechnology invention. It may prove to be true for nanotechnology, as for other technologies discussed above, that 50% of patents are dropped by about eight years after grant and only about 15% survive to full term, given the nature of nanotechnology that moves quickly. However, renewal rates may also prove greater for nanotechnology and many more patents survive to full term, suggesting that a maximum period of twenty years is not sufficient to protect nano-technological inventions. In this case, would SPCs be desirable? The experiences of the implementation of the SPCs may provide useful guidance.

### 6.3.1 Supplementary Protection Certificates for nanotechnology

Under the current patent system, the initial term of patent protection is four years and is renewable yearly up to a maximum of twenty years. Extra protection for up to five years may be granted for pharmaceutical products through the EU Regulation on Supplementary Protection Certificates for Medicinal Products (MPR).[1346] By granting an extra five years for pharmaceutical products, the ECJ held that this is to encourage research in the pharmaceutical products and offset regulatory delays.[1347] The introduction for the SPCs for medicinal products is also supported by the economic justification that SPCs protects.[1348] For

[1344] Christie and Rotstein, n.1341, at pp.407-408., and in (c) above they observe that the mechanism is similar to SPCs type for increasing the period, and compulsory licensing for decreasing the period,

[1345] Ibid, at p.408.

[1346] Initially by Council Regulation (EEC) No 1768/92 of 18 June 1992, now replaced by codifying Regulation (EC) 469/2009 of 16 June 2009. The question whether to increase or decrease the maximum patent term of protection is a difficult question based on the factors such as the patentees, industries and the development of the respective technology, Phillips and Firth, n.769, at p.77.

[1347] Farmatilia Carlo Erba SRL's SPC Application [1999] ECR I-5553; [2002] 2 CMLR 253; [2000] RPC 580; see also the Preamble of the MPR.

[1348] Supplementary Protection Certificates Report, Common Law Institute of Intellectual Property (1991) at p.2 (SPCs Report), at p.16 which states that *"since in practice SPC's will be applied for only for successful products, in effect they will protect successful investment and innovation. In fact, therefore, they will protect directly an economic interest protected only indirectly by the patent system".*

example in Prozac (fluoxetine), the basic patent expired in 1995, and SPCs expired in 2000 where in the UK about 80% of total sales revenues were granted during SPCs term, whereas in Germany where no SPCs were granted, the sales declined from 1995 onwards and in 1998 eleven generic versions of fluoxetine were being marketed there.[1349] Some new products are more complex and take more time to be established, developed and brought to market[1350] and this may also be true for nanotechnology.

SPCs take effect after the expiry of the basic patent term and a maximum additional five years is given on account of the procedures for pharmaceutical products to undergo testing and marketing authorisation before placing the products into the market.[1351] Therefore, the SPC is a type of *"legal instrument to compensate for the period elapsed between filing of a patent application directed to a new medicinal product and the eventual authorisation by the national authorities of the marketing of that medicinal product"*.[1352] Such processes to determine level of toxicity of a new substance, its pharmacology, biochemistry, pharmacokinetics and clinical efficacy may take longer time compared to normal inventions.[1353] This approval process affect the term of patent monopoly, that has been reduced, sometimes described as "*patent term erosion*".[1354] This general statement regarding extra time of five years given to the pharmaceutical products may provide a useful analogy for nanotechnology. Nanotechnology having unique characteristics and being a complex multidisciplinary technology may well be required to go for complex testing and marketing authorisation before placing products into the market place. For example, nanomaterials or

[1349] Huenges M and Bühler D 'Patent Term Extension' (2008) Managing I.P. 92, at p.92.
[1350] SPCs Report, n.1348, at p.2.
[1351] See for example, Davis, n.1170, at p.261; Moore J W 'Patent Term Restoration for Pharmaceutical Product in Europe: The Supplementary Protection Certificate' (1998) 14 C.I.P.R. 1387, at p.138. However, it is not an extension of patent term, but arises in its own right, Klix N and Hermann B 'Bitter Pill for the Pharmaceutical Industry' (2006) J.I.P.L.P., Vol 1. No.10, 639, at p.640; see also SPCs Report which based on the economic justification for patent system, SPCs creates a new and different kind of IP, n.1348, at p.16. However, unlike EU, in the US offers patent term extensions under 35 US §156 and regulatory bodies such as the US Food and Drug Administration offer advice to the patent office in granting patent term extensions, Hayes C 'Patent Term Extension for Enantiomeric Medicines: A Global Overview' (2012) J.I.P.L.P. Vol. 7, No.3 180, at 185.
[1352] Klix and Hermann, n.1351, at p.640.
[1353] SPCs Report, n.1348, at p.4.
[1354] Curley D 'SPCs as Targets for Litigation' C5 Presentation, 18 Feb 2009, at http://www.slideshare.net/duncancurley/c5-presentation-18-february-2009; the testing of efficacy and safety of the product can take up to 8 years that leaves the effective patent term of 12 years, Katzka C' Interpretation of the Term 'Product' in EU Council Regulations 1768/92 and 1610/96 on Supplementary Protection Certificates (2008) J.I.P.L.P. Vol. 3, 650, at p.650.

nanoparticles may have to undergo a process of testing in determining the level of its toxicity, harmful effect, or risks to the environment, or skin related problems.

Because of the administrative process of marketing and authorisation, the industries tried to urge that SPCs should be applicable to other products as well.[1355] In answering the demand, the SPC for plant products was introduced[1356] and the more recently enacted regulation on medicinal products for use in paediatrics.[1357] The regulation below provides a useful guideline in the context of nanotechnology invention. The scope of protection offered by SPCs has been explored through the meaning of 'product' which is protected.
Art 1 (a) of the MPR defines 'medicinal product' as:

> "any substance or combination of substances presented for treating or preventing disease in human beings or animals and any substance or combination of substances which may be administered to human beings or animals with a view to making a medical diagnosis or to restoring, correcting or modifying physiological functions in humans or in animals".[1358]

Art 1(b) of the MPR refers the 'product' as *"the active ingredient or combination of active ingredients of a medicinal product."*[1359]
The contentious issue which often came before the court concerns what amounts to "product."[1360] In Massachusetts Institute of Technology[1361] it was stated that this definition covers the active ingredient or combination of active ingredient and does not extend to the combination of one active ingredient with other non-active ingredient. In this case, the ECJ pointed out that *"the expression 'active ingredient' is generally accepted in pharmacology not to include substances forming part of a medicinal product which do not have an effect of*

[1355] Torremans, n.200, at p.155.
[1356] Regulation (EC) NO. 1610/96 of the European Parliament and of the Council of 23 July 1996 Concerning the Creation of a Supplementary Protection Certificate for Plant Protection Products.
[1357] Regulation (EC) No 1901/2006/ of the European Parliament and of the Council of 12 December 2006 on Medicinal Products for Pediatric Use, now incorporated into Reg 469/2009.
[1358] For a guideline of SPCs for Medicinal and Plant Product, see for example the UKIPO, Supplementary Protection Certificates: Guide for Applicants, September 2009 available at http://www.patent.gov.uk/patent/info/spctext.pdf, accessed on 15 April 2010.
[1359] Note that no guidance has been given as to the term "active ingredient", Klix and Hermann, n.1351, at p.640; this cause a problem of interpretation for the patent office, see Katzka, n.1354, p.651. The ECJ in Massachusetts Institute of Technology [2006] R.P.C. 34, at 876 states that in the absence of any definition of the concept of "active ingredient" in the MPR, the meaning and scope of those terms must be determined by their usual meaning in everyday language, citing Denmark v Commission [1988] E.C.R. 169, at 9, and P DIR International Film Srl v Commission [2000] E.C.R. I-447, at 26.
[1360] Wittkopp A 'An SPC's Filing Date May Affect It's Duration' (2008) Managing IP 177, 142, at p.142.
[1361] [2006] ECR I-4089.

*their own on the human or animal body"*.[1362] In Yissum Research & Development Co. of the Hebrew University of Jerusalem v Comptroller- General Patents,[1363] the ECJ held that the term 'product' under Article 1 of the Regulation is not intended to be decisive, but in any case the second medical use of known active ingredient is not covered under the definition. The provision has been interpreted restrictively to include only 'active ingredient' per se or combination of ingredient which have both activity (Massachusetts); and does not include the second medical use of active known ingredient (Yissum), thus preventing any artificial of non-active ingredient. It is not only the restrictive interpretation of the 'product' but it is also the conditions of obtaining SPCs which are set out under Article 3 of the MPR which states:

(i) the product is protected by a basic patent[1364] in force;
(ii) a valid authorization to place the product on the market as a medicinal product has been granted;
(iii) the product has not already been the subject of a certificate;
(iv) the authorization referred to in (b) is the first authorization to place the product on the market as a medicinal product.

All of these criteria must be satisfied, if not would be ground of invalidity under Regulation 15. In Farmitalia Carlo Erba Srl[1365] the court held that for the purpose of Article 3 of the Regulation, the product as medicinal products includes all forms of it to enjoy the protection under the basic patent, but the certification will not be granted for products that are not protected by a basic patent in force. If more than one patent covers on the product, the certificate will be granted for each of the basic patents.[1366] If the basic patent has already lapsed, the SPCs will not be granted, although the products might have some useful novel use. Takeda Chemical Industries Ltd's Applications[1367] concerned on a dispute over SPCs in term of the 'product' they are certified to cover. The issue was whether the invention and the product to be authorised are one of the same. In this case, the court held that certification cannot be granted for the combination of an anti-ulcer agent with two specific antibiotics if the patent only refers to the anti-ulcer agent. If a different use is found which is not related to the use referred in the basic patent, which may be true for nanotechnology, the certificate

[1362] [2006] ECR I-4089, at 17-18, thus preventing SPCs use for 'evergreening'.
[1363] [2007] OJ C96/19.
[1364] Art 1(c) MPR defines "basic patent" as *"a patent which protects a product as defined in (b) as such, a process to obtain a product or an application of a product, and which is designated by its holder for the purpose of the procedure for grant of a certificate"*.
[1365] [2000] R.P.C. 580.
[1366] Biogen Inc v Smithkline Biologicals SA [1996] ECR I-717, [1997] 1 C.M.L.R. 704; see also Torremans n.200, at p.152, n.15.
[1367] (No.3) [2004] R.P.C. 37.

would not be granted. The certificate will only be granted for the product which has been referred in the basic patent. This may be fatal to nanotechnology that brings a surprising result. In BASF AG's SPC Application[1368] it was held that only the active ingredient will be granted the certification and the first marketing authorisation will be considered for the product and any subsequent authorisation for the active ingredient produced by a patented improved manufacturing process cannot be the basis of the issuance of SPCs. Despite, this may cause serious weakness for nanotechnology because any subsequent authorisation for the new medical use of an active ingredient would not be considered as the first marketing authorisation. Care may need to be taken in drafting the subject-matter of SPCs for nanotechnology. In recent case, Attorney General Trstenjak has clarified the scope and substance of Article 3(d) on the first authorization to place the product on the market as a medicinal product in Neurim Pharmaceuticals (1991) Ltd v Comptroller-General of Patents[1369] based on schematic-teleological interpretation. AG gave opinion that a SPC for a product which is protected by a basic patent in force may be granted only where the first authorization which permits the product to be placed on the market as a medicinal product is within the scope of protection under the basic patent. It was observed that the fact that the same product had been authorized previously as a medicinal product for human use or a veterinary medicinal product does not preclude the grant of SPC based on a later authorization to place that product on the market as a new medicinal product, provided that the first-authorised medicinal product is not within the scope of protection conferred under the basic patent.[1370]

Potentially, nanotechnology could also be subject to stringent authorisation before the products enter into the market. This is because nano-product is still new and emerging, and its benefits and risks may not be certain yet. A 'precautionary' approach to release of products may be needed.[1371] Furthermore, research and development in nanotechnology is still not fully established, which means that a lot of time and cost would be needed. If the administrative process of authorisation for nanotechnology product to enter into the market is longer than what has been granted through the basic patent, nanotechnology may learn from

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[1368] [2000] R.P.C. 1.
[1369] Case C-130/11
[1370] Ibid, at para 73
[1371] See for example Cheyne I 'Gateways to the Precautionary Principle in WTO Law' (2007) J. Env L. 155, at pp. 171-172; and see discussion in 3.4.2.3.

the practices for SPCs especially related to nanotechnology medicinal products to compensate patentees for the effectively reduced lifetime of their patents. Of the same grounds as in medicinal products, nanotechnology may be identified for SPCs. This is because the restrictive interpretation of ‘product’ as discussed above and the strict condition to be satisfied, for example condition of the ‘basic patent’ and ‘first marketing authorisation’ suggest that the SPCs type can be extended to nanotechnology, particularly on nano-medicine without much adjustment.

## 6.4 Trade marks term of protection

Article 18 of the TRIPS provides that the registration for trade mark is renewable indefinitely and each renewal shall be a term of not less than seven years. According to Gervais, the reason why there is no time limit for trademark renewal is because the purpose of trademark is to protect the mental link between a product or service and its source of origin.[1372] The registration of trademark is renewable indefinitely if the mark continues to be used. The requirement of use to is provided under Article 19 of the TRIPS. The registration may be cancelled after a minimum of three uninterrupted years of non-use, unless the trademark owner has valid reason of obstacles to such use. The obstacles of such use include import restrictions or other government requirements for goods or services protected by the trademark and the need of approval or renewal to market the product in agri-food or pharmaceutical compound.[1373] As discussed above, this may well apply also to the products of nanotechnology.

In Malaysia section 32 of the TMA 1976, the period of trade mark registration is for a period of ten years and it is renewable. Section 42 of the UK TMA 1994 provides also the trade mark registration is for a period of ten years from the date of registration and the period is also renewable for further periods of ten years in accordance of section 43.

The term of trade mark protection renewable indefinitely is based upon the actual and genuine use. Article 5 of the Paris and Article 15(3) of the TRIPS make no compulsory for

[1372] Gervais, n.222, at p.282.
[1373] Ibid, at p.283.

the requirement of use, but nevertheless trade mark use has been referred as a means of trade mark registration. Recitals of the Trade Mark Directive[1374] states that:

> "Whereas in order to reduce the total number of trade marks registered and protected in the Community and, consequently, the number of conflicts which arise between them, it is essential to require that registered trade marks must actually be used or, of not used, be subject to revocation".

Trade mark registration may be revoked if within the period of five years after the completion of registration procedure it has not been put in genuine use in the UK and there is no proper reason for non-use.[1375] The use has been suspended for an uninterrupted period of five years and there are no proper reasons for non-use.[1376] The use of trade mark must be of genuine use. In Ansul BV v Ajax Brandbeveiliging BV[1377] the ECJ considered that "genuine use" means the actual use of the mark. Genuine use denotes use that is not merely serving solely to preserve the rights conferred by the mark.[1378] The ECJ determined that the use must be consistent with the essential function of a trade mark, which is to guarantee the identity of the origin of goods or services and to distinguish the product or service from others. The ECJ added that 'genuine use' of the mark entails use of the mark on the market for the goods of services protected by that mark and not just internal use by the undertaking concerned. In assessing whether there has been genuine use of the trade mark, the ECJ argued that regard must be made to all the facts and circumstances[1379] relevant to establishing whether the commercial exploitation of the mark is real particularly whether such use is viewed as warranted in the economic sector concerned to maintain or create a share in the market for the goods or services.[1380] But the ECJ in La Mer Technology Inc v Laboratoires Goemar SA[1381] has pointed out that when the use of trade mark serves a real commercial purpose, *"even minimal use of the mark or use by only a single importer in the Member State concerned can be sufficient to establish genuine use within the meaning of the Directive".*[1382]

[1374] First Council Directive 89/104/EEC of 21 December 1988 to approximate the laws of the Member States relating to trade marks. See also Cornish and Llewelyn, n.307, at p.728.
[1375] Section 46(1)(a) TMA 1994; Article 12 TM Directive.
[1376] Section 46(1)(b) TMA 1994; Article 10 TM Directive.
[1377] [2003] E.T.M.R. 85.
[1378] Ibid, at para 36
[1379] The circumstances include the nature of the goods or services, the characteristics of the market and the scale and frequency of the use of the mark, at para 39.
[1380] [2003] E.T.M.R. 85, at para 38.
[1381] [2004] E.T.M.R. 47.
[1382] Ibid, at para 27.

In Laboratoire de la Mer Trade Mark (No.2)[1383] it was considered by Blackburne J that limited use was not considered as genuine use.[1384] The CFI's decision in Kabushiki Kaisha Fernandes v OHIM [1385] determined that genuine use must be present in a substantial part of the territory and should exclude minimal or insufficient use and concluded that: *"genuine use must be demonstrated by solid and objective evidence of effective and sufficient use of the trade mark on the market concerned"*.[1386]

In assessing use, according to Bugge and Gregersen:

> "consideration should be given to customers, products and … the usual marketing activities. As regards the intensity of use for the purpose of complying with the requirement concerning genuine use, this will depend on the nature of the goods and services in question. The product market may be very narrowly defined so that the demand for the sales intensity of, e.g., a special alcoholic liquor is moderate as compared to usual sales".[1387]

It was observed that the concepts of use, non-use and genuine use are complex and sophisticated but requires no definition, and should be left in its own dynamic especially in the rapidly changing business where new ways of techniques of sales, marketing and commerce are developed and applied.[1388] The use must be 'serious' and slight use is insufficient.[1389] Unless there is proper reason for non-use, the mere use in order to maintain trade mark registration from revocation was insufficient to prove genuine use as considered in Re Invermont Trade Mark.[1390]

The court's decision above showed that trade mark continues to last and renewable indefinitely if proves to have use. The use must be genuine use, not merely a token use. The period of protection may also be applicable for nano-marks if the marks prove to be genuine use. The term of protection for nano-marks may be renewed indefinitely if the trade mark use indicates the connection of nano-marks with the trade mark function, as observed in Ansul's

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[1383] [2004] EWHC 2960 (Ch); [2005] F.S.R. 29.
[1384] Ibid, at para 34.
[1385] [2003] ETMR 98.
[1386] Ibid, at para 47.
[1387] Bugge J J and Gregersen P E P 'Requirement of Use of Trade Marks' (2003) E.I.P.R. 309, at 311.
[1388] Pretnar *B Use and Non-Use in Trade Mark* Law in Phillips J and Simon I (eds) *Trade Mark Use* (Oxford: OUP, 2005), at p.27.
[1389] Isaac B *Use for the Purpose of Resisting an Application for Revocation for Non-Use* in Phillips J and Simon I (eds) *Trade Mark Use* (Oxford: OUP, 2005), at p.227,n. 17.
[1390] [1997] RPC 125; see also Imperial Group v Philip Morris [1982] F.S.R. 72 where the proprietor had no real intention to use the mark, but only to maintain the registration in order to stop rival business to introduce other trade mark.

case. There is no reason for trade mark revocation of registration if nano-mark is genuine use in relation to the goods or services for the purpose of indicating of trade mark origin. However, care must be made for not granting the protection of the underlying creations similar to the shape marks, because consumer may identify a product by its distinctive shape as a result of technical feature in the product rather than its trade mark origin. Furthermore, this is to avoid the monopolisation of shape entirely because of its functional if the term of protection is too long.[1391]

## 6.5 Design term of protection

Article 26(3) of the TRIPS requires that the protection for industrial designs is minimum 10 years which is satisfied by the 10 year minimum under UK unregistered design right, albeit not fully exclusive in the last 5 years. Table 6.1 shows term of protection for unregistered design right and semiconductor chip protection in the UK.

**Table 6.1 design right term of protection**

| Law | Creation of design | Publication of design | Expiry of design |
|---|---|---|---|
| Unregistered design right (CDPA 1988) | Section 216<br>-fifteen years after recorded, or an article was made to the design<br>-ten years from the date of first sale if articles made to the design are made available for sale or hire | | -fifteen years after recorded or article made<br>-ten years from the date of first sale |
| Semiconductor Regulations | Regulation 6<br>-fifteen years recorded in a design document or made to an article<br>-another ten years from first marketing | | -fifteen years if fail to market the design<br>-25 years if succeed to market the design |

[1391]As Lord Templeman observed under Trade Marks Act 1938 in Coca-Cola Trade Marks [1986] R.P.C. 421 of the danger that the shape would become *"total and perpetual monopoly"*, at 457.

Under the UK design right, the period of protection for design right is shorter than the registered design and copyright.[1392] The period of design right is fifteen years after the design was recorded or was made to the design. Furthermore, if the article was made available for sale or hire within first five years from the end of calendar year, the period is ten years from the date of first sale. Unlike copyright, the duration of the design right is more akin to patent because its functional character is considered as an industrial property and the profit for the investment can be generated within a short period.[1393] The way to determine the term of the design right also should consider the right *"balance between the innovation (creation of a new designs) and production levels (item produced to the design)"*.[1394] Nano-creation design may enjoy the term of protection offered under unregistered design right for fifteen years from the creation of the design or ten years from the marketing of the design because the period would give some adjustment for time to create and market of the design. This term of protection suggests that there may be a real period of ten years from filing of the design.

Article 38 of the TRIPS provides for the term of protection for layout-designs (topographies) of integrated circuits. Where registration is a condition for protection, TRIPS requires the term of protection to be for ten years from the date of the filing an application for registration or from the first commercial exploitation. If registration is not required as a condition for protection, the protection for layout-designs is of not less than ten years from the date of first commercial exploitation. The member states may also provide that the protection shall lapse fifteen years after the creation of the layout design. A member states would be complying under this provision by applying the shorter of the terms, provided that the correct stating date is followed.[1395] Whereas Article 8 of the Treaty on Intellectual Property in Respect of Integrated Circuits[1396] provides for eight years term of protection for integrated circuit.

According to Regulation 6, if the owner semiconductor design fails to market his design in fifteen years, his design right expires, but if he able to market his design before fifteen years

[1392]The reason is to reflect the policy consideration that the design right should be lesser i.e. to encourage the registration simply as registered design, MacQueen et al., n.622, at p.332.
[1393] Torremans, n.200, at p.352.
[1394] Ibid, at p.352 adds that these ten years allow the continuation of the design to be created, as well as do not deprive others for the use of the design.
[1395] Gervais, n.222, at p.420.
[1396] See 5.4.5.3.

expires, he will be able to enjoy another ten years from first marketing.[1397] Thus, for example, if the design owner of semiconductor markets his article fourteen years after he first created the design, he can enjoy another ten years which is total 24 years from first creation.[1398] The term of protection of the TRIPS seems to have adopted UK unregistered design approach of ten years. Nano-creation design may enjoy the term of protection as exemplified under semiconductor chip for fifteen years of the making of the article. As argued in the interview conducted in this thesis,[1399] cycle of innovation in semiconductor chip needs time to mature, other than the existing fifteen years of protection; another ten years term of protection from the first marketing of the article may be suitable for nano-design creation.

## 6.6 Conclusion

In summary, confidentiality lasts forever provided the information is being kept secret. This may be good for protecting nanotechnology. However, confidentiality is more vulnerable term for large teams involved like nanotechnology and of reverse engineering. The patent term of twenty years is likely to be sufficient as the period under the TRIPS applicable to all inventions as "one size fits all". If the term proved to be insufficient, nanotechnology may be identified for SPCs, specifically nano-medicine. Trade mark is renewable indefinitely provided that the mark is used genuinely – to indicate the origin function of the product rather than protecting underlying creations as evidenced in shape marks. Design provides various term of protection for nano-creations and based on the discussion, the magnitude of period of protection that may be right for nanotechnology is between ten to 25 years which is involved UK unregistered design to registered design and patent plus SPCs.

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[1397] Howe, n.1198, at p.374.
[1398] Unlike in the ordinary design that would expire a year after first marketing in similar circumstances, ibid, at p.374.
[1399] Interviewee A.

# CHAPTER 7
# CONCLUSION AND RECOMMENDATIONS

This thesis has examined the development of nanotechnology, especially in two comparator jurisdictions, Malaysia and the UK, and canvassed perceptions of nanotechnologists as to its likely trajectory and as to appropriate forms of intellectual property (IP) protection. Based on these findings, together with relevant scientific, policy and legal literatures, it discussed the various forms of IP protection potentially available for nanotechnology, both those particularly stressed by interviewees and other forms. It compared the various forms of IP as regards an important aspect – their duration.

Nanotechnology can be recognised as one of the important areas of worth tackling, for being new, emerging, unique and the law is still undeveloped, especially for Malaysia. It is typified by its small scale from range of 1nm to 100nm, signifies as $10^{-9}$ and thus is a technology that can be appreciated only with the assistance of special tools. Interestingly, as size is reduced and the laws of classical physics change to the laws of quantum mechanics, the properties of given structures behave differently from macro-scale. Some creations involve adaptation of things known at macro-scale to take advantage of these effects. Many valuable creations involve things previously unknown being crafted to behave in a way previously unknown.

For this, the main questions were; can IP (including but not limited to patents) cope with this intermediate but surprisingly different zone, which cuts across boundaries between many technical disciplines? Is the balance between protection and non-protection appropriate for this scale, given the survey of the technology and its key practitioners? Or do new forms of IP have to be set up? From the analysis discussed in this study, it is evident that the existing forms of IP are sufficient to cater for the issues posed by nanotechnology. However, the discussion also proved that there are significant legal and administrative challenges which must be taken into consideration with regard to the IP protection for nanotechnology in Malaysia (in particular).

There are no special forms of IP protection for nanotechnology in Malaysia and there is greatest need to protect as the technology is emerging. This thesis has focused on the main arguments that current IP forms are sufficient to protect nanotechnology, and thus the idea of devising of sui generis protection is undesirable. Rather, it is recommended to rely on and possibly develop the forms of IP already recognised and protected at the international, regional and national level. This thesis has strongly argued that the current IPRs are indeed sufficient to govern the issues related to nanotechnology. The debates on sui generis protection for databases and computer programs show that the creation of sui generis rights gives rise to the problem in protecting those technologies, especially at the supra-national level.[1400] When new technology is introduced, it is not necessary that the new law has to be created. The important thing is that the new technology be tested in consideration of the existing law. However, it must be admitted to a certain extent that the existing laws of IP are challenged because of the unique characteristic posed by nanotechnology. This thesis identified gaps in the provisions, and certain modifications that are desirable to better protect nanotechnology in the future. Therefore, this law must be adapted in certain respect to take fully account of the legal and scientific principles of nanotechnology.

In order to do this, it has been necessary to analyse the nature of nanotechnology based on its scope and development, which required analysis from various legal and scientific understanding, as well as informed from key technologists conducted through qualitative interviews. The analysis and guidance from this thesis are hoped to provide a platform for legal framework for IP protection of nanotechnology in Malaysia. The general conclusions from the chapters will now be recapitulated.

**Chapter Two** introduced and explained the basic scientific understanding of nanotechnology in the selected jurisdiction. This chapter focused on what is nanotechnology, and how is its development important in determining the legal pattern for nanotechnology. This chapter analysed that nanotechnology cannot be discretely and uniquely defined because of its multidisciplinary and unique characteristics. It also found that, this fragmented and imprecise

[1400] See for example Diver L 'Would the Current Ambiguities within the Legal Protection of Software be Solved by the Creation of a Sui Generis Property Right for Computer Programs?' (2008) Vol.3, No.2 125, at p.137; Christie A 'Designing Appropriate Protection for Computer Programs' (1994) E.I.P.R. 486, at p.488; Aplin T 'The ECJ Elucidates the Database Right' (2005) 2 I.P.Q. 204, at p.208; see also discussion in Derclaye E *The Legal Protection of Databases: A Comparative Analysis* (Cheltenham: EE, 2008).

definition may be highly critical for the legal analysis, though less problematic for the scientific analysis. This chapter explored that to date there is little agreement of what nanotechnology is and there is no satisfactory working definition for nanotechnology. Nanotechnology has been defined according to its size range, size dependent property, function and its effect and combination of these. However, there is still no precise definition that could be adopted, which suggested that a sui generis right is impossible to frame for nanotechnology. This chapter also proved that the defining terminology would be significant to determine the scope of IPRs for nanotechnology. Thus, without clear definitional boundaries, the task of creating new sui generis rights is difficult if not impossible.

The selected jurisdictions have identified prioritised areas of nanotechnology to be developed in the future, especially in Malaysia and the UK. Although other jurisdictions may not be the main discussion under study, Australia and the US have been considered from time to time, as compared with the chosen jurisdictions, there are similarities and differences of prioritised areas, and they are also advanced in nanotechnology initiatives. Malaysia and UK are compared in their nanotechnological development. This thesis has found that both jurisdictions are having similar focused areas in health and medicine. This finding indicates that SPCs type protection may prove desirable for nanotechnology as discussed in Chapter Six. However, it was also found that there are other focused areas that differ from Malaysia and the UK, particularly molecular farming. In comparing between Malaysia, UK and Australia, it was found that other than similarities between the jurisdictions especially in health and medical areas, there are significantly different focused areas in Australia, in mining and agricultural industry. Since this thesis is only looking at the overlap areas of interest in the jurisdictions, the different areas are not covered in this thesis. These findings could be useful as subject matter of study for the future research. Prioritisation of nanotechnology in the jurisdictions showed that the sector can hardly wait for new IPRs to be devised. Furthermore, there were no evidences to show that these jurisdictions have developed separate IP protection for nanotechnology, for example the US. Although advanced in their nanotechnology development, nonetheless no sui generis right for nanotechnology has been introduced. Therefore, this strengthens the earlier contention made in this study that it is not only difficult and undesirable but also unnecessary to devise a new law.

Unlike most other current scientific and technological fields, nanotechnology is new, emerging and multidisciplinary in nature. These unique characteristics suggested that many different forms of IP subject matter are relevant for nanotechnology, not just patents, which meant discussion in this study. Furthermore, observation through the historical background and its trajectory development suggested that nanotechnology is significant for all IPRs and it has developed without a separate IP regime. The interviews with key technologists have also suggested that all IPRs are relevant for nanotechnology. These findings suggest that all forms of IP are significant and needed to be discussed in this thesis.

Reinforced from the qualitative interviews conducted in this study, and consulting through literatures, this thesis demonstrated that the most appropriate forms of IPRs for nanotechnology are breach of confidence and patents, discussed in Chapter Three and Chapter Four respectively. Other forms of IP protection are also proved to be important including copyright, trademark and design law as discussed under Chapter Five. The analysis from interviews and the technological development of nanotechnology have showed that there are strong parallels between nanotechnology and the previous technologies including biotechnology, information technology and semiconductor chip. The previous technologies, to a certain extent, share similar issues which could provide useful analogy for nanotechnology.

**Chapter Three** discussed the protection of nanotechnology by the law of confidence. The law of confidence has been regarded as the most appropriate form of protection for nanotechnology. This was evidenced from the interview analysis conducted in this study. Equitable approach for breach of confidence is judicially well established to protect nanotechnology. The law of confidence has suggested that protection of information at macro-level law is flexible and pragmatic enough to protect nano-level information. The protection provided by the law of confidence is wider to protect any confidential information, and this could include nanotechnology information which has technical value and trade secret information. Furthermore, confidentiality requires no process of registration, no limitation of the term and no difference between products and process, goods and services. Surprisingly, although TRIPS is the only instrument at the international level to protect confidential information, nevertheless there arises a common understanding at the national and international level to protect secret information, as well as the cross-border flow of information.

The quality of confidence may be developed by scientists and engineers in nanotechnology by engaging themselves in creation of research. As long as the information is not public property or public knowledge, the information is said to have the quality of confidence. Nonetheless large team of individuals in nanotechnology are less likely to maintain confidentiality, however arguments can be made that the property at macro-level and nano-level is different. This could mean that the mere availability of nanotechnology products does not necessarily mean that the confidentiality has lost, and the relevant groups who have received the information must have some interest to the information disclosed, which could involve scientists and technologists. Normally nanotechnology involves the basic research, therefore in order to secure the information before publication or applying for patent, the law of confidence is the best mechanism to protect the information.

The contractual obligation by means of express agreement or NDA is the most suitable in considering the speed of nanotechnology that moves quickly. In the absence of contractual obligation, the term can be implied based on objective test that the scientists or technologists ought to have realised that on reasonable ground, the information was imparted in confidence. Nanotechnology may adopt the integrative approach by combination of necessity test and business efficacy and purposive test to determine the obligation of confidence. Similarly, in case of employment contract, when the employment contract ends, the obligation could be made in the form of express agreement. However, the difficulty would arise in implied term as nanotechnology involved teams of people, often university personnel enjoying academic freedom, in determining types of information that belong to him or his ex-employer. If the contractual obligation is not established, the equitable principle would come to play.

The law of confidence protects unauthorised use of the information beyond of what is intended. In team of individuals like nanotechnology, third parties recipient may be made liable for breach of confidence if transmitted beyond what was intended or misused of the confidential information. This may be done within a team member itself, or between a different team.

The principles and the scope of public interest defence are examined to nanotechnology especially related to health, safety and environment risks that nanotechnology could bring. The difficulty may arise in balancing the right of disclosure and maintaining confidentiality as new technology like nanotechnology. Therefore, the balancing the interest has showed some parallel with other statutory rights in accessing the information for example in relation to personal, environmental and freedom of information. It was observed that Malaysia should have similar provision, for example in relation to freedom of information to protect fundamental liberties of the right of information especially relevant to nanotechnology.

From the interviews conducted in this study, patent law is also important form of IP protection for nanotechnology. This was observed under **Chapter Four.** This chapter highlighted that types of nano-creations are products and processes and they can be categorised as “inventions”. The practices of biotechnology, computer program and business methods have provided guidance in determining the scope of protection for nano-inventions. It also demonstrated that the current patentability requirements are tested for nanotechnology. It then set out that mere reducing the size into nanoscale does not automatically confer patentability. However, it was pointed out that nanotechnology did not only involve miniaturisation, but also the properties behave different, which could be protected. It also showed that mere down-scaling of the invention might be obvious to the person skilled in the art. Again, this could be arguable because it is not only the size that matters in nanotechnology, but also the property. It was found that since nanotechnology can be used or made in any kind of industry, the requirement of industrial applicability is less problematic. Nanotechnology could also pose risks to the environment within the concept of morality and public order. Therefore, patent offices should consider balancing the interests of the inventor, other human interests and environment. Furthermore, consideration should not only be made to the commercial exploitation, but also other aspects such as the nature of the inventions and making and using the invention whether they are environmentally damaging.

This chapter explained that difficulty in defining and multidisciplinary of nanotechnology have proved to be problematic in classifying and monitoring nanotechnology, searching relevant prior art, determining the relevant patent examiners and drafting of claims constructions. It was found that the tagging system has been developed in classifying and monitoring nanotechnology as evidenced from the EPO and USPTO. This is also significant in identifying and searching for relevant prior art for nanotechnology. This chapter explored that patent examiners could not understand nanotechnology because they are more familiarised in their own fields rather than others. This led to have team approach to overcome the unique characteristics of nanotechnology that comprises of different experts representing their own respective fields.

This chapter also considered the issue of ownership for nanotechnology inventions. It was recognised that there was difficulty in identifying the inventive concept in various disciplines involving nanotechnology. It set out that in joint ownership, it was less likely to pose problem if the parties in a team have prepared the agreement in advance to equally share the benefit arising from the research project. The agreement could also be made when it involved the different teams as the case for nanotechnology. It was examined that Malaysian law has assumed that all inventions created in the employment contract will belong to the employer. Whereas in the UK, to determine whether the employer owned the inventions or not, all are depended upon two situations provided under section 39 of the PA 1977. It demonstrated that ownership created under employment contract would vary on a case by case basis. This showed that it is significant to agree the ownership created in the employment contract under a written agreement. However, the issue became contentious for collaborative research outside the written agreement especially relevant for nanotechnology. For this, the ownership should be made clearly in the employment contract or NDA to ensure all parties had enjoyed equitable share. This chapter was essential as it examined that the provision of employee compensation scheme has proved to be less generous for multidiscipline like nanotechnology. The individuals basis of reward scheme could lead to the difficulty in identifying who actually contributed to the invention and this could also impede the development of nanotechnology.

This chapter also gave consideration to determine the patent defences and found that experimental use defence and prior user right have proved to be problematic for nanotechnology. Research tools such as carbon nanotubes, STM and AFM are important for nanotechnology development. Thus, the experimental use defence is significant to ensure that the use of the research tools did not infringe the patent. There are various approaches to implement experimental use defence including narrow, broader and flexible approach. It explained that if narrow approach is adopted, it could bar the progress of technological development and if broader approach is adopted, although it could encourage the progress of technology, but the company might prefer to use secrecy rather than patent. Thus, this study has concluded that flexible approach would be appropriate for nanotechnology considering its emerging and multidisciplinary, as well as the interest of parties involved. Prior user right has also proved to be difficult especially in determining the element of good faith for team members of nanotechnology. The effective and serious preparations are also allowed from specific geometry at macro-scale to nanoscale, but may prove otherwise if used or applied to other applications. Since nanotechnology's property behaves differently at different size, this also proved critical for the defence of prior user right based on different sizes.

It was also deemed prudent to examine the other types of IPRs (copyright, trademark and designs) that potentially relevant to nanotechnology. This was discussed in **Chapter Five**. This chapter explored the extent that the subject matters of IP applicable to nanotechnology. It discussed that at that the international attitudes towards protection of nano-creations, there was neither express exclusion nor express inclusion, which could be assumed that nano-creations could be protected in principle. This chapter explained that all of these IP subject matters may be applicable to nanotechnology, with certain difficulties.

It was demonstrated that the 'work' under copyright could include "nano-work" and mainly relevant to artistic and literary works. Since artistic works are appreciated because of visual appearance, this was found to be problematic for nanotechnology although perceptible with the assistance of imaging apparatus. It was decided in <u>Lucasfilm</u> that purely utilitarian function was not work of sculpture, and this trend of court's interpretation suggested that the same trend will be followed by the courts in Malaysia. It was further pointed out that in relation to literary works; this chapter gave response in light to the copyright for DNA. DNA molecule in literary work could provide some insightful for nano-creations. However, the contention was found to be weak except copyright may operate at nanoscale because of technical characteristic of the DNA and it was hard to prove infringement.

Chapter Five gave further consideration by exploring whether “sign” could include nano-marks. This led to examine that the word “sign” was broad enough to include marks at nanoscale. It was stated since the requirements of “graphical representation” have been tested in connection to the non-visually perceptible marks as in colours, smell and sounds; it proved that it was equally applicable to nano-marks. Furthermore, it showed that although classes of goods under Nice Classification were general, it did not mean that marks on nanoscale products are excluded. However, Malaysian law proved to be less generous to protect nano-marks because the lists of “mark” referred are having similar visual characteristics. This chapter also recognised that the shapes of nano-products are unlikely to be protected as trademarks considering the technical characteristics of nanotechnology and the problem of monopolisation of the shape.

Nowadays, the word “nano” has popularly been used in relation to products and services which gave rise the issue of descriptiveness or deceptiveness. It was further pointed out that it was difficult to establish that the word “nano” is not descriptive or deceptive because normally consumers are unable to associate “nano” with the trade origin. This chapter also considered the average consumer for nanoscale marks, consisting of various parties including scientists, technologist, lab technician etc.

**Chapter Five** also investigated whether nano-creations comprise designs, and whether non-visibility poses problems to design law. This chapter demonstrated that the requirement of “eye-appeal” has limited the scope of the protection for nano-creations under design law in Malaysia. Conversely, in the UK/EU, the protection for nano-creations could be granted, but with certain difficulties. It was observed that the difficulties arise because of complex in the design law itself, and the likelihood of the design overlapped with other IPRs. This chapter recognised there was no requirement that the design should be visible to the eye, except for parts of a complex product, both under UK registered design/Community design and UK unregistered design which has suggested that design could include nano-creations. It was also recognised that the product under registered design could exist in different forms, including nano-forms. However, since nanotechnology is identified because of its technical characteristics, the protection under registered/Community design proved to be less generous for nano-creations. Therefore, it proved critical to consider the protection under UK unregistered design right by looking at the Semiconductor Chip model. It explained that Semiconductor Chip model has proved to be successful in protecting Semiconductor Chip; it was very small enough that could reach nano-size and its internal layers has suggested for non-visibility to the eye. The conclusion of Chapter Five contributed to the unregistered design right model for nanotechnology that could be identified especially for Malaysia.

**Chapter Six** focused on the issue of whether the terms of protection under existing IP are appropriate or whether a more suitable term can be identified for nanotechnology. This section has argued the existing term of design and patent protection is adequate to protect nanotechnology, based on the magnitude between ten years to the period of 25 years in considering the newness of the technology, the fact that it moves rapidly and the need for commercialising nanotechnology effectively. Confidentiality lasts forever if the information has been kept secret by all means for example using secret code or NDA. However, complex and multiple disciplines that involve various parties in nanotechnology make it less likely to maintain secrecy. Furthermore, confidentiality has the danger of sudden loss, for example by reverse engineering.

This thesis has observed that the period of twenty years provided under the TRIPS for patents is probably sufficient for nanotechnology. The non-discriminatory term of protection for any technology provided under the TRIPS has been called as "one size fits all" is arguably sufficient to protect nanotechnology. This is because the period of twenty years is within the reasonable bounds of the optimal duration to protect nanotechnology creations. Nevertheless, another extra period of five years could be identified as provided under SPCs if nanotechnology would have to undergo period of testing and authorisation, for example in determining level of toxicity. Furthermore, new and complex technology would need an extra time to develop before bringing the product into the market. The case law proved that for the granting of SPCs, the word "product" has been interpreted rather restrictively as well as its conditions which suggested that SPCs may be identified only in relation to nano-medicine.

Trademark term is renewable indefinitely provided that the marks are in genuine use. The indefinite term relates to the function of trademark that is to associate the product or service with the trade origin. The use must be in genuine use, and this does not include the slight use or the mere use of maintaining trade mark registration. The requirement of 'genuine' is significant because the protection does not extend to the underlying creation like shape marks for its technical character. The term should not be too long for the policy consideration in avoiding monopolisation. This is equally true for nanoscale marks, which may be identified for their technical character, for example the shape of nanotubes. The shape of nanotubes should be made available to everyone to exploit.

There are various term of protection under design law comprises the period from ten years to 25 years, except for short lived design as in Unregistered Community Design, created with toys and fashion industries in mind, the term is three years. The various periods have indicated that the period of improvement of the design after its creation and the period of the prior launch of the article to the market. The magnitude of ten to 25 years would be appropriate to nano-creations in considering the nature of nanotechnology that moves quickly.

## 7.1 Suggestions and recommendations

Based on the conclusions made in this study, there are several suggestions and recommendations regarding the way in which the proposed legal framework could be better relating to IP and nanotechnology, as outlined below:

**Chapter Two:**

I. Historical background and trajectory of nanotechnology have shown that the importance to project nanotechnology development for the future. It also demonstrated that nanotechnology has developed without special IP rights, reinforced that *sui generis* right for nanotechnology is undesirable. The key milestone of nanotechnology development has identified that the duration for the development is based on magnitude.

II. Nanotechnology should be developed without special IPRs regime because law is flexible enough to cope with new technology including nanotechnology, as exemplified also in previous technologies including biotechnology and ICT.

III. Nanotechnology development under both jurisdictions, Malaysia and the UK (EU) has demonstrated that medical or health are overlapping areas, which suggested for the patent protection. The areas also illustrated that pattern of duration that could be identified under SPCs for nanotechnology. Furthermore, nanoelectronics have also been identified important areas which suggested for unregistered design right, especially for Malaysia to adopt.

**Chapter Three:**

I. This study has considered the proprietary rights in the information. It was demonstrated that both jurisdictions; Malaysia and UK have rejected the notion of proprietary analysis of the information and this has been predicted to continue in the near future. It was stated that when the contract of employment ends, it is difficult to determine the implied term, thereby preventing exchanging of ideas or free movement of the employee to another company. This has suggested that proprietary analysis by Honore' could provide sound theoretical basis, albeit not in the near future.

II. In consideration of the speed of nanotechnological development, the springboard doctrine has been identified as significant to balance the interest of the plaintiff and encourage competition.

III. Steps should have been taken by scientists or technologists to secure their confidential information by way, for example secret code, limited access, or limit to control and use of confidential information.

IV. In collaborative works involving nanotechnology, the obligation of confidence should be made in advance through contractual agreement or NDA to stipulate clearly the information should not be made or used without authorisation. In the absence of express term, the court would rely on the circumstances of a contract to imply the obligation of confidence. For being complex and multidisciplinary like nanotechnology, the court should adopt an integrative approach of combining the test of business efficacy and purposive approach in maintaining interests of the different parties involved.

V. Tort principles should be applied to the breach of confidence claims involving the conflict of laws as provided under Rome II Regulation. The Treaty should provide a framework for nanotechnology which would generally have the cross-border element.

VI. It was recognised that public interest defence relevant to nanotechnology considering for example the use of nanoparticles may have the potential risk, harm and danger to the human and environment. As the potential effect of nanotechnology is still uncertain and unknown, the principle of precautionary principles would be important for nanotechnology. The precautionary principle should be applicable to nanotechnology because there are tenable grounds that the release of nanomaterials into environment would give serious harm to the human and environment. Furthermore, the toxicity effect of nanotechnology has indicated that the negative consequence was irreversible.

VII. There are other statutory rights to access of the information in order to balance the interest of new and emerging technology like nanotechnology and at the same to preserve the interest of the public of not to expose the danger from the technology, for example under HRA, EIR and FOI. The FOI which has applied in the UK and Australia are persuasive for Malaysia to enact the same laws for nanotechnology.

**Chapter Four:**

I. There was no doubt that nanotechnology could potentially pose risk to the environment which against the principle of morality and public order. The patent office should balance the interest of the inventor against the human and environment, in consideration not only the commercial interest but also other aspects such as the nature invention. It was found that the patent office should establish the special Ethics and Public Interest Panel comprised different experts to decide whether or not the invention is against public order or morality. Malaysia should follow the practices of the UKIPO which recognised the “green” or environmental-friendly invention to be used for example nanoparticles eco-friendly applications.

II. The research has also found that the fragmented and non-satisfactory definition of nanotechnology has led to the problem of classification and monitoring system for nanotechnology. Malaysia should adopt the classifying and monitoring system developed by other patent office such as EPO, USPTO and JPO as guidelines for classification and examination purposes; and to search and locate the relevant prior art for nanotechnology. Multidisciplinary like nanotechnology, the approach of classification should be according to sub-disciplines that concerned of the technology.

III. The level of patent examiners’ knowledge of the patent office also should be upgraded and improved (for example by cross-functional expertise) to handle the issues related to nanotechnology. Given the complexities of nanotechnology, collaboration and team approach should be adopted.

IV. A centralised database of prior art should also be developed to provide database for nanotechnology prior art. This should be able to solve the problem of limited availability of prior art or to trace the scattered available prior art for nanotechnology. The examiners should get the assistance, for example, from academia and industries to locate and classify prior art; and they also can ask for the second review, for example, the UKIPO has engaged in the websites the non-binding opinions of validity and infringing invites information by publication of the cases on the websites. Malaysia should follow this move in classifying resources for nanotechnology prior art.

V. Joint ownership is very important in relation to nanotechnology. Joint inventor in the same team has shown less problematic in determining the ownership. However, when it involved different teams under the same research project, this may not be true. Thus, ownership should be agreed in advance among the parties or by way of employment contract or employee invention code. In a collaborative works of nanotechnology, the agreement should be drafted with a view that all individuals/teams enjoy an equitable share, and should be made in certainty.

VI. The issue of ownership between employee and employer is relevant to nanotechnology because the research normally starts at the university or government's laboratory. In Malaysia, the law governing the invention under employment contract has given more generous towards the employer, where it assumed that all inventions created in the employment contract belong to the employer. In contrast, the position in the UK has proved that there are two situations the invention belong to the employer provided under section 39 of the PA 1977. Thus, Malaysia should adopt to amend section 20 of the PA 1983 especially for nanotechnology because under UK law the phrase "normal duties" and "specifically assigned" in nanotechnology would vary according to circumstances in each case.

VII. Employee compensation scheme was seen undesirable for nanotechnology because the reward was granted individually, whereas nanotechnology involved team of individuals. This has demonstrated that the researcher would reluctant to share his ideas to work collaboratively and thereby impeding the technological development and provides disincentives. The statutory employee compensation scheme did not provide a good framework for nanotechnology instead contractual agreements should be given preferable.

VIII. The phrase “scientific research” under Malaysia PA 1983 is equivalent to “experiment” under UK PA 1977. The approach of deciding the acts done for scientific research as in for experimental purposes should be adopted by Malaysia.

**Chapter Five:**

I. Section 13A and 13B of Malaysian copyright law (equivalent to section 51 and 52 of the UK) has limited to protect artistic design which has been made industrially. To give generous treatment for nano-creations, Malaysia should follow the UK lead in protecting artistic design by the route of unregistered design. Furthermore, unregistered design right through semiconductor chip has protected non-visible and small scale design which could suggest being the best model for nano-design.

II. The definition of “mark” under Malaysia TMA 1976 has limited the scope of nano-marks protection because it is related to the visual characteristics of the goods and services. Thus, instead of “mark”, Malaysia should follow UK/EU to use “sign” which is wider to include nanoscale marks.

III. The word “nano” should be refused for trade mark registration if for deceptiveness because it confuses the public perception and creates uncertainty over nanotechnology. The word “nano” should freely available to anyone to use for policy consideration.

IV. “Eye-appeal” requirement under section 3(1) of IDA should be removed in order to protect nano-design.

**Chapter Six:**

I. The period of twenty years under patent is appropriate to protect and develop nanotechnology. However, it showed that nanotechnology could potentially have subjected to marketing authorisation which could suggest for SPCs type of protection. Nevertheless, because of restrictive interpretation of the "product" and strict conditions under SPCs, it has suggested that SPCs could be extended to nano-medicine without much adjustment.

II. The term of nano-marks is renewed indefinitely if proved to be genuine use. The trade mark use indicated that the consumer has associated nano-marks with trade mark origins and not merely on its underlying creations as similar to shape marks. This in particular important to avoid monopolisation of the technical characteristic of shape marks. This is because, for example, the shape of nanotubes should be made freely available.

III. The protection under design started from ten to 25 years has indicated that leeway is allowed to give for improvement of the nano-creations before the launch into the market. This thesis has concluded that the right magnitude of duration for nano-creations are between ten to 25 years which reflect the duration under unregistered design to registered design, and patent plus SPCs.

It is submitted however that further research could be useful in the promising areas of mining, agriculture and molecular farming, such as in ascertaining whether and to what extent that the plant variety rights are applicable protection for nanotechnology. Equally, the researcher would like to suggest that a future research scope and impact of compulsory licensing could also meaningfully be carried out for nanotechnology.

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# APPENDIX 1
# DOCTRINAL AND COMPARATIVE LEGAL ANALYSIS

## 1.1 Introduction of legal research

In this study, the methodological approach employs doctrinal and comparative legal analysis. This section examines the doctrinal and comparative analysis and justifies their usefulness and appropriateness for the current study.

Legal research relates to the various principles and relationship of "how the law works".[1] This is to understand the operation of the law and legal system in matters concerning the sources of law, operation of judicial precedent, equitable principles, statutory interpretation, the judicial decision making process and the relationship between domestic and international law.[2]
Kissam identifies the purpose of legal research broadly as to:[3]

(a) classify and categorise cases, statutes and other legal materials into separate legal elements;
(b) synthesis various elements of cases and statutes together into a consistent and useful legal standard or legal rules;
(c) clarify and resolve the doctrinal issue;
(d) produce teaching materials and all kinds of educational guides;
(e) understand legal doctrine or legal process by explanation of causes, analysing of consequence and interpretation of meaning; and
(f) critique legal doctrine or legal process as to whether appropriate methods are being used or whether the values are achieved.

Kissam's approach is significant in classifying, categorising and synthesising IP laws especially from Malaysia and the UK in order to identify the common rule which may be suitable for nanotechnology. In clarifying and resolving the doctrinal issues, this study examines how nanotechnology is protected under the current IPRs. However, according to (d), this is not the

[1] Stott D *Legal Research* (2nd edn) (London: Cavendish Publishing Limited, 1999), at p.1.
[2] Ibid, at pp.1-2.
[3] Kissam P C 'The Evaluation of Legal Scholarship' (1988) 63 Wash. L. Rev. 223, at pp.230-239, however admits that these purposes are complex and overlapping.

main purpose of this study to produce of teaching materials and all of educations guides, but it is hoped to have some values and practices in the future. In order to understand legal doctrine or legal process this study explains, for example the justification of the most appropriate form IPRs over the others. In analysing the consequence and interpreting the meaning, this study investigates for example what constitutes confidentiality in nanotechnology. This study also aims to critique whether the legal doctrine or legal process is appropriate for nanotechnology. Thus, the list provided by Kissam is relevant to this study and manages to validate the approach employed throughout this thesis.

This study adopts doctrinal legal research in analysing legal rules of IPRs and nanotechnology, both under Malaysian and UK law. This study also engages a comparative analysis of the law in Malaysia and UK as well as, where relevant, European laws and other international instruments. However, this wider and limited jurisdictional material may be treated as persuasive rather than authoritative. Therefore, in this study, doctrinal and comparative law are not treated mutually exclusive, but rather complement each other.[4] It is hoped that the approaches employed are able to reflect the aim of the study that is to assess the scope and development in selected legal jurisdictions in relation to IPRs over nanotechnology and to propose a legal framework for Malaysia.

### 1.2 Doctrinal analysis

Doctrinal analysis[5] tries to ask *"what the law is in a particular area"*.[6] It is a type of "black-letter"[7] rules in analysing, interpreting and clarifying of the legal rules and principles of the law.

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[4] The legal doctrinal itself plays a vital part to achieve the objective of comparative analysis, Warrington M and Van Hoecke M 'Legal Cultures, Legal Paradigms and Legal Doctrine: Towards New Model for Comparative Law' (1998) I. C. L. Q. 495, at p.522.

[5] Also known as *"traditional legal scholarship"*, Jones G *'Traditional' Legal Scholarship: A Personal View* in Birks P B H (ed) *Pressing Problems in the Law: What Are Law Schools For?* Vol. 2 (Oxford: OUP, 1996), at p.9; Dobinson and Johns in McConville M and Chui W H *Research Methods for Law* (eds) (Edinburgh: Edinburgh University Press, 2007) refer as *"theoretical legal research"*, at p.18; also called *"the definitive form of legal scholarship"*, Murphy W T and Roberts S 'Introduction' (1987) 50 M.L.R. 677, at p.677.

[6] Dobinson and Johns, n.5, at pp.18-19. This contrasts with the natural sciences research which tries to explain natural phenomena through causal relationship between variable, Chynoweth P *Legal Research* in Knight A and Ruddock L (eds) *Advanced Research Methods in the Built Environment* (West Sussex: Wiley-Blackwell, 2008) at p.30.

The formulation of legal 'doctrine' through the analysis of legal rules can be found in the primary legal materials such as statutes and cases.[8] The collection and analysis of the case law and relevant legislation are primarily important to demonstrate how the law has been developed in relation to the judicial reasoning and legislative enactment.[9] Traditionally, doctrinal analysis has been successfully applied in relation to legal analysis, legal synthesis and policy argumentation.[10] This is the prime task of legal scholars for the law to be in the future, as Lord Goff states that:

> "the prime task of the jurist is to take the cases and statutes which provide the raw material of the law on any particular topic; and, by a critical re-appraisal of that raw material, to build up a systematic statement of the law on the relevant topic in a coherent form, often combined with proposals of how the law can beneficially be developed in the future. There has thus been provided for all lawyers, practitioners and students, an established framework for the consideration of each problem as it arises".[11]

On the basis of authoritative texts of primary and secondary sources, the aim of doctrinal research is to systematise, rectify and clarify the legal rules.[12]

Doctrinal analysis plays an important role in developing legal system and has considerably been emphasised, Birks who advocates that *"traditional legal research and scholarship which criticises, explains, corrects and directs legal doctrine is still and must remain in the heart of the law school's research"*.[13] Similarly, Jones argues that:

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[7] Black's Law Dictionary defines "black-letter" as *"one or more legal principles that are old, fundamental, and well settled. The term refers to the law printed in book set in Gothic type, which is very bold and black"*; Black's Law Dictionary (9th edn) (United States: A Thomson Reuters); it *is "the black or Gothic type that was traditionally used in formal statements of legal principles or rules at the start of a section, which was typically followed by a descriptive exposition or commentary"* Salter M and Mason J *Writing Law Dissertation: An Introduction and Guide to the Conduct of Legal Research* (New York: Pearson, 2007) at p. 48, and at p.44, n.1; In emphasising the role of comparative law and black-letter rule, Örücü points out that *"traditional black-letter law-oriented (rule-based) comparative law research is normative, structural, institutional and positivistic, and would not use any approach other than the reading of statutes, cases, parliamentary debates and doctrinal works, and would regard description and identification to be the final stages of the inquiry"*, Örücü E *Methodology of Comparative Law* in Smits J M (ed) *The Elgar Encyclopedia of Comparative Law* (Cheltenham: Edward Elgar Publishing, 2006) at p.449.

[8] Chynoweth, n.6, at p.29; the doctrinal analysis is characterised by unique method of reasoning and analysis, Vick D W 'Interdisciplinarity and the Discipline of Law' (2004) J. Law & Soc. Vol. 31, No.2 163, at p.178.

[9] Dobinson and Johns, n.5, at p.19.

[10] Kissam, n.3, at p.234.

[11] Lord Goff 'Judge, Jurist and Legislature' (1987) 2 Denning L.J. 79, at p.92.

[12] McConville M and Chui W H *Research Methods for Law* (eds) (Edinburgh: Edinburgh University Press, 2007) at p.4.

[13] Birks P B H (ed) *Pressing Problems in the Law: What Are Law Schools For?* Vol. 2 (Oxford: OUP, 1996), at p.ix.

> "to dismiss doctrinal writing as expository is to dismiss the skills of synthesis, evaluation and criticism which have always been the hall-marks of leading texts and articles. It also ignores the fact that the doctrine is still the heart of English law".[14]

Therefore, according to Rhode doctrinal analysis remains the method of choice among the majority of legal scholars, because it requires no special expertise beyond what has been taught through the training of the traditional law school and this analysis has the capacity to influence and assist practitioners, judges and policy makers in drafting and implementing legislation.[15] However, Levmore claims that the doctrinal analysis requires intellectually demanding tasks by stating that:

> " the messy work product of the judges and legislators requires a good deal of tidying up, of synthesis, analysis, restatement, and critique. These are intellectually demanding tasks, requiring vast knowledge and the ability (not only brains and knowledge and judgment, but also Sitzfleisch) to organize dispersed, fragmentary, prolix, and rebarbative materials. These are tasks that lack the theoretical breadth or ambition of scholarship in more typically academic fields. Yet they are of inestimable importance to the legal system and of greater social value than much esoteric interdisciplinary legal scholarship".[16]

Thus, doctrinal research is not simply finding the correct legal rules per se, but the researcher also has to engage with the process of selecting and weighing materials based on the authoritative, hierarchical and social context of the interpretation of the legal rules.[17]

The function of doctrinal analysis is interpreting, analysing and evaluating legal rules and the legal system. Doctrinal analysis also plays a role as a basic building block of other studies such

[14] Jones, n.5, at p.11; Doctrinal analysis is still dominant mode of legal scholarship, see Posner P A 'The Legal Situation in Legal Scholarship' (1980-1981) 90 Yale L.J. 1113, at p.1113; historically, theoretical and text-based doctrinal research have been dominated the law schools in the UK, see Genn D H et al. Law in the Real World: Improving Our Understanding of How Law Works' Report Summary, The Nuffield Inquiry of Empirical Legal Research, Nov 2006, at p.4.

[15] Rhode D L 'Legal Scholarship' (2001-2002) 115 Harv. L. Rev. 1327, at p.1339; the predominant effect of doctrinal has become synonymous to the legal study, Vick, n.8, at p.177.

[16] Levmore S 'In Memoriam: Bernard D Meltzer (1914-2007)' U. Chi. L. Rev. 409, Vol 74, No. 2, at p.437; Siems views that the overriding principles which have been developed by the legal scholar require them to construct the area of law in a consistent manner, Siems M M 'Legal Originality' (2008) 28 O.J.L.S. 147, at p.153; this formulation requires rigorous analytical skill, see also Jones, n.5, at p.14; the close reasoning and greater attention to textual context are themselves involved intellectual skills, Bradney A 'Law as a Parasitic Discipline' (1998) J. Law & Soc. Vol. 25, No.1, 71, at p.76; the doctrinal legal research was always evaluative and critical, see Tiller E H and Cross F B 'What is Legal Doctrine?' (2006) Nw. U.L.Rev. Vol. 100, No.1 517, at p.518.

[17] Dobinson and Johns, n.5, at pp.21-22.

as historical of comparative studies of law.[18] The other functions of doctrinal analysis are to describe and interpret the law beyond than just merely reporting the legal rules and to systematise the law by way of reinterpreting differing concepts, rules and principles.[19]

Apart from being emphasised as important, doctrinal analysis has also received criticism for being too theoretical without a real world application, as Rhode observes that:

> "much conventional legal analysis is not done well. It exhaustively exhumes unimportant topics or replicate familiar argument on important ones. Too little effort is made to connect law to life by assessing the real world consequences of analytic frameworks. Of course to do so in systematic fashion would require significant time, money, and expertise, which is precisely what most authors of doctrinal works are happy to avoid. The result is that on many key legal issues, we are glutted with theory and starved for facts".[20]

Not only that, some criticised doctrinal analysis as *being "merely descriptive or expository, or about the dry, mechanical application of rules*".[21] Collier has criticised doctrinal analysis as *"impoverishes the questioning spirit of both law student and teacher"*[22] and as *"an intellectual strait-jacket on understanding of law and society"*.[23] It also has been observed by Bradney that doctrinal research which used to dominate the law schools through the internal evidence of the court judgements and statutes has now entered its final death throes.[24] The criticism of doctrinal analysis according to Bradney appeared in two different situations i.e. it ignores the questions outside the legal range and treats them as something less important; and it concepts are complexed and complicated without able to bridge the gap to other disciplines. [25]

Although the accepted paradigm for legal research is legal doctrinal analysis due to new sources and the types of modern research, the emphasis has shifted requiring the researcher to engage in

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[18] Vick, n.8, at n.86, pp.177-178; see also Warrington and Van Hoecke state that doctrinal forms an essential part of any legal system, n.4, at p.522.
[19] Warrington M and Van Hoecke, n.4, at pp.523-528.
[20] Rhode, n.15, at p.1340.
[21] Vick, n.8, at p.179.
[22] Collier R 'The Changing University and the (Legal) academic Career – Rethinking the Relationship between Women, Men and the 'Private Life' of the Law School' (2002) 22 Legal Stud. 1, at p.19.
[23] Ibid, at p.27.
[24] Bradney, n.16, at p.71, however claims that this statement does not mean that doctrinal analysis is no longer done.
[25] Ibid, at pp.76-78.

a wider context rather than a restrictive doctrinal research methodology.[26] The trend of legal study has now changed, not only on purely "black-letter" law, but also other important approaches such as interdisciplinary, social-legal study, empirical study, comparative study etc.[27] It has been claimed also that the doctrinal research is too narrow in its scope and application because of reference primarily on the legal text, and the non-doctrinal approaches represent the broader approach taken into consideration of methods from other disciplines such as social sciences and humanities.[28]

The doctrinal analysis of legal rules is crucial for legal research and it continues to pervade legal research. This study is no exception and adopts the doctrinal analysis and approach. In relation to the IP protection for nanotechnology, the critical analysis has been engaged in analysing the appropriate and adequate legal rules protecting nanotechnology. However, the doctrinal analysis may not be able to satisfy all the questions relevant to IP protection for nanotechnology, as reflected from the criticisms of doctrinal analysis noted above and as Hutchinson's view that the researcher should be able to understand, appreciate and critique different available methodologies to build a more academic and critical view of law.[29] For this reason, this study does not attempt to treat doctrinal analysis in isolation or as the only important method for legal research but comparative analysis between Malaysian and the UK law will also be given consideration. This is because as Warrington and Van Hoecke argue doctrinal analysis provides groundwork and insights for the comparatists to reconstruct the legal landscape.[30] On the basis of

[26] In addition to the doctrinal methodology, the legal researcher may engage in social science research such as qualitative and quantitative, comparative research, case studies, benchmarking and content analysis, Hutchinson T 'Developing Legal Research Skills: Expanding the Paradigm' (2008) 32 Melb. U. L. Rev. 1065, at pp.1082-1084; and, at p.1094.
[27] For an extended discussion of different types research in law, of not promoting or discrediting one after another see Siems, n.16 above; see also the discussion of legal research relationship at the core of humanities such as classic, history, philosophy and political theory in McCrudden C 'Legal Research and the Social Sciences' (2006) L. Q. R. 632; For an interesting exposition benefits of interdisciplinary approaches see Vick, n.8 above; for a good consideration of interdisciplinary legal scholarship, and why it develops rapidly and what future it may hold, see Posner R A 'Legal Scholarship Today' (2001-2002) 115 Harv. L. Rev. 1313; For a useful observation of the empirical legal research which is increasingly important for the policy makers, the judiciary, academics, practitioners and law reformers, see Genn, n.14 above.
[28] McConville and Chui, n.12, at p.5; See also Hutchinson T C and Burns K 'The Impact of "Empirical Facts" on Legal Scholarship and Legal Research Training' (2009) The Law Teacher, 43(2) 153, state that doctrinal legal research has never been taught explicitly to the legal researcher within the traditional legal territory, at p.161.
[29] Hutchinson, n.26, at pp.1086-1087.
[30] Warrington and Van Hoecke, n.4, at p.522.

historical and technological perspective, this study is trying to look at the scientific and legal principles underpinning nanotechnology in response to earlier technologies.

### 1.3 Comparative legal analysis

There is no decisive meaning of what might be considered as comparative law and comparative method.[31] Several attempts have been made to define the term comparative law and its method. Some scholars refer as the process of comparing legal system – Zweigert and Kötz, for example advocate that comparative law involves *"an intellectual activity with law as its object and comparison as its process"*.[32] Similarly, Gordley refers it as a process of comparing the law of different legal systems;[33] and De Cruz defines comparative law as a systematic study of the legal rules which seeks to compare two or more legal systems, legal traditions, or institutions as a method of comparing legal systems which produces results on the legal systems being analysed.[34] Some other scholars place emphasis on similarities and differences, for example Jansen claims that comparative law is a special legal subject which explores the similarities and differences of different cultural and social phenomenon.[35] Dannemann also demonstrates that *"comparing legal systems involves at least to some degree exploring both similarities and differences"*.[36] Husa notes that comparative study *"concern those who seek similarities, those*

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[31] Örücü E *Unde Venit, Quo Tendit Comparative Law?* in Harding A and Örücü E (eds) *Comparative Law in the 21st Century* (London: Kluwer Academic Publishers, 2002) at p.1 and admits that comparative law is a distinct subject on its own right, at p.4; see also comparative law has been perceived as a discipline and an independent subject in its own internal structure, see Samuel G 'Comparative Law and Jurisprudence' (1998) 47 Int'l & Comp. L. Q. 817, at p.817; but see different view by Gutteridge which emphasises that comparative law is a study and research in law, and not a distinct branch of law, Gutteridge H C *Comparative Law: An Introduction to the Comparative Method of Legal Study and Research* (Cambridge: CUP, 1946) at p.1. Gordley J 'Is Comparative Law a Distinct Discipline?' (1998) 46 Am. J. Comp. L. 607 states that comparative law is not a distinct disciplines, at p.607; Palmer V V 'From Lerotholi to Lando: Some Examples of Comparative Law Methodology' (2004) Global Jurist Frontiers, Vol. 4, Issue 2, 1 emphasises that comparative law is only a method and not a substantive body of knowledge, at p.2.

[32] Zweigert K and Kötz H *Introduction to Comparative Law* (2nd edn) (trans. Weir T) (Oxford: Clarendon Press, 1998), at p.2 add that should put extra dimension of internationalism, that is comparative of different legal system of the worlds rather than comparison of different rules in a single legal system; Örücü, n.31, disagree with this definition, states rather *"circular and vague",* at p.1.

[33] Gordley, n.31, at p.607.

[34] De Cruz P *Comparative Law in a Changing World* (London: Routledge and Cavendish, 2007) at p.232 and at p.4; see also Palmer, n.31, at p.2.

[35] Jansen N *Comparative Law and Comparative Knowledge* in Reimann M and Zimmermann R (eds) *The Oxford Handbook of Comparative Law* (Oxford: OUP, 2008), at p.306.

[36] Dannemann G Comparative Law: Study of Similarities or Differences? In Reimann M and Zimmermann R (eds) *The Oxford Handbook of Comparative Law* (Oxford: OUP, 2008), at p.384; see also Schlesinger R B 'The Past and

*who stress differences; those interested in western law, those interested to non-western law; those who are generalists and those who are country-specialists".*[37] Some include international dimension, for example Rheinstein discusses that *"comparative law has something to do with world outside of our own country, ... that it is concerned with law as a supra-national phenomenon".*[38] Similarly, Sacco explains that *"comparative law examines the way in which legal institutions are connected, diversified and transplanted from one country to another*".[39] Likewise, Wilson argues that comparative law provides advantageous for future development of the national legal systems.[40] Furthermore, as pointed out by Green comparative law provides special significance for the international lawyer.[41]

The growing interest for comparative legal research has become increasingly important. There is a large volume of studies describing the significance of comparative legal research. For example, Koopmans claims that the twenty-first century may be considered as the era of comparative methods and explains that:

> "Over the least ten or fifteen years the legal climate seems to be changing. There is more awareness that comparative methods may lead the lawyer somewhere, and that comparative materials may be a source of inspiration for legal decisions – whether by legislative bodies or by the courts. This evolution may be influenced by the process of European integration; it may also just result from the fact that we are living closer together (the "global village" situation); it may, finally, be an autonomous process, occasioned by the lawyer's search for fresh perspectives, in particular when completely new legal problems are to be solved".[42]

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Future of Comparative Law' (1995) 43 Am. J. Comp. L. 477 who states that *"to compare means to observe and to explain similarities as well as differences"*, at p.477.

[37] Husa J 'About Methodology of Comparative Law – Some Comments Concerning the Wonderland…' Maastricht Faculty of Law Working Paper 2007/5 downloadable via http://ssrn.com/abstract=1085970, visited on 12 January 2009, at p.5.

[38] Rheinstein M 'Comparative Law – Its Functions, Methods and Usages' (1968-1969) Ark. L. Rev. Vol. 22, No.3, 415, at p.415.

[39] Sacco R 'Legal Formants: A Dynamic Approach to Comparative Law (Installment II of II) (1991) 39 Am. J. Comp. L. 343, at p.388.

[40] Wilson G *Comparative Legal Scholarship* in McConville M and Chui W H *Research Methods for Law* (eds) (Edinburgh: Edinburgh University Press, 2007), at p.87.

[41] Green L C 'Comparative Law as a "Source" of International Law' (1967-1968) Tul. L. Rev. 52, at p.54, further explains that this purpose could be served by allowing him to seek a common rules of the local law and this form a basis for the international unification; in term of the universal concept of justice, it avoids lacunae for the court to decide upon international disputes; and in term of the development of the legal rules, it provides the general principles of laws with the aim of clarifying the existing law or allow the existing law to adjust to new social conditions, at p.66.

[42] Koopmans T 'Comparative Law and the Courts' (1996) 45 Int'l & Comp. L. Q. 545, at p.545.

Legrand also highlights the same contention that *"it is apt to say that Europe, or at least the Europe of the European Union is currently experiencing a comparative moment"*.[43] It is also worth observing Lord Goff's view on this that *"comparative law may have been the hobby of yesterday, but it is destined to become the science of tomorrow. We must welcome, rather than fear, its influence"*.[44] In addition to this, the growing interest in comparative study is witnessed over the last ten years, a period in which the number of article on comparative law has quadrupled.[45]

The main aim of comparative law is to acquire knowledge of different rules at comparison[46] that comparative legal research goes beyond the theoretical context.[47] The comparative method has considerable value and is of practical significance in assisting the court to fill the gaps in the legislation and case law or in matters that are not covered by statute or case law.[48] Furthermore, comparative legal research provides a greater range of solution because of different systems that are compared; in comparison to the analysis of a single legal system.[49] As far as the international dimension is concerned, comparative legal research facilitates in the discovery, elucidation and application of the *"general principle of law"* for the national and international courts to apply.[50] The comparative analysis also acts as a tool for the researcher towards universal theory of law, and to achieve international unification and harmonisation of the law.[51] This means that the investigation of the knowledge from other countries assists the researcher in better understanding the functions of the rules and principles of the law.[52]

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[43] Legrand P 'How to Compare Now' (1996) 16 Legal Stud. 232, at p.232.
[44] Lord Goff of Chieveley 'The Future of the Common Law' (1997) 46 Int'l & Comparative L. Q. 747, at p.748.
[45] Örücü, n.31 at p.2.
[46] Zweigert K and Kötz, n.32, at p.15; see also Sacco, n.39, at pp.4-6.
[47] Legrand, n.43, at p.233.
[48] Gutteridge, n.31, at pp.37-40; De Cruz, 34, p.21; Wilson, n.40, at p.88. In observing gaps of the law, according to Dannemann is like a blind spot in the eyes, which is very difficult to detect from within, unless such blind spot is compared with other system, n.36, at p.416-417. This is because comparative law is considered as blue prints models for legal reasoning and also models of law reform for better understanding of changing concepts, Örücü, n.31 at p.14.
[49] Zweigert and Kötz, n.32, at p.15.
[50] De Cruz, 34, at p.25.
[51] These objectives sometimes have been categorised as practical, sociological, political, or pedagogical, Örücü, n.31, at p.2, at n.7; see also Sacco, n.39, at pp.2-3.
[52] This aids the courts as a method of construction and interpretation of the disputed subject matters, Örücü, n.31, at p.14.

One of the most significant discussions among scholars is the right approach for comparative method. Zweigert and Kötz advocate a "functionalist" approach[53] which suggest that in comparing individual legal systems or groups of legal systems *"comparatist must strive to grasp these legal styles"*, and the factors which crucial to legal styles include historical background and development; characteristic mode of thought in legal issues; type of legal sources and the way to handle them and ideology.[54] Husa examines that the functionalist approach for comparative law should not be limited to the written law only, but should be prepared to consider a larger cultural, social, economic and ideological issues as a whole.[55] However, the functionality approach has been refuted by Palmer on the basis that one may not necessarily be interested to explore the function of the legal rules and principles, but instead it is only to understand, preserve and trace the evolution of another law.[56]

On the other hand, Palmer strongly suggests that comparative law should expand more on a practical level and submits that the strategies for comparative methodology should be viewed pragmatically, especially on the law in action and not merely the law in the book.[57] Palmer concludes that the best approach should be concerned, for example the specific purposes of the research.[58]

Similar to doctrinal analysis, comparative analysis has also received many criticisms. Gutteridge, points out that it is difficult for the comparative process to take place because comparative law employed broad areas and it tended to serve many purposes[59] Glendon describes *"the problem*

[53] *"the basic methodological principle of all comparative laws is that of functionalist",* n.32, at p.34.
[54] Zweigert and Kötz, n.32, pp.67-68 (emphasis in the original).
[55] Husa, n.37, at pp.8-9.
[56] Palmer, n.31, at p.23, further argues that to claim functionality as a basic method for comparative law is actually an artificial restriction on the scope of one type of comparison over the other, at p.24.
[57] Ibid, at pp.33-34; see also Rheinstein states that comparative law is intellectually challenges and "a field of practical utility" n.38, at p.424.
[58] *"it cannot be a single exclusive method that comparative law research should follow. The tasks of teaching, research of law reform, or historical investigation are too varies and contingent to be achieved by a single approach. It would be a serious blow if all matters had to be analysed from one angle or perspective, or treated with the same detail and depth, or prepared to the same degree or in the same way",* n.31, at p.29.
[59] Gutteridge, n.31, at p.72; see also Legrand notes that *"before we talk about method, we need to know what is the point of the whole enterprise"*, Legrand 'John Henry Merryman and Comparative Legal Studies: A Dialogue' (1999) 27 Am. J. Comp. L. 2, at p.50; see also Leyland *"important to consider first what we are trying to achieve by undertaking comparative work"*, Leyland, *Oppositions and Fragmentations: In Search of a Formula for Comparative Analysis* in Harding A and Orucu E (eds) *Comparative Law* (Cheltenham: Edward Elgar Publishing, 2006), at p.221.

*of comparative law is one word "context" – to understand legal rule in any system, one must have some understanding of its social and economic background and its practical consequences in operation".*[60] She further emphasises that to compare means that one should go beyond comparing the rules as she points out that:

> "no matter how carefully limited the scope of project may be, one runs the risk of missing real functional similarities and differences unless one compares not only the rules themselves, but their social context and the manner in which they actually operate within their surrounding legal system".[61]

Legrand, queries on the basis the limit of comparison by asking that *"where law begins and where it ends and to what extent the contextual element ought to be pursued"*.[62] On the other hands, Glendon lists the problems of comparison in determining the subject matter of comparison, the validity of comparison, the efficiency of one model legal systems from the other legal systems and the policy consideration of the legal systems may not be similar.[63] The differences of language and uncertainty of the legal terminology are also the obstacles that comparatist encounters throughout the process of comparison especially when the foreign law is not given a proper definition.[64] The lack of rich intellectual range is one of the problems of comparative analysis, because comparatist fails to appreciate the comparison beyond a mere description of the legal rules.[65] Other than these obstacles, *"legal transplant"*[66] may also be perceived as one of the problems of comparative law. The relationship of comparative law and legal transplants has been recognised and explained by De Cruz:

> "comparative law remains useful and challenging enterprise that provides the methodological basis for identifying, interpreting and evaluating legal transplants; it thereby provides a vital step towards a

[60] Glendon M A *State, Law and Family: Family Law in Transition in the United States and Western Europe* (Amsterdam-New York-Oxford: North-Holland Publishing Company, 1977), at pp.17-18.
[61] Ibid, at pp.17-18; This has also been suggested by Legrand to look beyond a mere legal rules where states that *"the danger of superficial comparison that overlooks the socio-cultural or the socio-historical context have been demonstrated by reference to examples that might suggest that deeper comparative inquiry is essential to avoid serious misconceptions",* n.43, at p.235; see also Leyland, n.59, at p.221.
[62] Legrand, n.43, at p.234.
[63] Glendon, n.60, at p.18.
[64] Gutteridge, n.31, at p.119; see also Leyland states that *"at practical level the translations of terminology can present a formidable obstacle"*, n.59, at p.215.
[65] Legrand, n.43, at pp.233-234; see also Leyland, n.59, at p.220.
[66] Watson refers "legal transplants" as *"the moving of a rule or a system of law from one country to another, of from one people to another. – have been common since the earliest recorded history",* Watson A *Legal Transplants* (Edinburgh: Scottish Academic Press, 1974) at p.21; *"at most times, in most places, borrowing from a different jurisdiction has been principally way in which law has developed",* Watson A *Society and Legal Change* (Edinburgh: Scottish Academic Press, 1977), at p.98. Other terminology for legal transplants is *"legal transposition",* Örücü, n.31, at p.13; *"borrowing and imitation"*, Sacco, n.39, at p.394.

deeper and more understanding of the cross fertilisation of ideas across different jurisdictions, legal systems and cultures".[67]

Nevertheless, the importance of legal transplants has been emphasised as *"the most fertile source of development"*[68] and *"borrowing and imitation is therefore of central importance to understanding the course of legal change"*.[69] It is also importance to find a quick answer to similar legal problems[70] or having similar economical development between the countries.[71]

Comparing the laws means that it is necessary to look at other legal systems, however as warned by Lepaulle careful consideration should be observed when there is legal transplantation.[72] This is because as Shah illustrated the moving of legal rule from one place to the other as advocated by Watson seems not to consider the role of the culture of the "sending" or "receiving" society.[73] Fedtke notes certain difficulties that may occur when legal transplantation takes place such as to determine the types of law concerned, the extent to which legal transplantation takes place, the translation of the foreign language and the technical aspects of applying the new rules to the existing rules.[74] Legal transplantation may also be perceived as problematic because the lawyers failed to tackle the complexities of the law.[75]

In utilising a comparative analysis in this thesis, this study does not intend to follow any particular comparative approach, but rather analyse more flexibly and adopt contextual or practical analysis whenever deemed appropriate. This accords with Husa who emphasises that there should not be one method or approach, but comparatists should adopt many methods and

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[67] De Cruz, n.34 at p.119. See also "importance of "legal transplant" is central theme in current comparative law Schlesinger, n. 36, at p.13.
[68] Watson, n.66, at p.21.
[69] Sacco, n.39, at p.394; the same view that it is common situation of transferring one legal system to the other, and legal transplant has become the sources for legal change, Wise E M 'The Transplant of Legal Patterns' (1990) 38 Am. J. Comp. L. Supp. 1, at p.5.
[70] Atar N 'The Impossibility of a Grand Transplant Theory' (2007) Ankara Law Review Vol. 4, No. 2 177, at p.195
[71] Kahn-Freund O 'On Uses and Misuses of Comparative Law' (1974) 37 M.L.R. 1, at p.23.
[72] Lepaulle 'The Function of Comparative Law' (1922) 35 Harv. L. Rev. 838, at 839; see for example criticism of legal transplantation in Legrand P 'European Legal Systems are not Converging' (1996) I.C.L.Q. 52, at p.79.
[73] Shah P 'Globalisation and the Challenge of Asian Legal Transplants in Europe' (2005) S.J.L.S. 348 at p.348.
[74] Fedtke J *Legal Transplants* in Smiths J M (ed) *The Elgar Encyclopedia of Comparative Law* (Cheltenham: Edward Elgar Publishing, 2006), at pp.435-436.
[75] Comments on case Soo Boon Siong @ Saw Boo Siong v Saw Fatt Seong & Soo Hock Seang [2005] 5 M.L.J. 129 (High Court); [2008] 1 M.L.J. 27 (Court of Appeal), Salim M R 'Are Legal Transplants Impossible' (2009) Journal of Comparative Law, downloadable at http://ssrn.com/abstarct=1444684, at p.1, visited on 27 April 2010.

approaches that are contingent to the purposes of their research.[76] Since comparative legal study seeks to explore similarities and differences of the subject matters it will be advantageous for Malaysia because it has already shared the legal historical background with the UK.[77] From the perspective of IP protection in Malaysia, the earlier laws enacted were closely linked to the law in the UK. For example, before the introduction of the indigenous Malaysian Patent Act 1983 (PA 1983)[78], there were four pieces of laws governing patent system: the Registration of United Kingdom Patents Act 1951 for the Federation of Malaya; the Patents Ordinance for the State of Sarawak; the Registration of United Kingdom Patents Ordinance 1937 for the State of Sabah and the Patents (Rights of Government) Act 1967. This provides a good basis of comparative analysis of IP laws between Malaysian and the UK law. Similarly, before the introduction of the Malaysian Industrial Design Act 1996 (IDA 1996),[79] industrial designs were protected under different statutes: the United Kingdom Designs (Protection) Act 1949 for West Malaysia; the United Kingdom Designs (Protection) Ordinance for the State of Sabah; the Designs (United

[76] Husa, n.37, at p.18, further explains that it would be more useful if comparatists define concretely the idea of flexible methodology.

[77] The reception of English law to Malaysia has been made through the section 3 and section 5 of the Civil Law Act 1956. Section 3 reads as follow:

(1) Save so far as other provision has been made or may hereafter be made by any written law in force in Malaysia, the Court shall –
    (a) in Peninsular Malaysia or any part thereof, apply the common law of England and the rules of equity as administered in England on the 7 April 1956;
    (b) in Sabah, apply in common law of England and the rules of equity, together with statutes of general application, as administered or in force in England on 1 December 1951;
    (c) in Sarawak, apply the common law of England and the rules of equity, together with statutes of general application, as administered or in force in England on 12 December 1949, subject however to subparagraph 3(ii);

Provided always that the said common law, rules of equity and statutes of general application shall be applied so far only as the circumstances of the States of Malaysia and their respective inhabitants permit and subject to such qualifications as local circumstances render necessary

Section5 reads:

(1) In all questions or issues which arise or which have to be decided in the States of Peninsular Malaysia other than Malacca and Penang with respect to the law of partnerships, corporations, banks and banking, principals and agents, carriers by air, land and sea, marine insurance, average, life and fire insurance, and with respect to mercantile law generally the law to be administered shall be the same as would be administered in England in the like case at the date of the coming into force of this Act, if such question or issue had arisen or had to be decided in England, unless in any case other provision is or shall be made by any written law;

In all questions or issues which arise or which have to be decided in the States of Malacca, Penang, Sabah and Sarawak with respect to the law concerning any of the matters referred to in subsection (1), the law to be administered shall be the same as would be administered in England in the like case at the corresponding period, if such question or issue had arisen or had to be decided in England, unless in any case other provision is or shall be made by any written law.

[78] Act 291, as amended in 1986 and 1993. The similar historical legal connection is also shown in industrial design and trade marks laws.

[79] Act 552.

Kingdom) Ordinance for the State of Sarawak.[80] Another example concerns trade mark law. Before the Trade Marks Act 1976 (TMA 1976)[81] came into effect, there were also different laws governing the trade marks: Trade Marks Ordinance 1938 for Straits Settlements which was closely modelled on the UK Trade Mark Act 1938; Trade Mark Ordinance 1950 for the Federation of Malaya; Trade Mark Ordinance 1949 for Sabah and Trade Mark Ordinance for Sarawak.[82] These examples provide a good basis of comparative analysis of IP laws between Malaysian and the UK law.

Other than the legal historical development, this study also examines the historical development across the technology. One of the methods was conducted by employing the qualitative interview between Malaysian and the UK key scientists. This study also investigates similarities and differences issues between nanotechnology with the previous technology, such as biotechnology and semiconductor chip and how the previous technological issues could be potentially relevant to nanotechnology. Both similarities and differences are also useful from the international perspectives. Other than comparing between the two legal systems (Malaysia and UK), the international treaty which is mostly relevant throughout the thesis is the Agreement of Trade-Related Aspects of Intellectual Property Rights 1994 (TRIPS). The comparative legal study also examines the approaches adopted in other Commonwealth countries for instance, Australia.[83] Thus, both similarities and differences either in terms of the legal or technological development between Malaysia and the UK jurisdiction, as according to Dannemann yields the best result when the researcher balances between discovering the common features and detecting contrasting features.[84] Moreover, the newly developing legal areas like Malaysia are inevitably concerned to adopt a more matured legal system like UK.[85] Whilst technological and economic developments in the UK are more advanced, however, both may share similar technological cycle although to some extent they may not be identical. Thus, the historical and technological

[80] For a general introduction of the historical background of industrial designs law in Malaysia, see for example Abdul Jalil J *Industrial Designs Law in Malaysia: Cases and Commentary* (Petaling Jaya: Sweet & Maxwell Asia, 2004), pp.1- 9.
[81] Act 175, as amended in 1994 and 2000.
[82] For an extensive discussion of the historical background of the trade marks law in Malaysia, see for example Kwang T B *Trade Mark Law and Practice in Malaysia* (Kuala Lumpur: Butterworth Asia, 2001) at Chapter 1.
[83] See Chapter 3 specifically relevant discussion for breach of confidence and nanotechnology on the basis of common law approach, judgment and cases from Australia will be treated persuasive.
[84] Dannemann, n.36, at p.401.
[85] Zweigert and Kötz, n.32, at p.41.

development as the basis for "transplants" between both systems, suggest that in the future the "transplants" could thrive in either way (from UK to Malaysia or Malaysia to UK).

The technique of comparing both similarities and differences is significant as part of an effort to improve legal rules which have been recognised as a problem by referring how other systems have solved the same problems.[86] The technique suggested by Zweigert and Kötz will be relevant to this study. In applying the technique in this study, the question is whether IP law relevant to nanotechnology creations has been successfully established in the UK; and followed by whether, the models law adopted from the UK could potentially work in Malaysia. In applying the second ~~questions~~, all the relevant context of Malaysia should be taken into consideration. These two questions are likely to be answered if, as quoted from Dannemann, the

> "unifying legal rules makes sense only if the problems experienced by the legal systems involved are at least roughly similar, and unification is more easily justified if the rules in the different systems involved produce identical or at least similar results".[87]

Despite these advantages, comparative approach may be criticised, for example the propriety of legal transplantation that is, of recommending imposing a law from one country into another. In applying and receiving a law from another country, there may occur incidents of less likely to consider the differences of culture, social, political and economy context of the receiving country.

Despite the difficulties in comparative law, it is nevertheless an importance tool for a better development, amendment and modification of the laws. The legal researcher plays a crucial role in examining and interpreting the function of the legal rules and principles.[88] Furthermore, the comparative legal analysis is significant when the law in one country is still new or rather non-existent, like Malaysia, to adopt the legal rules which has been established in other country, like UK particularly in the areas of IP protection for nanotechnology.

### 1.4 Interview technique

[86] Dannemann, n.36, at p.403.
[87] Ibid, at p.402.
[88] According to Palmer all lawyers by nature are comparatists, when they look, differentiate and deduce of the legal point, n.31, at p.1.

The interviews were combined with other methods of equipping the researcher with important technology and upcoming legal issues. A period of literature study and attendance at a conference in Leuven[89] which reported on the progress of an extensive EU funded programme and presented the views of scientific and legal experts for the US and Australia, as well as EU member states were undertaken. This combination of approaches enhanced the technical level of dialogue during interviews, thus optimising their effectiveness. The combined programme also facilitated a critical approach to the content of conferences and interviews (Table 1.1). This integrated approach of programme and interviews has worked successfully and interviewees' responses have been valuable to inform legal analysis and recommendations.

**Table 1.1: Approach of qualitative methodology**

| **Schedule** | |
|---|---|
| Activity | Date |
| Reading the scientific literature, under guidance of Prof Emeritus Peter Jones | Continuing until 2009 |
| Interview A | 3 June 2008 |
| Interview B | 25 September 2008 |
| Leuven Conference – Nanotechnology and the Law: The Legal Nitty-Gritty for Nanofoods, Nanocosmetics and Nanomedicines | 8 and 9 December 2008 |
| Interview C | 21 April 2009 |
| Interview D | 28 April 2009 |

### 1.4.1 Justification for qualitative interviews

From the interviews it was hoped to gain some insight into nanotechnology both under Malaysian and UK scientific development and legal jurisdiction as well as to equip the

[89] Conference on "Nanotechnology and the Law: The Legal Nitty-Gritty for Nanofoods, Nanocosmetics and Nanomedicines", Katholieke Universiteit, Leuven, 8 – 9 December 2008.

researcher with the scientific background and identify relevant legal issues of the technology. This is particularly important for new subjects because, as Stedward notes interviews may provide contemporary data on subjects which have not been thoroughly studied elsewhere or in which accessible literatures is still limited.[90] It is also a greater informative experience for the researcher to be able to observe the attitude of the interviewees to supplying the information which could be helpful in order to evaluate the information supplied.[91] The interview is flexible and encourages the researcher to probe any question or to follow up any questions which are relevant to the study or to turn back to the questions which need further clarification. Another reason for undertaking interviews was that it may provide the opportunity to motivate the interviewee to give accurate and complete information immediately.[92] Moreover, the opportunity is provided in the interview to guide the interviewee to interpret complex and abstract issues in the questions.[93]

The privilege of the interview however is balanced by certain disadvantages. For example, other considerations need to be taken into account, not only the time consumed[94] and the higher cost, but also the preparation for an interview, obtaining and setting up the interview, writing up the transcription and the notes as well as analysis of the content.[95] This can also be very difficult from one interview to another because of different situations and variables, for example, it all depends on the speed of the speech, clarity, pacing, complexity of vocabulary, accents of the interviewer or respondents, background knowledge and technical skill.[96] In this study, interviews were conducted with comparatively few key figures with a view to gaining expert insights into the field as well as optimising resources and minimising disadvantages, given the need to balance qualitative and doctrinal aspects of the thesis.

### 1.4.2 The objectives of the interview

[90] Stedward G *On the Record: An Introduction to Interviewing* in Burnham P (ed) *Surviving the Research Process in Politics* (London: Printer, 1997) at p.151. At the outset of the research, legal analysis of nanotechnology issues was scarce and rather superficial in the published literature.
[91] Gorden R L *Interviewing: Strategy, techniques and Tactics* 3rd edn (Illinois: The Dorsey Press, 1980) at p.62.
[92] Ibid, at p.61; in contrast for example to a postal questionnaire.
[93] Ibid, at pp.61-62.
[94] Especially on the transcription of the interview, writing and translation if the interview conducted in a language other than English.
[95] Stedward, n.90, at p.152.
[96] Gorden, n.91 at p.223.

The use of interviews can be challenging and informative, but acts as a vehicle for bringing the research topic to life.[97] This type of qualitative research allows for greater expression and insights of the information than a self-completion questionnaire[98] and other non-face-to-face techniques[99] because people may talk and present their perspective in their own terms freely.[100] The same submission espoused by May, that conversations with people on a range of topics generate rich insights on issues such as biographies, experiences, opinions, values, aspirations, attitudes and feelings.[101] Thus, the aim of these interviews was to provide some insights for the researcher in analysing legal aspects along with confirming and augmenting scientific understanding of the technology[102]. Gorden contends that the purpose of the interview should be explained in a manner that the respondent understands because if the explanation is too narrow or too vague the respondent may not appreciate or connect the questions with the purpose of the interview.[103]

To make the process of interviewing successful, Harrison emphasises four basic requirements:[104]

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[97] Stedward, n.90, at p.151. The interview is referred as a tool of research by way of intentionally learning other's feelings, thoughts and experiences, Rubin H J and Rubin I S *Qualitative Interviewing*: *The Art of Hearing Data* (London: Sage Publications, 1995) at p.2.

[98] Because no one present to clarify any difficulty to respondents and having no opportunity from respondents to elaborate the point asked, see further in Bryman A *Social Research Methods* 3rd ed (Oxford: OUP, 2008) at pp. 218-219. Gray D E *Doing Research in the Real World* (London: SAGE Publications, 2004) states that interview approach is favoured where (a) need to acquire high personalized data; (b) having opportunity for probing; (c) a highly response rate, at pp.214-215. Bell J *Doing Your Research Project: A Guide for First-Time Researchers in Education, Health and Social Science* 4th edn (Berkshire: Open University Press, 2005) points out that adaptability in interview means that *"a skilful interviewer can follow up ideas, probe responses and investigate motives and feelings, which the questionnaires can never do"*, at p.157.

[99] For example survey and observational methods. Jones contrasts qualitative interview and survey interview as less structured in their approach and allowing individuals to expand beyond *'yes'* and *'no'* responses which are more common in case of survey interviews, Jones C *Qualitative Interviewing* in Allan G and Skinner C (ed) *Handbook for Research Students in the Social Sciences* (London: RoutledgeFalmer, 2002) at p.203.

[100] Harrison L *Political Research: An Introduction* (London: Routledge, 2001), at pp.74-75.

[101] May T *Social Research: Issues, Methods and Process* (Buckingham: Open University Press, 2001), at p.121. Kvale S and Brinkmann S *Interviews: Learning the Craft of Qualitative Research Interviewing* 2nd (London: SAGE, 2009) regard interview as conversational interest between parties involved whereby the knowledge is created "inter" the points of view of both interviewer and interviewee, at p.123.

[102] The researcher spent months in studying the relevant technology, so as to be able to understand the legal issues from a technologically informed standpoint and to conduct the interviews with a general understanding of the interviewees' work.

[103] Gorden, n.91, at p.215. The purpose of the interview should be clear and honest, Harrison n.100, at p. 97.

[104] N.100, at pp.96-97. Kvale and Brinkmann argue that there are no fixed criteria for good quality of interview, except rests upon the craftsmanship of the interviewer to gain knowledge of the research topic, sensitivity of the social relation between the interviewer and interviewee, an epistemological awareness as well as ethical consideration in conducting interview, n.101, at pp.174-175.

(a) Accessibility – the question on how to gain access to the relevant interviewees; and how to control the access through the gatekeepers;
(b) Objectivity – the 'closeness' of the interviewer and interviewee; and the objectivity of the language used and phrasing of the question;
(c) Cognition – the interviewee understands the purpose of the interview and the expected information obtained from him/her; and she/he must have access to relevant information;
(d) Motivation – to value the response from the interviewee and to maintain the interest of the interview session; the rules and the language used for the questions asked need to be taken into consideration.

Other than the process of the interview itself, similarly the researcher needs to posses certain traits to make the interview a successful one. A good example of these traits is set out by Gorden. He argues that the interviews need:[105]
(a) Flexibility – the interviewer to behave actively when it is called for, and passively when needed to facilitate communication;
(b) intelligence – allow the interviewer to clearly appreciate the objective of the interview; evaluate the information critically and probe the clarity and completeness; and
(c) emotional security – alleviate the interviewee from anxiety so that one may direct full attention to the flow of the response and keep up a good interpersonal relationship.

These criteria favour face-to-face meetings between the researcher and interviewees, on the interviewees' 'home' territory, with a set of carefully prepared questions that are comprehensive but designed not to 'lead' the interviewee to a particular response, with the flexibility to follow promising lines of conversation and avoid repetition.

### 1.4.3 The selection criteria

The sample used in this research partly followed the model of a snowball sample. Bryman states that this sample is a *"form of convenience sample"*.[106] The procedure is that the interviewer

[105] Kvale and Brinkmann, n.101, at pp.172-173.
[106] Bryman, n.98, at p.184.

contacts a small group of people relevant to the research and uses their information to make contact with others.[107] This study applied the same process by providing the initial interviewee with a table-list of scientists and seeking advice as to whether the people in the list were appropriate to interview or whether there were others who the initial interviewee thought could be a relevant person to interview. This approach led to the second interview. One might perceive that there could be a problem using of snowball sample, for example according to Bryman that it is very unlikely to be representative of a population.[108] However, this may be counteracted in a limited way by presenting interviewees with a pre-prepared list selected by reference to area of scientific interest.

The first interviewee (A) was identified based on his qualifications and his position in a particular nanotechnology department. In this regards, this interviewee was considered as the key person to inform the researcher comprehensively because he was able to speak across a full range of information. Drawing on the technique of the 'inverse snowball sample' advice from the first expert interviewed, along with the comprehensive nature of the information received in the first interview, informed and enabled the next selection to be made.[109] Thus, the second interviewee (B) was chosen to represent his position on business and the commercialisation dimension of nanotechnology. The first two interviewees were sufficient to meet the objectives of the interviews[110] and therefore, there was no need to extend the sample further.

The interviews were also conducted in Malaysia to gain comparative on the scientific development and the legal analysis. There were two interviewees chosen in Malaysia. The third interviewee (C) was identified based on his own qualification and experience, scientific networking as well as likely acquaintance himself with inventions and other forms of IP. His institution is a prominent nanotechnology institution and has been identified by the government of Malaysia among the established six nanotechnology centres. In parallel, the fourth interviewee

[107] Ibid, at p.184.
[108] Ibid, at p.185.
[109] When he has been given a list of the next person, he was not only agreed with the list, but also suggested the second interviewee. He also eliminated few names in the list. This is inverse snowball sample.
[110] The reasons for the selection of the first and the second interviewees were because there are departments dedicated to nanotechnology and the range of divergent of expertise in the Newcastle University. This is an independent valuation of their expertise and standing in a wider community because apart from their being located at the University where the researcher is doing her PhD, comparison of their profiles with those of scientists at other UK universities suggests that their expertise was the best suited to this research. The easy accessibility to researcher also supported the justification for choosing the institution.

(D) was also recognised on his distinct position in the institution as well as the training he received in nanotechnology related subject matter. Both were associated to contribute on the policy consideration for nanotechnology in Malaysia. The four interviewees ultimately chosen were considered leading nanotechnology experts and can explain the scientific and legal regime for nanotechnology both in Malaysia and UK.

They may be considered as special respondents because according to Gorden, they hold unique positions in their organisations which qualify them to give special information which are directly relevant to the objective of the study.[111] One interviewee, for example, characterised his own approach as "top-down" and another interviewee as "bottom-up" approach. This suggests that although the very small number of interviewees nonetheless reflects the variety of approach.

### 1.4.4 The significance role of an expert

Harrison states that *"in qualitative research, all interviewees are regarded as 'experts', that is, they have information in which we as students or researchers are interested"*.[112] The technique of the interview process to be analogous with the role of the scientific expert[113] in the courts. Prominent scientists are often called as such as those the researcher interviewed. In UK and Malaysia, expert witnesses in patent cases help to shape new development in the law by informing the courts understanding of new technologies.[114] Thus, evidence from technical experts is of considerable importance in developing and interpreting IP law. The researcher wished to adopt similar standards for the gathering of evidence for the thesis. In this concern, the process of the examination-in-chief in the court is perceived relevant in particular the avoidance of non-leading questions to the current study. That the court has given great significance to the

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[111] Gorden, n.91, at, p.136 provides interesting guidelines criteria for selecting respondents - (a) who has the relevant information; (b) are they physically and socially accessible to have the information; (c) which persons are the most willing to offer the information?; (d) which persons are most able to give an accurate accounting of the information?, at pp.146-147.
[112] N.100, at p.98.
[113] An interesting experience in dealing with high technical patent cases and make a concluding remarks that *"there is no perfect way of going about expert evidence"*, Jacob R 'Court-Appointed Experts v Party Experts: Which is Better?' (2004) C.J.Q. 400, at p.407.
[114] SmithKline Beecham Plc v Apotex Europe Ltd [2004] EWCA Civ 1568; [2005] F.S.R. 23, at 543. The expert is important in patent cases to; (a) explain the technical terms; (b) instruct the court pertaining scientific principles; (c) show the scientific knowledge at the time of the grant; (d) explain the nature and characteristics of the invention, Malek H M et al. (eds) *Phipson on Evidence* 16th edn (London: S&M, 2005) at p.1025.

role of an expert relates not only to facts, opinions and experiences in the evidence adduced.[115] Their duties and responsibilities have been set out in particular detail in the case law and should be widely applicable.[116] They should possess relevant qualifications and experience in the relevant field of dispute, ability to draw logical opinion from the facts and have the quality to view a problem impartially.[117] The greater weight should be emphasised in giving their opinion independently, unbiased and truthfulness.[118] Lord Wilberforce in Whitehouse v Jordan[119] upheld the role of an independent expert:

> "it is necessary that expert evidence presented to the court should be, and should be seen to be, the independent product of the expert uninfluenced as to form or content via the exigencies of litigation. To the extent that it is not, the evidence is likely to be not only incorrect but self-defeating".[120]

Equally, experts may provide valuable assistance to the court by giving a series of seminars in the relevant aspects of technology and it has been perceived to be adopted in the future if the

[115] As, in court, judges find the demeanour of witnesses gives a guide to the weight to be given to their evidence. The skill and training of the experts enable them to form opinions, to deduce conclusion from the observed facts and to identify facts which may be obscured from the eyes of lay witnesses, Malek et al., n.114, Ch 33 at p.972. Where the expert opinion is properly adduced, the tribunal may take into consideration of an expert's qualification, how has the expert obtained the qualification, the expert's credibility and the extent to which his evidence is based, Keane A *The Modern Law of Evidence* 7th ed (Oxford: OUP, 2008). The law has treated experts special sorts of witness whose power flowed from his own special knowledge, Jones C A G *Expert Witnesses: Science, Medicine, and the Practice of Law* (Oxford: Clarendon Press, 1994). Although the courts have increasingly relied on the scientific and expert evidence, the problem might be encountered by the courts on qualifications of experts, probative helpfulness of expert evidence, how to weight the novel and contested "scientific" findings and the role of experts in testifying the ultimate issue, Anderson T et al *Analysis of Evidence* 2nd edn (Cambridge: CUP, 2005). Dennis queries whether English law should have any specific threshold requirements for the reliability of the expert witnesses. The development of experts technique for analysing and interpreting evidence suggests to adopt a pragmatic approach in order to make expert witnesses are more reliable in the future, at pp.858-860, Dennis I *The Law of Evidence* 3rd edn (London: S&M, 2007). The higher standard of accuracy and objectivity should be required and seem to be provided due to the fact that the evidence of experts carries more weight than ordinary witnesses, Tapper C *Cross & Tapper on Evidence* 11th edn (Oxford: OUP, 2007). For an interesting discussion on the effect of ill-served of expert witnesses in the adversarial system of trial see McEwan J *Evidence and the Adversarial Process – The Modern Law* 2nd edn (Oxford: Hart Publishing, 1998); a good discussion of expert opinion in a monograph see Redmayne M *Expert Evidence and Criminal Justice* (Oxford: OUP, 2001).

[116] National Justice Compania Naviera SA v Prudential Assurance Co Ltd (The Ikarian Reefer) [1993] 2 Lloyd's Rep. 68.

[117] Mildred R H *The Expert Witness* (London: Long Group Ltd, 1982), at p.7. Their role as educator to assist party, lawyers and judges, see Bond C et al. *The Expert Witness in Court: A Practical Guide* 2nd edn, Burn S ed (Kent: Shaw & Sons, 1999) at p.61.

[118] Holborn C J et al. *Health Care Professionals as Witnesses to the Court* (London: Greenwich Medical Media Ltd, 2000), at p.30.

[119] [1981] 1 W.L.R. 246, at 256-257.

[120] This principle has been adopted in The Ikarian Refer [1993) 2 Lloyd's Reports 68.

technology was *"complex and undisputed"* and the parties have consented to it.[121] If the subject matter involved is highly technical, it is important that the expert put forward all relevant considerations to the issue to be decided because the court warned of the dangers of an expert acting as an advocate or holding back relevant information.[122] However, the court should give careful consideration not to accept the expert's personal view, instead of his reasons for that view.[123] Thus, the reception of such evidence resembles qualitative research techniques. By contrast the court tend to be impatient of qualitative or statistical techniques in IP cases for example the market survey evidence[124] as of little significance because of concerns on the technical flaws whilst preparing questions for the interview.[125] Put another way, the courts have been doubtful as qualitative methodologies and questionnaires. There seems here a clear parallel between legal literature of evidence and the research methodology literature.

### 1.4.5. Semi-structured interview

Bryman has contrasted the interview in qualitative research and quantitative research to the effect that qualitative interview is less structured because it emphasises generality in the formulation of initial research ideas and interviewees' perspectives.[126] Bryman further asserts that the flexible approach of the qualitative interview allows the interviewers not to stick to one particular schedule or guide; that they are free to ask new questions or follow up questions; and they may also emphasise in the research result important issues in the course of interview because what is important at this stage is that researcher expects rich and detailed answers.[127]

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[121] Lord Hope of Craighead in Kirin Amgen Inc v Hoechst Marion Roussel Ltd [2004] UKHL 46, para 135.
[122] Cantor Fitzgerald International v Tradition (UK) Ltd [2000] R.P.C. 95, at 127.
[123] SmithKline Beecham Plc v Apotex Europe Ltd [2004] EWCA Civ 1568, at 543.
[124] Usually confined to trademarks and passing-off case.
[125] Lea G 'Masters of All They Survey? Some Thoughts upon Official Attitudes to Market Survey Evidence in U.K. Trade Mark Practice' (1999) I.P.Q 191 and suggests that the questions should be phrased in clear, simple language and elicit only necessary information to the subject matter concerned and if possible to encourage the interviewee to actively participate in survey proceedings, at p.225.
[126] Bryman, n.98, at p.437. The general accepted view that there are structured interview and semi structured interview. Some may refer to less structured interview or unstructured interview, however, the terms *'unstructured-interview'* is misnomer because it is impossible to have completely unstructured interview as it will always have structure and the interviewer is still keep control on the process of the interview, Wilson, n.40, at p.98; Salter and Mason, n.7, at p.62. Harrison categorises that unstandardised interview as including informal, focused, unstructured and free interview, unstructured-interview, n.100, at p.92.
[127] Bryman, n.98, at p.437.

Rubin and Rubin have submitted that qualitative interview is distinguished from data collection in social and political research because:[128]

(a) qualitative interviews are modifications and extensions of ordinary dialogue,
(b) qualitative interviews are more concerned with the understanding, knowledge and insights of the interviewees,
(c) the content, the flow of the idea and the choices of the topic may change in order to meet the interviewee's knowledge and feeling.

This research employed semi-structured interviews because, as May has pointed out, the interviewer is more flexible and freer to probe beyond the acquired answers and consequently enter into a very helpful dialogue with the interviewee.[129] This category of interview is non-standardised where the interviewer has prepared a list of issues or questions to be asked, but did not necessarily deal with all of them in each interview.[130] This interview approach was considered imperative because the researcher was interested to know the *'whys'*, the *'how*s' and the *'whats'* of the respondent's clarification and elaboration of the response.[131]

### 1.4.6 An introductory statement

Once the interviewees had indicated their willingness to participate[132], they were provided with an 'introductory statement'. This was to inform them briefly of the nature and approach of the interview and to ask for an appropriate date for the interview. The introductory statement was sent to the interviewee before the interview briefly to sketch out for the interviewee the nature, context, and expected result and the topic which will be covered in brief; outline the justification of the chosen topic; the selection criteria of the interviewee; the confidentiality issues of the

[128] Rubin and Rubin, n.97, at p.6.
[129] May, n.101, at p.123.
[130] Gray, n.98, pp.215-217 and explained that the flexibility may allow the order of questions to be changed or adding an additional questions including issues which were not anticipated at the beginning of the interview.
[131] Harrison, n.100, at p.92.
[132] The researcher is grateful for the assistance of her supervisor, Professor Alison Firth who initially sent selected potential interviewees emails approaching them for the interview. The emails were to inform the prospective interviewees of the purpose of the interview: to discuss on the scientific aspects of the technology and how the information obtained from the interview will allow the researcher to focus on her legal analysis of the IPRs for nanotechnology. The supervisor attended Newcastle interviews to effect introductions and she remained in attendance. This did not seem to affect the successful dynamic of the interviews. The supervisor was given opportunity to ask supplementary questions for her own interest and enlightenment but otherwise did not participate actively during the interviews. Subsequently she was able to assist with completing the record at one or two points where the tape recordings were not completely clear.

interview; the research and development of nanotechnology; the possible IPRs for nanotechnology.[133]

Introductory statement explained the emerging status of the technology draws the attention not only for being contentious but also the status of legal discussions especially in the context IP, is still at the very basic. For this reason, introductory statement explained that the interviews were very significant because they sought to examine the trend and development of the technology based on experiences of both Malaysia and the UK. To inform the interviewees attentively, the introductory statement gave an overview of the current trend of the research and development of nanotechnology including US, Japan and Europe. Moreover, the importance of IP protection was explained along the lines of general justification and problematic challenges posed by the current state of the law.

### 1.4.7 During interview

Normally, when the interview started[134] the researcher asked interviewees whether in particular they have understood, or would need further clarification on anything which was still unclear for them in the IS.[135] If the answer was affirmative, then the researcher dealt with any issues that arose before proceeding to the next step of giving the assurance on the issue of the confidentiality of the information given. The researcher gave assurance that the interviewees' names would be kept anonymous unless and until they gave permission to be cited explicitly. The interviewees were also given an assurance that the material they provided in the interview will be kept confidential until it was included in the thesis. The researcher then sought the interviewees' permission to be tape-recorded during the interview and asked further whether they would like to have a copy of the finding of the research from the interview.

[133] For some tips on good introductory statement see Bryman, n.98, at p.210.

[134] The first few minutes of an interview are important that the interviewer should show interest, understand and respect to the subject matter before the interviewee uncover his information and talk freely, Kvale and Brinkmann, n.101, at p.128.

[135] For example, interviewee C asked the relevancy the researcher with a legal background interviewing the scientist

In approaching[136] the interview, the researcher then outlined briefly the topics which to be covered in the interview. During the session, there should be strategies for establishing and maintaining good relationships between interviewer and interviewee.[137] Only then the atmosphere of the session becomes more neutral and free. For example, the session with interviewee C was conducted in the staff room in an informal setting. Normally the interview was conducted with little prompt[138] and the researcher should be aware of what is being said and be prepared to explore some issues in greater depth.[139] In the interview, the researcher skimmed through the sub-theme of the questions because with little prompt sometimes the interviewees have already covered the information although initially they have not been asked. At the end of the session, the researcher asked the interviewees permission to proceed with the transcription. The researcher asked all interviewees if they would like to have a copy of the finding of the research at the end of the study.

The interviews were very exciting, enriching and enjoyable experiences for not only an excellent cooperation during the interview sessions, but for the most important part is that they served the main purpose of doing interview. For example one of the interviewees in the Newcastle University was very generous with his time and information and he was volunteering to disclose very exceptional information in response to the prompting questions. In discussing the concept of nanotechnology too, one of the interviewees showed the researcher his invention on rice husk at the range of nanoscale, and another interviewee explained his booklet “the law of scale” quite extensively. He also kindly shared his experience and views on the technological development in Malaysia as well as gave the researcher copies of other documented reports on his institutional research and development.

Interestingly, the researcher also found fascinating with the used of certain techniques during the interview, for example as suggested by Bryman on the flash cards or show cards.[140] This technique seemed to work very well especially when the interviewee has been given a choice to

[136] There are considerably wide approaches to produce effective materials such as writing it down, or prompting, simple key-issues or an aid-memoire, Jones, n.99, at p.204.
[137] Jones, n.99, at p.208. The interviewee is unwilling to answer the question or may possibly cut the interview short if the interviewer has little rapport, Gray, n.98, at p.223.
[138] Jones, n.99, at p.205.
[139] Ibid, at p.204.
[140] Bryman, n.98, at p.207, this reasonably works well when the respondent is given a list of possible answers.

opt for the three different definition of nanotechnology quoted from the Royal Society and Royal Academy of Engineering, UK; the European Patent Office and the National Nanotechnology Initiative, US.

At the end of the interview, in order to make to that everything was covered in the interview, the researcher asked the question *"is there anything we have not covered in this interview that you think relevant to my research"*. According to Stedward this augments the rich generation of the original information.[141] This could be a back-up too if the interview has gone astray to deliberately balance the good points which have not been covered as well as to take advantage of the interviewee's knowledge.[142]

After the substantive interview session ended, the researcher thanked the interviewees for sharing their thoughts and interesting views and for bringing some helpful knowledge to the study. The researcher felt indebted for the time spent and gain fruitful conversation throughout the interview session.

### 1.4.8 The use of tape recording and the transcription of the tape

The researcher was granted permission to use tape-recorder during all the interview sessions. Inevitably, this device is helpful because the chance of getting the whole information is minimal unless the person is well-versed with shorthand.[143] Hence, the interview data in the interview was interpreted by verbatim transcription. As Jones emphasise that *"ideally interviews are transcribed verbatim"*.[144] One of the interviewees in Malaysia used Malay in the interview and the other one partly used English and partly Malay. Both of these interviews were transcribed verbatim, translated into English and paraphrasing the essence of relevant information. In view

[141] Stedward, n.90, at p.155. This gives interviewee additional opportunity to deal with issues he has been thinking or worrying him during the interview session, Kvale and Brinkmann, n.101, at p.129.
[142] Stedward, n.90, at p.158.
[143] Because the quality of the interview sometimes is undermined for deliberately focusing on note-taking rather than actually listening to what has been said which of course affect for verbatim text, Harrison, n.100, at p.93. Kvale and Brinkmann note that rather than involve a simple clerical task, transcription is considered as an interpretative process where series of practical and principal issues arise in transforming oral speech into the written text, n.101, at p.177. It also allows the interviewer to concentrate on listening, interpreting and re-focusing the interview, Gray, n.98, at p.227.
[144] Jones, n.99, at p.210.

of that, the time required for transcription was greater.[145] In this study, the shortest time took for the interview was approximately 60 minutes, and the longest time took for about 120 minutes. Hence, the average time taken for transcription almost 8 to 10 hours of verbatim text for at least 13-15 long typed pages. Ideally because of its laborious works, it is advisable to transcribe while the mind is still fresh with the interview and by reference to the notes taken during the interview session.[146] However, using the tape recorder may not always be practicable, especially in a noisy environment.[147] Furthermore, the technical interruption may occur using tape recorder for run malfunction, or miss a crucial sentence or respondent who speak very softly.[148]

### 1.4.9 Ethical and confidentiality issues

Finally, it is worth noting that in these interviews the ethics of confidentiality[149] was given utmost importance. In certain situations the confidentiality issue can be really difficult to maintain and the reason why the respondents are reluctant to have information published is because to a certain extent his position may in some way be identified.[150] If this happens, it has been suggested that the researcher needs to further mask identity or seek approval for disclosure from the interviewee.[151] To that effect, the researcher gave reassurance the interviewees names will remain anonymous unless permission was given to reveal the information. In this respect, at the end of the interview session, the researcher asked each of the interviewees if they would like

[145] Harrison, n.100, at p.102.
[146] Ibid, at p.102. In addition to the tape-recording, note taking and transcribing into the text, Stedward suggests effective note taking may be in the form of contextual information, for example with the inclusion of the impression, observation and expansions of the interview, n.90, at p.161. Ideally, in the qualitative report, the writing style has to be rich, convincing and readable, Rubin and Rubin, n.97, at p.268. See also the reflexion on the feminist research in interviewing women MPs by Puwar N 'Reflections on Interviewing Women MPs – Sociological Research Online (1997), available online at http://ideas.repec.org/a/sro/srosro /1996-19-1.html , visited on 18 Feb 2009.
[147] Stedward, n.90, at p.152.
[148] Jones, n.99, at p.207 and suggests to back-up with note taking although arguably it will affect eye-contact during the session.
[149] More often present in psychological experiments or sociological or social anthropological field, Rees R *Ethical Issues* in Allan G and Skinner C (ed) *Handbook for the Research Students in the Social Sciences* (London: RoutledgeFalmer, 2002) at p.142. The protection involves *"secure storage data; restricting access to raw data; obtaining permission for subsequent use of data; publication of research findings in a manner that does not allow for ready identification of subjects; destruction of raw data"* O'Leary Z *The Essential Guide to Doing Research* (London: SAGE Publications, 2007) at p.54.
[150] Gorden, n.91, at p.219.
[151] O'Leary, n149, at p.54. Kvale and Brinkmann argue that in certain situation, for example journalistic interview, interviewees might wish to be credited with their full name for the time spent and information provided, n.101, at p.73.

to approve the transcription of the interview. One interviewee kindly allowed the researcher to proceed with the transcription, stating that he would like to have a copy of the findings at a later stage. On another occasion the interviewee expected an explicit permission if the information is very likely involved confidential information of the institution.

### 1.5 Conclusion

The doctrinal analysis plays an important role in the development of the legal system. Doctrinal research has become the prominent method for the legal research and continues to be a popular method among legal researchers. However, it was also subjected to criticism for being too theoretical and of no real world application. Thus, as a complement to the doctrinal analysis, the comparative legal study is adopted in this thesis. The comparative approach extends not just to law, but also to scientific and practical considerations. In this thesis, the contrasting comparison of the technological experiences and views of the Malaysian and UK scientists enable the researcher to better appreciate the significant interplay of the law and science in the two jurisdictions. Furthermore, this comparison provides a focus for the researcher by which the gaps in Malaysian law may be identified and analysed.

Although interviews conducted in this study were treated as anecdotal rather than substantive, nonetheless they offer a rich analysis and some insights for this thesis. The interviews acquainted the researcher with significant technological and legal issues that are helpful in this thesis.

# APPENDIX 2
# CENTRE OF EXCELLENCE FOR NANOTECHNOLOGY AND PROPOSED ACTIONS IN MALAYSIA

**Table 2.1: Centre of excellence for nanotechnology in Malaysia**

| Institute /University | Application | Funding (RM million) |
|---|---|---|
| Institute of Microengineering and Nanoelectronics (IMEN), UKM[1] | MEMS | 38.2 (MOSTE) |
| Ibnu Sina Institute for Fundamental Science Studies (IIS), UTM[2] | Nanochemistry | 20 (IDB)[3] 11(MOSTE) |
| Combinatorial Technology and Catalysis Research Centre (COMBICAT), UM[4] | Catalysts | 15 (MOSTE) |
| Glycolipids Research Centre, UM | Nanomaterials/Surfactants | 11.2 (MOSTE) |
| Advanced Materials Research Centre (AMREC), SIRIM Berhad | Nanocomposites | Unknown |
| School of Physics, USM[5] | Electronics (Blue LED) | 22.5 (MOSTE) |
| School of Medical Sciences, USM | Molecular Nanotech | 2.2 (MOSTE) |
| Institute of Advanced Technology (ITMA), UPM[6] | Electronics, Nanomedicine | Unknown |

Source: The SIRIM Report[7]

There is also a new institute established called Institute of Nanoelectronics Engineering, in UniMaP.[8] This has become one of the focused regional centres in nanoelectronics engineering for the Northern Corridor Economic Region (NCER)[9] in the areas of nanobiochips, photonics, non-volatile memory devices, novel devices and smart sensors.[10]

[1] National University of Malaysia.
[2] Technology University of Malaysia.
[3] Islamic Development Bank.
[4] University of Malaya.
[5] Science University of Malaysia.
[6] Putra University of Malaysia.
[7] Final Report, Research Survey for Implementing Nedo's International Cooperative Research Project for Development Support Projects in Asian Countries (Malaysia) Environmental and Bioprocess Technology Centre, (2006) ETC237/16/586 (R045/06) SIRIM Berhad available http://www.tech.nedo.go.jp/PDF/100008942.pdf (SIRIM REPORT).
[8] Perlis University of Malaysia.
[9] It is government initiatives to maximize economic potential at the northern regions of Peninsular Malaysia and to bridge the economics gap between regions.
[10] Hashim U et al. 'Nanotechnology Development Status in Malaysia: Industrialisation, Strategy and Practices' (2009) Int. J. Nanoelectronics and Materials 2, No. 1, at p.7.

The tables below show the research undertaken in various research groups on given prioritized areas.

**Table 2.2: Advanced materials and sensors**

| Application | Areas | Head/Institute | Funds |
|---|---|---|---|
| Metal Industry | Metal Composites | AMREC | MOSTI |
| Chemical industries<br>- acrylic acids<br>- oleochemicals<br>- surfactants | Catalysts,<br>Catalyst support,<br>Adsorbent | COMBICAT, UM | MOSTI |
| | Catalyst<br>Adsorbent | Institut Ibnu Sina, UTM | MOSTI<br>MOHE[11] |
| Nanoelectronics | Chemical sensor | UTP[12] | MOSTI |

Source: The MNNI[13]

**Table 2.3: Electronics and communications**

| Applications | Areas | Head/Institute | Funds |
|---|---|---|---|
| Automotive | MEMS and Microsensors/ Organic Electronics | IMEN UKM, UPM, VLSI | MOSTI |
| GMR | Electronics | AMREC | MOSTI |
| Blue Light Emitting Devices | Electronics | USM | MOSTI |
| Advanced optical crystal for electro-optic application | Electronics | UTM, UM, UPM | MOSTI |

Source: The MNNI[14]

**Table 2.4: Medicine and Health**

| Application | Areas | Head/Institute | Funds |
|---|---|---|---|
| Biopharmaceutical proteins for human therapeutics drugs and vaccines | Nanomedicine | UPM | MOSTI |
| Bone graft substitutes | Nanomaterial | MINT[15], SIRIM, USM, UKM, UIA[16] | MOSTI |

[11] Ministry of Higher Education.
[12] Petronas Technology University of Malaysia.
[13] http://www.nano.gov.my.
[14] http://www.nano.gov.my.

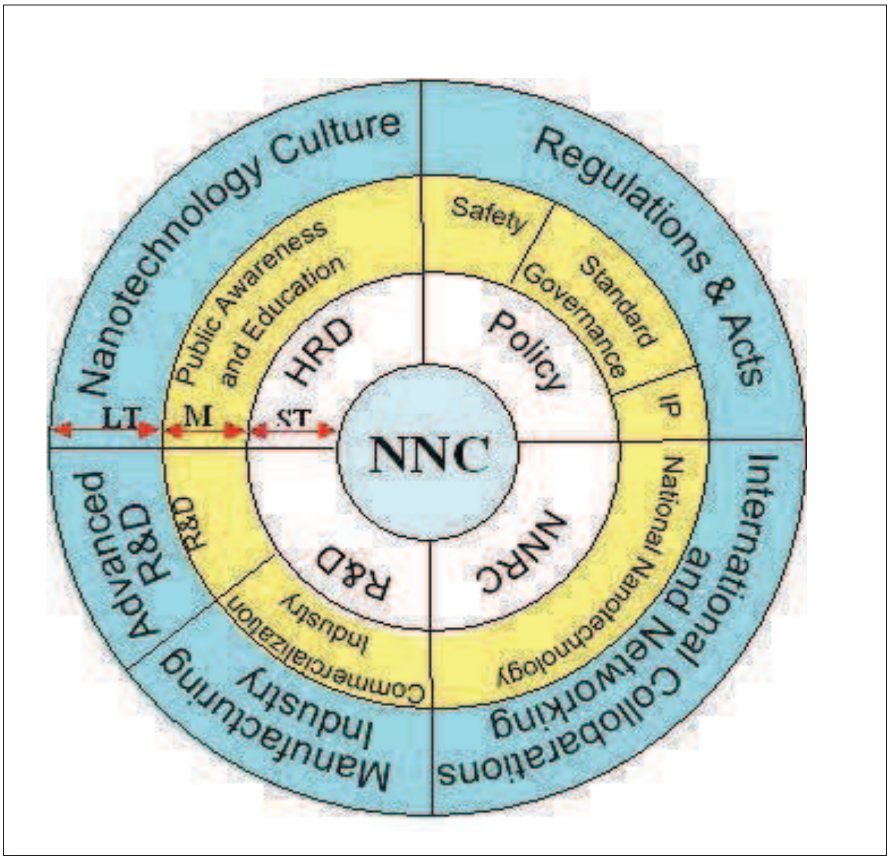
| | | | |
|---|---|---|---|
| Diagnostic kits for infectious diseases | Nano-device Molecular Nanotechnology | USM | MOSTI |
| Antioxidants in preventing degenerative damage in Down syndrome and ageing | Nanomedicine | UKM | MOSTI |
| Vaccine production against infectious diseases | Nanomedicine | USM | MOSTI |
| Oncology: Liver cancer | Nanomedicine | UM | MOSTI |
| Diagnostic kit for diabetic vasculopathy | Nanomedicine | UM | MOSTI |
| Antibiotic resistance | Nanomedicine | UM, USM, VRI[17], MOH[18] | MOSTI |
| Drug Synthesis | Nanomedicine | UiTM[19] | MOSTI |

Source: The MNNI[20]

Figure 2.1 below shows the key actions for nanotechnology that have been proposed for Malaysia in the Short Term, Medium Term and Long Term

**Figure 2.1: Key proposed actions for nanotechnology**

[15] Malaysian Institute of Nuclear Technology Research.
[16] International Islamic University of Malaysia.
[17] Veterinary Research Institute.
[18] Ministry of Health.
[19] MARA Technology University of Malaysia.
[20] http://www.nano.gov.my.




Source: The MNNI[21]

[21] http://www.nano.gov.my.

# APPENDIX 3
# THEORY OF PROPERTY

The court in the UK and Malaysia are reluctant to accept proprietary rights in information. Furthermore, the implied and equitable obligation for ex-employee may have the potential of difficulty for the court to determine the obligation that arises between the parties. Furthermore, in the cross-border movements and exchange of ideas and information the proprietary analysis may provide a useful ground of protection.

This **Appendix 3** examines theory of property by Honoré and to what extent it applies to nanotechnology context; discusses the rights, duties, limitation and other elements which form part of the standard incidents of ownership.[1] He also suggests that an individual must at least hold some of these incidents for the rightful ownership, although does not necessarily mean that he should hold all of them. A property framework provided by Honoré may be an effective method of exploring issues arising from nanotechnology and confidential issue. This theory shows that how nanotechnology information might be controlled and used. Since nanotechnology involves collaborative research project, this theory of property may be important in determining the ownership of nanotechnology information.

**The right to possess**

According to Honoré, the right to possess means that the person has an exclusive physical control over the thing. He divides the legal control into two; (a) the right to be put in exclusive control of a thing; (b) the right to remain control. He maintains that the other should not have the right without the permission, or unless the laws provide otherwise. The question that relevant here whether the parties able to have physical control over the information? The word "exclusive physical control over the thing" seems very unlikely to fit well with nanotechnology information. This is because it is very unlikely to prove that the person has physical control over the confidential information of nanotechnology. Nonetheless, an important element of the case law is the efforts made to keep information secret. For example, when the information has been treated

[1] Honoré T *Making Law Bind* (Oxford: Clarendon Press, 1987) original version published in Oxford Essays in Jurisprudence, Guest A G (ed) (1961) at pp 161-192.

with limited access, or put it under locked or key access, or has been encrypted with secret or special code, this situation could satisfy the criteria of "right to possess" because unauthorised person would not have the right to control over the information.

**The right to use**

The right to use includes the "use", "management" and "entitlement to income" which overlap with the right to manage and the right to income. He also refers the right to use encompasses owner's personal use and enjoyment of the thing owned. This is likely relevant to nanotechnology information because it gives right to the owner to enjoy and use of the information.

**The right to manage**

This right demonstrates how and by whom the thing owned shall be used. The right to manage for the use and exploitation according to Honoré may includes for example the right to licence, the right to make contract, the right to use of others' things. In the nanotechnology information, this could mean that the owner of the information has the power to determine the terms regarding to licence, make contract or use. The existence of know-how licensing suggests that this could be satisfied.[2] Know-how is used to describe a license of confidential information with some level of accuracy i.e. the licensee should be shown the means on how to use the information into practicality.[3] This is because simply disclosing the information does not make the licensee to make effective use of the information.[4] Thus, in nanotechnology, the licensee should be shown the practicality of the information for example by exhibiting that the properties behave differently at nanoscale.

**The right to income**

[2] See 3.2.
[3] Hull J 'Trade Secret Licensing: The Art of the Possible' (2009) J.I.P.L.P, Vol.4, No.3, 203, at p.206.
[4] Ibid, at p.206.

The income is derived from the use of a thing. Honoré refers this right as surrogate of use; where allowing other to use the thing in return for a reward. With regards to nanotechnology information, this occurs when the owner allows other persons to use the information. In return, the owner would receive a kind of reward, for example in term of the money or any commercial investment for example as in Douglas v Hello![5] where commercial interest of photographic images of a celebrity wedding were recognised by the court.

**The right to capital**

According to Honoré this right is having an economic aspects consists the most important right - the power to alienate; and the liberty to consume, waste and destroy either whole or part of a thing. The person can exercise the right during his life or on his death by way of sale, mortgage, gift or other mode. In nanotechnology information, the person may choose to publish the information, thereby destroying confidentiality, or may choose to keep it secret thereby to accord the protection.

**The right to security**

The right of the owner to remain in the position of his property and entitle for adequate compensation for any expropriation made. In other words, without adequate compensation, the owner will not be forced to give up his property. This right may not be applicable to nanotechnology information, because any expropriation will make the information available and lose its confidentiality. However, the question may arise here, whether the owner of the information has to be forced for the disclosure, such as for the interest of the public? This means that if it is proved that the information has considerably affected the interest of the public; the owner of the information will not have the right to secure his information.

**The rights of transmissibility**

[5] [2005] EWCA Civ 595; [2007] UKHL 21.

This right is described as the owner of having interest in transferring his ownership to another person by of giving them away, through its sale or at the owner's death through a will to successors. In nanotechnology information, it has been argued that the information may involve by more than one person and this would rather difficult to maintain the secrecy once the information has been transmitted to another person, by giving it away, or by sale or upon the death of the owner. The information can be transmitted, but it is difficult to "alienate" in the sense of original holder losing knowledge of it.

**The incident of absence of term**

The right is given to the owner to enjoy the right for indeterminate of time without appearing some contingencies such as bankruptcy, sale in execution or state expropriation. For this, the owner has indeterminate duration of ownership to enjoy his right without unjustifiable reasons regarding his right over his property. This right may be applicable to nanotechnology information if the information has been kept secret for indeterminate of time. But the problem may arise in nanotechnology as multidiscipline and a lot of people involved and is very difficult to maintain the confidentiality as some people may disclose the information.

**The duty to prevent harm**

This is the duty of the owner not to use the thing owned that may harm others and duty to prevent other from using to harm other members of society. This right may be relevant to nanotechnology information on the basis that the owner of the information does not have the right to use the information that harms others. For example, the use of nanotechnology information should be prevented if it is believed that it can violate or risk the environment.

**The liability of execution**

The right concerns with the liability of the owner's interest in their debts either can be taken away by execution for a judgement debtor or insolvency. Their property may be liable to be seized for the payment of the debt. This is unlikely to be relevant to the discussion for confidential information generally or in the nanotechnology context.

**The incident of residuary character**

The ownership of the property may be expired or abandoned, and in certain circumstances the other person will have the corresponding right of the property. In relation to nanotechnology information, information abandoned in the sense of lost; nobody is capable of possessing the right. If confidential information is abandoned, i.e. the information made available to the public, third party cannot claim for breach of confidence.

The adaptability of Honoré's theory shows that the rights, duties and other elements are required to give account on ownership are indeed may be applicable to nanotechnology information. This theory shows that nanotechnology information may be considered as property in the sense of controlling and using as well as determining the ownership of the information. For example, in case of ex-employee who wishes to move to another company, the theory can protect the information if the implied or equitable obligation are not able to solve the issues. Furthermore, in the cross-border transmission and exchanging of information and ideas, this theory may be helpful to protect the flow of the information. Thus, if the court moves to characterise the information, although it is not much hope in the UK, the court in Malaysia might be influenced by the decision in the Hong Kong's court,[6] to take the proprietary lead will be sound.

[6] In Linda Chih Ling Koo, John Ho Huang Chiu v Lam Tai Hing where the Hong Kong's Court took the view that confidential in university researchers' questionnaires could be protected as proprietary analysis. In this case Bokhari J considered that proprietary rights can be used to restrain the use of confidential information, and concluded *that "a man's entitlement to keep his confidential information confidential, and to recover compensation of such information is misused, is not confined to what can be achieved under contract or through the intervention of equity where the information was imparted trusting the recipient to keep the same confidential. There is a proprietary interest in confidential information; and there is jurisdiction in the Courts to intervene to preserve such interest or award compensation for harm done to it*." (1993) 23 I.P.R. 607, at 632. See comment on this case, Hull J 'Proprietary Rights in Questionnaires: An Academic Question in the Hong Kong Court of Appeal' (1994) E.I.P.R. 104; see also Loh E 'Intellectual Property: Breach of Confidence?' (1995) E.I.P.R. 405.

Nevertheless, this may not be possible to achieve in the near future since both jurisdictions, Malaysia and UK have reluctance to accept the stance of proprietary analysis of the information.

# APPENDIX 4
# THE EUROPENA PATENT OFFICE NANOTECHNOLOGY CLASSIFICATION

**Table 4: 1 The EPO nanotechnology classification**

| Code | New Code | Class/Fields | Example |
|---|---|---|---|
| Y01N2 | B82Y5 | Nanobiotechnology | *Nanocapsules as carrier systems for therapy and pharmaceutical treatment<br>*Biomolecular motors<br>*Molecular arrangements for biocatalysts<br>*Pre-targeting with peptides or antibodies<br>*Host-guest complexes in targeted drugs<br>*Ultrasound imaging or radioactive pharmaceutical preparations |
| Y01N4 | B82Y10 | Nanotechnology for information processing, storage and transmission | *DNA computing<br>*Quantum computing<br>*Single electron logic<br>*Nanotube displays<br>*Biomolecules for electronics and data storage<br>*Read heads with nm precision |
| Y01N6 | B82Y30 | Nanotechnology for materials and surface science | *Nanoparticles, nanocomposites, dendrimers, nanotubes and fullerenes<br>*Supramolecular systems<br>*Ultrathin functional films<br>*Self assembling monolayers (SAM)<br>*Hydrogen storage in nanostructured materials |
| Y01N8 | B82Y15 | Nanotechnology for interacting, sensing or actuating | *Measurement of physical, chemical, biological properties at surfaces with nm-resolution<br>*Measurement of interfaces with lateral resolutions in the nm-range<br>*Normalisation routines for nanoanalytics<br>*Measurements of size distribution of nanoparticles<br>*Tools for ultraprecision engineering like Scanning Probe Microscopes<br>Use of quantum dot labels for analysis biological material |
| Y01N10 | B82Y20 | Nanooptics | *Optical quantum well structures<br>*Photonic crystals<br>*Quantum optics<br>*Optical surfaces with nm surface precision |
| Y01N12 | B82Y25 | Nanomagnetics | *Low dimensional magnetism |

| | | | |
|---|---|---|---|
| | | | *XMR technologies such as magnetoimpedance, anisotropic magnetoresistance, giant magnetoresistance, tunnelling magnetoresistance |
| | B82Y35 | Methods or apparatus for measurement or analysis for nanostructures | |
| | B82Y40 | Manufacture or treatment of nanostructures | |

Source: Scheu M et al., at p.207; and the EPO[1]

[1] Available at http://www.epo.org/topics/issues/nanotechnology.html

# APPENDIX 5
# INTERVIEW ANALYSIS

## 5.1 How to define nanotechnology?

For this question, one of the interviewees expressed the view that to define nanotechnology is not difficult for scientists because they are the ones who work in this field. Two of the interviewees defined nanotechnology as the ability to manipulate things at the scale of 1nm to 100nm, and at this scale there is sudden change of the properties with different characteristics such as strength and chemical reactivity.

## 5.2 What is the effect of sudden change of properties from macro-scale to nano-scale?

All of the interviewees agreed that the effect of sudden change of the quantum effect would bring the properties to behave differently. According to them, many properties can be exploited at this scale with new particles, different structure and a lot of opportunity. The opportunity would also give advantage to develop novel products, different functionality, accessible new areas, manipulating new areas and new process.

## 5.3 What are areas of interest in nanotechnology (in general)?

For this question, all of the interviewees viewed the important areas in nanotechnology being medical applications. One of the interviewees gave as an example sensory device in detecting molecules in the blood or detecting diseases that quickly bring the result as compared to the normal diagnosis system, and drug delivery system. The other two interviewees gave the example of developing nanomachine called "nano-bot" that manages to go through the blood and detect the cell system, for example cancerous cells. Other examples given by the interviewees were analysis of the DNA by developing a lab-on-chip system, as well as the application for agricultural, environmental and clean energy.

Three of the interviewees agreed that other than medical application, nanotechnology is also important in consumer products such as nano-cream that helps skin cell preventing from acne and scars, or the using of titanium oxide in compact powder. One of the interviewees viewed upcoming areas of interest in nanotechnology as the micro-system business areas, in particular contract of manufacturing; defences application and electronic systems.

## 5.4 What are their personal areas of interest?

The personal interests of the interviewees were different. One of them is involved in nano-electronics, another involved in the business type of contract of manufacturing, one involved in chemistry working on the zeolite, and aerogel using rice husk at the range of 1 to 100nm. One of the interviewees works in photonics and bio-mimetic (the technology that mimics nature).

## 5.5 Is nanotechnology new?

Two of the interviewees pointed out that nanotechnology are not new because it has been around us for many years, for example clay involving nano-composites was used during Greek period and the Egyptians preserved the dead people using nanotechnology. But one of the interviewees agreed that it is new now in the way we understand the technology and this technology is expected to mature in the next 100 years. They all agreed that it is only recently that nanotechnology has been actively explored.

## 5.6 What is the nature of nanotechnology?

All of the interviewees agreed that nanotechnology is not a single or focused discipline as compared to other disciplines. They mentioned that because of the different areas involved in nanotechnology it might engage people to work collaboratively and across disciplines including persons from medicine, science and engineering. One interviewee mentioned that nanotechnology not only involved people from technical and engineering aspects, but should also involve persons from legal, religious and social sciences fields. Another interviewee had a similar view by stating that nanotechnology is different from other technology because it integrated between sciences and its application and people involved are have different background and they must work in a team.

## 5.7 Are there any safety, environment and health (SEH) issue that nanotechnology could pose?

One interviewee mentioned that the ethical and environmental issues are likely to occur in the chemistry field, for example the use of nano-particles in sunscreen and other beauty and cosmetic treatment, on the issue whether they have toxicological effect. The same interviewee has also queried whether nano-particles would have the similar effects like asbestos. The same interviewee also doubted whether it is ethical to the use the materials until the effects are known or whether the precautionary principle should be adopted. However, according to this interviewee there is less concern of SEH in medical technology and nano-electronics. The interviewee doubted whether currently there is any toxicological effect of nanotechnology to the environment and mentioned that the UK government are working hard on this issue. The interviewee suggested that there should be a serious study on chemical engineering to see whether there was any nanotechnology risk in that area.

One of the interviewees pointed out that with the effect of quantum mechanics, where there are sudden changes of properties; nanotechnology behaves differently with different function, effect and properties. He stated that it is unlikely that they would be informed about something which is unsettled like nanotechnology on its health and environmental issue. One of the interviewee also stated that there is likely more concern with the danger of nanoparticle especially when inhaled to the body in terms of its health and safety. For that reason, according to him, there are people who study nano-safety. One of the interviewees stated that whether nanotechnology is dangerous depends upon how it is handles. Therefore, according to this interviewee people are intimidated by nanotechnology and fear the term “nano-bot” that could have the dangerous effect. However, he expressed that nano-bot is just DNA molecule acting as a robot that can go through the body, for example in detecting some disease.

## 5.8 Are there any activities or steps taken to minimise the potential risk posed by nanotechnology?

In prompting this issue, one of the interviewees stated that in two or three years time the environmental toxicological data at nanoscale should be recognised. He added that there is activity for the engagement of the public such as works done by the Policy, Ethics and Life Science Centre (PEALS). The other activities made, as one of the interviewees mentioned was that through conferences, seminars and workshops on nanotechnology. One of the interviewees mentioned a company which had written in its Annual Report on the impact of nanotechnology particularly in the industrial sectors and predicted the applications of nanotechnology on the consumer products.

### 5.9 What are the trends and development of nanotechnology?

One of the interviewees stated that he was involved in the contract of manufacturing for process development, i.e. to do things that incorporated new development process. Therefore, as he commented further, there are a lot of collaborations with the industry and joint fund with the government agency. One of the interviewees suspected and hoped that there should be a nanotechnology policy for Malaysia in the future and currently Malaysia is the member of the Asia Pacific Nano Forum (APNF) to form a nanotechnology working committee. One of the interviewees regarded nanotechnology as the "technology in the 21$^{st}$ century" and stated Malaysia should identify the niche areas that researchers can participate to do research. Another interviewee stated that the niche areas that Malaysia needed to identify must be the areas that other countries have not explored yet. He opined that this is a good opportunity for Malaysia and would bring advantages for Malaysia.

### 5.10 What are the intellectual property rights that are relevant to nanotechnology?

Two of the interviewees viewed patent as the most relevant for protecting nanotechnology, one of the interviewees agreed that all forms IP protection are relevant for protecting nanotechnology, one interviewee mentioned that the most IP best timing for nanotechnology is non-disclosure in the contract of manufacturing. In other words, he involved in maintaining of the confidential information by way of non-disclosure agreement between customers. Another interviewee agreed where he stated that the post-graduate students will be required to sign the non-disclosure agreement to make sure that all information relevant to the research conducted are being kept in confidence and not flowing out from the university. He warned that whenever someone has good information about something, based on his own personal experience, the information should not be disclosed to anyone. This is because the information might have some value which is worth IP protection. Two interviewees mentioned that trade marks in particular are relevant, for example concerning the shape of carbon nanotubes and the used of the word "nano".

### 5.11 Whether the current IP system is sufficient protection for nanotechnology?

One of the interviewees held the view that some element of nanotechnology related to intellectual property can be tackled using the existing framework, and some of the elements are challenged by the existing system. He analogised to the semiconductor industry (for example in Texas Instrument), because at the beginning of technology patent protection was not regarded as important until the technology matured. One of the interviewees held the view that nanotechnology has to fit to the existing regulation, because new technology has to cope with the existing regulation, and that it is undesirable to have specific regulation for nanotechnology.

## 5.12 To what extent is the current IP system sufficient to address the issues related to nanotechnology?

For this question, one of the interviewees mentioned the challenge of the different size of nanotechnology could bring. He gave the example of metal alloy at the macro scale with the range at centimetre level; he queried whether metal alloy at nano-scale can be patented again? He understood that the matter is still not fully settled, and according to him this is the big issue and important to consider i.e the length scale from macro to nano scale is relevant, and it could be argued also that there is no important different between the two scales. He also queried whether it can be patented or not when the only difference is in size? He stated that since a lot of investment is needed to develop products at nano level, if the patent is not allowed, the useful technology might be inhibited (because the function of patent is promoting innovation and creating incentive). Thus, according to this interviewee, many companies may close down and the product would never reach the market.

Another interviewee made the point that it will always be a guess as to whether the current IP system is sufficient or not... He expressed the view that whenever new technology emerged, there would be a lack of experts at the patent office in accessing the documents. Thus, according to this interviewee, this could affect whether or not the patent is broadly granted. He further stated that as the new technology progresses to the application, the early patent will lose its value. This is because according to him generally a lot of time required to develop new invention. He gave the example in software industry on how to write the code using microscope and in genetic patent on the issue whether the discovery in genetics could patented? He however expressed doubts as to whether these issues are fundamental to nanotechnology.

When prompted with this issue, one of the interviewees pointed out that the patent examiners need to have the expertise so that whenever application is made they have the ability to distinguish whether the product is novel or not, and not simply to reject any application that looks similar between macro-scale products and nano-scale products, for example his product on nano-membrane was rejected because it was stated that it was not new. He also mentioned that in term of nanotechnology standardization, he expected that Malaysia will adopt the standard for nanotechnology under ISO TTC/299.[1] This matter of adoption of standardisation is still under discussion in Malaysia. According to this interviewee standardization is very important for nanotechnology especially in term of the size, particle and safety.

As to the word "nano" one of the interviewees held the viewed that nowadays the word "nano" is very popular and everyone is rushing to put the word "nano" in their products. He suggested that if the word "nano" is to be used, it has to make sure that the "nano" enhancement has been put in the products. This is because, people are simply put nano word, for example in cosmetic for example "Nano Silver". The interviewee gave the example of Taiwan which has already introduced the "Nano Mark" to control the use of "nano" word, that if the word "nano" is to be used, the product needs to go a testing in order to make sure that it actually contains nanotechnology. He suggested that this could be adopted by the Standards and Industrial Research Institute of Malaysia (SIRIM)[2] for nanomaterials testing and measurement. The popular use of the word "nano" was also an issue raised by another interviewee. The other interesting issue relevant to trade marks mentioned by one of the interviewees was the shape of carbon nanotubes either in single-walled, double-walled and multi-walled, and current law was sufficient to address the issue.

[1] This is standard for classification, terminology and nomenclature; metrology and instrumentation; science-based health; safety and environmental practices; and nanotechnology products and processes, see more at Hatto P ISO/TC 229 – Nanotechnologies, ISO Committee Chairs Conference, Geneva, 5 June 2008, available at http://www.iso.org/iso/search.htm?qt=ISO%2FTC+229&searchSubmit=Search&sort=rele&type=simple&published=on; see also at http://www.iso.org/iso/iso_technical_committee?commid=381983; http://www.who.int/ifcs/documents/forums/forum6/ppt_nano_hatto.pdf accessed on 22 February 2010.

[2] Especially relevant for nanotechnology may be providing technical standard and quality, and certification, inspection and testing for nanotechnology, see generally at http://www.sirim.my/web/core.

## 5.13 How did they compare nanotechnology with previous technology?

One of the interviewees analogised nanotechnology with the semiconductor chip industry. According to him, at the early time, as happened to Texas Instruments, patents were not very popular until the technology matured. During this time, companies were not worried to patent their products, and they would wait until the technology matured. One of the interviewees stated that naturally biotechnology is nanotechnology because of the working on DNA. According to him, it has been predicted that after biotechnology there would be nanotechnology and there is strong relationship between nanotechnology and biotechnology for example as in biosensors, genomic and proteomic. Another interviewee agreed that biotechnology is part of nanotechnology.

## 5.14 Does nanotechnology enjoy strong commercialisation?

Two of the interviewees viewed that in Malaysia nanotechnology does not enjoy strong commercialisation because commercialisation is still low in Malaysia. The area which has enjoyed some commercialisation is in nanoparticle, but this does not yet apply in the high technology. One of the interviewees pointed out that his department has enjoyed a lot of commercialisation in nanotechnology; has developed and considered his department as commercialisation organised system.

# APPENDIX 6
# QUESTION FOR INTERVIEW

**QUESTION 1: Interview subject information**

This section is to learn about the expert (warm-up questions). This section represents the general question including interviewee's background, their qualification (training or experiences), their divergent of disciplines, the role play and their responsibilities.

1a. What is your title?

1b. How long have you been in this current position?

1c. Would you like to tell me something about your work and your responsibilities? (Please comment on how far your responsibilities extended throughout the organisation)

1d. How did you qualify? Did you qualify by training or by experiences?

1e. What is your areas of interest? (omit if already answer under 1c)

**QUESTION 2: Organisation's information**

This section is to learn more of the organisation in investigating the different disciplines involve in the organisation. The goal is to identify research conducted in various areas of nanotechnology with specific expertise. This will determine/indicate the specific and forthcoming areas of interest in nanotechnology at the organisation.

2a. Would you like to tell me something about your organisation's works?

2b. What different types of nanotechnology does your organisation works with?

2c. Which areas would you say are the most important areas of nanotechnology in your organisation?

2d. What would be the forthcoming areas of interest of nanotechnology in your organisation or other spheres that you know? (for example Malaysia)?

2e. Why do you think the trends of discipline have evolved in such a way? (the underlying factors)?

**QUESTION 3: Defining nanotechnology**

This section examines the effect between classical and quantum physics at the nanoscale. This is to understand how nanoscale structures behave differently as compared to the macro-scale.

3a. How do you explain the effect of sudden changes that have novel properties and functions at nanoscale is different at macro scale level? (*the large surface area to volume ratio at the nanoscale leads to chemical reaction, where the law of physics change to quantum effects*)

**QUESTION 4: Own perception of the technology**

This section is to get interviewee own perception on the impact of nanotechnology. This is to identify the key benefits of nanotechnology and potential problems of nanotechnology could pose.

4a. What is the impact of nanotechnology in general?

4b. What do you think the beneficial impact of your own area of technology?

4c. Is there any potential problem of your own area of technology?

**QUESTION 5: Risks to Health, Safety and Environment (HSE)**

The section is to identify the potential risks that nanotechnology could pose to HSE. This uses as an indication of what is happening in the field and which might be useful of patent refusal on the ground of public order.

5a. Do you think that nanotechnology could pose any risk to human health, safety and environment? (this question is conditional upon Question 4.c)

Follow up: Whether the risk poses to your own areas or as a whole?

Follow up: If the answer in 5a is NO, then ask any dangers that nanoparticles/artefacts could cause diseases like mesothelioma as in asbestos case.

5b. Are there any programs or activities initiated to anticipate the matters so far?

Follow up: Would you suggest any programs or activities relevant to that?

**QUESTION 6: Trends and development of nanotechnology**

This section is to get the view of the trends and development of nanotechnology. The interviewees may provide with any statistical data, funding sources, projects under development/already developed, publications and research and development (R&D)

6a. What are the trends and development of nanotechnology at your organisation?

6b. What relevant scientific research at your organisation most significant to date?

6c. What types of research needs might be relevant to your organisation? (this may include the equipment and tools necessary to conduct the research in the technology)

6d. Does your organisation receives any funding from national and international organisation? (this includes the funding from the government and the industrial sectors)

6e. Does your organisation have strong collaboration with government and industry?

**QUESTION 7: Legal regime for nanotechnology**

This section examines whether the interviewees have any experience in IP system. This section asks whether to have specific legal regime for nanotechnology or otherwise.

7a. Do you have any personal experience in dealing with IP system? (for example as patent examiner or as an expert to give evidence in litigation)

7b. (if the answer is YES in 7a)... Do you think that current IP system is sufficient to govern the issues relating to this technology? (then go to Question 7d)

Follow up: Do you think that the research exemption enforcement is adequate?

7c. (If the answer is NO in 7a)... Then ask whether regulation related to environment and IP are relevant to nanotechnology? (then go to Question 7e)

7d. What are other types of regulation which could possibly be applicable to nanotechnology?

7e. How do you compare nanotechnology and other technology that preceded it for example...

(a) Biotechnology

(b) Semiconductor chips

**QUESTION 8: Commercialisation of nanotechnology**

This section is to know the practices of commercialisation aspect (strong or otherwise) at interviewee's organisation.

9a. Do you think that your organisation enjoys strong commercialisation of nanotechnology?

9b. What problems does commercialisation of nanotechnology raise? (*note whether interviewee aware of the copyright research exception)*

**QUESTION 9: The closing questions**

10a. Is there anything we have not covered in this interview that you think that relevant to my research/survey?

# APPENDIX 7
# INTRODUCTORY STATEMENT OF THE INTERVIEW

My name is Norain Ismail, having law background, and currently a PhD student at the Newcastle law school. My research concerns with the intellectual property rights over nanotechnology. The topic draws my attention because being an emerging status of technology it involves contentious issues and yet the discussion is still on the basic legal aspects of the law. The aim of my research is to assess the scope and development of nanotechnology in different selected legal jurisdiction and how it can be applicable to Malaysian context. In other words, the central idea of my research is to propose a legal framework to nanotechnology in Malaysia based on the approaches and experiences from other legal jurisdiction.

I am working at the university which encourage the staff to acquire knowledge relevant to the niche area of the university. This is in line with the university aspiration to become the world leading innovative and creative technical university. This conforms to the national aspiration to produce highly competent professionals. I believe undertaking of this research will enhance further contribution especially in the legal aspects of engineering and technology.

Nanotechnology is believed to have diverse effect and wide range application to human life. Worldwide research and development (R&D) has allocated a large sum to the technology investment. For example, a number of patent applications have increased, where United States takes a leading role, followed by Japan and Europe. Consulting literatures through European Patent Office website, suggests that by 2004, about EUR8 billion was devoted in nanotechnology Research and development (R&D) worldwide. Accordingly, by the year 2015, nanotechnology is expected to reach market amounted EUR1 trillion. Realising of the future importance of this technology, European Commission finances nanotechnology projects with approximately EUR500 million a year, which is likely to double over the next decade or two.[1]

Many view that intellectual property plays a vital role in protecting the new emerging technology like nanotechnology. The current state of intellectual property law will be tested for example involving the invention at the atomic and molecular scale. The inherent unique

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[1] Available at http://www.epo.org/topics/issues/nanotechnology.html

characteristics will eventually create a challenge in determining the right and possible legal avenue for nanotechnology. There are discussion concerning the comparative study relating to nanotechnology among Trilateral Offices members of the United States Patent and Trademarks Office (USPTO), EPO and Japanese Patent Office (JPO), at the 24th Trilateral Conference, Tokyo, 17 November 2006, which attested a comparative study concerning examination practices and exchange for information about the definition and classification in the field of nanotechnology.[2]

This interview will be conducted among the selected expert scientist. The experts are important because they represent a different scientific background across the range of disciplines (the expert is in line with the admissibility of expert opinion in the court). The experts are hoped to assist in identifying sources of information, and they are expected to give relevant weight of question of fact, opinion, experience and perception on the technology. In so doing, this interview hopes to learn the divergent discipline, the role play and the responsibilities of an expert; the interest and forthcoming interest of the technology as well as the trends of nanotechnology; the potential impact of nanotechnology and possible legal regime to nanotechnology. The selection criteria of those scientists are based on multidisciplinary in nature, patent listed, no overlapping publication, science and international networking.

[2] Available at http://www.trilateral.net/conf_sum/2006.pdf

# APPENDIX 1
# DOCTRINAL AND COMPARATIVE LEGAL ANALYSIS

## 1.1 Introduction of legal research

In this study, the methodological approach employs doctrinal and comparative legal analysis. This section examines the doctrinal and comparative analysis and justifies their usefulness and appropriateness for the current study.

Legal research relates to the various principles and relationship of "how the law works".[1] This is to understand the operation of the law and legal system in matters concerning the sources of law, operation of judicial precedent, equitable principles, statutory interpretation, the judicial decision making process and the relationship between domestic and international law.[2]
Kissam identifies the purpose of legal research broadly as to:[3]

(a) classify and categorise cases, statutes and other legal materials into separate legal elements;
(b) synthesis various elements of cases and statutes together into a consistent and useful legal standard or legal rules;
(c) clarify and resolve the doctrinal issue;
(d) produce teaching materials and all kinds of educational guides;
(e) understand legal doctrine or legal process by explanation of causes, analysing of consequence and interpretation of meaning; and
(f) critique legal doctrine or legal process as to whether appropriate methods are being used or whether the values are achieved.

Kissam's approach is significant in classifying, categorising and synthesising IP laws especially from Malaysia and the UK in order to identify the common rule which may be suitable for nanotechnology. In clarifying and resolving the doctrinal issues, this study examines how nanotechnology is protected under the current IPRs. However, according to (d), this is not the

[1] Stott D *Legal Research* (2nd edn) (London: Cavendish Publishing Limited, 1999), at p.1.
[2] Ibid, at pp.1-2.
[3] Kissam P C 'The Evaluation of Legal Scholarship' (1988) 63 Wash. L. Rev. 223, at pp.230-239, however admits that these purposes are complex and overlapping.

main purpose of this study to produce of teaching materials and all of educations guides, but it is hoped to have some values and practices in the future. In order to understand legal doctrine or legal process this study explains, for example the justification of the most appropriate form IPRs over the others. In analysing the consequence and interpreting the meaning, this study investigates for example what constitutes confidentiality in nanotechnology. This study also aims to critique whether the legal doctrine or legal process is appropriate for nanotechnology. Thus, the list provided by Kissam is relevant to this study and manages to validate the approach employed throughout this thesis.

This study adopts doctrinal legal research in analysing legal rules of IPRs and nanotechnology, both under Malaysian and UK law. This study also engages a comparative analysis of the law in Malaysia and UK as well as, where relevant, European laws and other international instruments. However, this wider and limited jurisdictional material may be treated as persuasive rather than authoritative. Therefore, in this study, doctrinal and comparative law are not treated mutually exclusive, but rather complement each other.[4] It is hoped that the approaches employed are able to reflect the aim of the study that is to assess the scope and development in selected legal jurisdictions in relation to IPRs over nanotechnology and to propose a legal framework for Malaysia.

### 1.2 Doctrinal analysis

Doctrinal analysis[5] tries to ask *"what the law is in a particular area"*.[6] It is a type of "black-letter"[7] rules in analysing, interpreting and clarifying of the legal rules and principles of the law.

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[4] The legal doctrinal itself plays a vital part to achieve the objective of comparative analysis, Warrington M and Van Hoecke M 'Legal Cultures, Legal Paradigms and Legal Doctrine: Towards New Model for Comparative Law' (1998) I. C. L. Q. 495, at p.522.

[5] Also known as *"traditional legal scholarship"*, Jones G *'Traditional' Legal Scholarship: A Personal View* in Birks P B H (ed) *Pressing Problems in the Law: What Are Law Schools For?* Vol. 2 (Oxford: OUP, 1996), at p.9; Dobinson and Johns in McConville M and Chui W H *Research Methods for Law* (eds) (Edinburgh: Edinburgh University Press, 2007) refer as *"theoretical legal research"*, at p.18; also called *"the definitive form of legal scholarship"*, Murphy W T and Roberts S 'Introduction' (1987) 50 M.L.R. 677, at p.677.

[6] Dobinson and Johns, n.5, at pp.18-19. This contrasts with the natural sciences research which tries to explain natural phenomena through causal relationship between variable, Chynoweth P *Legal Research* in Knight A and Ruddock L (eds) *Advanced Research Methods in the Built Environment* (West Sussex: Wiley-Blackwell, 2008) at p.30.

The formulation of legal 'doctrine' through the analysis of legal rules can be found in the primary legal materials such as statutes and cases.[8] The collection and analysis of the case law and relevant legislation are primarily important to demonstrate how the law has been developed in relation to the judicial reasoning and legislative enactment.[9] Traditionally, doctrinal analysis has been successfully applied in relation to legal analysis, legal synthesis and policy argumentation.[10] This is the prime task of legal scholars for the law to be in the future, as Lord Goff states that:

> "the prime task of the jurist is to take the cases and statutes which provide the raw material of the law on any particular topic; and, by a critical re-appraisal of that raw material, to build up a systematic statement of the law on the relevant topic in a coherent form, often combined with proposals of how the law can beneficially be developed in the future. There has thus been provided for all lawyers, practitioners and students, an established framework for the consideration of each problem as it arises".[11]

On the basis of authoritative texts of primary and secondary sources, the aim of doctrinal research is to systematise, rectify and clarify the legal rules.[12]

Doctrinal analysis plays an important role in developing legal system and has considerably been emphasised, Birks who advocates that *"traditional legal research and scholarship which criticises, explains, corrects and directs legal doctrine is still and must remain in the heart of the law school's research"*.[13] Similarly, Jones argues that:

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[7] Black's Law Dictionary defines "black-letter" as *"one or more legal principles that are old, fundamental, and well settled. The term refers to the law printed in book set in Gothic type, which is very bold and black"*; Black's Law Dictionary (9th edn) (United States: A Thomson Reuters); it *is "the black or Gothic type that was traditionally used in formal statements of legal principles or rules at the start of a section, which was typically followed by a descriptive exposition or commentary"* Salter M and Mason J *Writing Law Dissertation: An Introduction and Guide to the Conduct of Legal Research* (New York: Pearson, 2007) at p. 48, and at p.44, n.1; In emphasising the role of comparative law and black-letter rule, Örücü points out that *"traditional black-letter law-oriented (rule-based) comparative law research is normative, structural, institutional and positivistic, and would not use any approach other than the reading of statutes, cases, parliamentary debates and doctrinal works, and would regard description and identification to be the final stages of the inquiry"*, Örücü E *Methodology of Comparative Law* in Smits J M (ed) *The Elgar Encyclopedia of Comparative Law* (Cheltenham: Edward Elgar Publishing, 2006) at p.449.

[8] Chynoweth, n.6, at p.29; the doctrinal analysis is characterised by unique method of reasoning and analysis, Vick D W 'Interdisciplinarity and the Discipline of Law' (2004) J. Law & Soc. Vol. 31, No.2 163, at p.178.

[9] Dobinson and Johns, n.5, at p.19.

[10] Kissam, n.3, at p.234.

[11] Lord Goff 'Judge, Jurist and Legislature' (1987) 2 Denning L.J. 79, at p.92.

[12] McConville M and Chui W H *Research Methods for Law* (eds) (Edinburgh: Edinburgh University Press, 2007) at p.4.

[13] Birks P B H (ed) *Pressing Problems in the Law: What Are Law Schools For?* Vol. 2 (Oxford: OUP, 1996), at p.ix.

> "to dismiss doctrinal writing as expository is to dismiss the skills of synthesis, evaluation and criticism which have always been the hall-marks of leading texts and articles. It also ignores the fact that the doctrine is still the heart of English law".[14]

Therefore, according to Rhode doctrinal analysis remains the method of choice among the majority of legal scholars, because it requires no special expertise beyond what has been taught through the training of the traditional law school and this analysis has the capacity to influence and assist practitioners, judges and policy makers in drafting and implementing legislation.[15] However, Levmore claims that the doctrinal analysis requires intellectually demanding tasks by stating that:

> " the messy work product of the judges and legislators requires a good deal of tidying up, of synthesis, analysis, restatement, and critique. These are intellectually demanding tasks, requiring vast knowledge and the ability (not only brains and knowledge and judgment, but also Sitzfleisch) to organize dispersed, fragmentary, prolix, and rebarbative materials. These are tasks that lack the theoretical breadth or ambition of scholarship in more typically academic fields. Yet they are of inestimable importance to the legal system and of greater social value than much esoteric interdisciplinary legal scholarship".[16]

Thus, doctrinal research is not simply finding the correct legal rules per se, but the researcher also has to engage with the process of selecting and weighing materials based on the authoritative, hierarchical and social context of the interpretation of the legal rules.[17]

The function of doctrinal analysis is interpreting, analysing and evaluating legal rules and the legal system. Doctrinal analysis also plays a role as a basic building block of other studies such

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[14] Jones, n.5, at p.11; Doctrinal analysis is still dominant mode of legal scholarship, see Posner P A 'The Legal Situation in Legal Scholarship' (1980-1981) 90 Yale L.J. 1113, at p.1113; historically, theoretical and text-based doctrinal research have been dominated the law schools in the UK, see Genn D H et al. Law in the Real World: Improving Our Understanding of How Law Works' Report Summary, The Nuffield Inquiry of Empirical Legal Research, Nov 2006, at p.4.

[15] Rhode D L 'Legal Scholarship' (2001-2002) 115 Harv. L. Rev. 1327, at p.1339; the predominant effect of doctrinal has become synonymous to the legal study, Vick, n.8, at p.177.

[16] Levmore S 'In Memoriam: Bernard D Meltzer (1914-2007)' U. Chi. L. Rev. 409, Vol 74, No. 2, at p.437; Siems views that the overriding principles which have been developed by the legal scholar require them to construct the area of law in a consistent manner, Siems M M 'Legal Originality' (2008) 28 O.J.L.S. 147, at p.153; this formulation requires rigorous analytical skill, see also Jones, n.5, at p.14; the close reasoning and greater attention to textual context are themselves involved intellectual skills, Bradney A 'Law as a Parasitic Discipline' (1998) J. Law & Soc. Vol. 25, No.1, 71, at p.76; the doctrinal legal research was always evaluative and critical, see Tiller E H and Cross F B 'What is Legal Doctrine?' (2006) Nw. U.L.Rev. Vol. 100, No.1 517, at p.518.

[17] Dobinson and Johns, n.5, at pp.21-22.

as historical of comparative studies of law.[18] The other functions of doctrinal analysis are to describe and interpret the law beyond than just merely reporting the legal rules and to systematise the law by way of reinterpreting differing concepts, rules and principles.[19]

Apart from being emphasised as important, doctrinal analysis has also received criticism for being too theoretical without a real world application, as Rhode observes that:

> "much conventional legal analysis is not done well. It exhaustively exhumes unimportant topics or replicate familiar argument on important ones. Too little effort is made to connect law to life by assessing the real world consequences of analytic frameworks. Of course to do so in systematic fashion would require significant time, money, and expertise, which is precisely what most authors of doctrinal works are happy to avoid. The result is that on many key legal issues, we are glutted with theory and starved for facts".[20]

Not only that, some criticised doctrinal analysis as *being "merely descriptive or expository, or about the dry, mechanical application of rules*".[21] Collier has criticised doctrinal analysis as *"impoverishes the questioning spirit of both law student and teacher"*[22] and as *"an intellectual strait-jacket on understanding of law and society"*.[23] It also has been observed by Bradney that doctrinal research which used to dominate the law schools through the internal evidence of the court judgements and statutes has now entered its final death throes.[24] The criticism of doctrinal analysis according to Bradney appeared in two different situations i.e. it ignores the questions outside the legal range and treats them as something less important; and it concepts are complexed and complicated without able to bridge the gap to other disciplines.[25]

Although the accepted paradigm for legal research is legal doctrinal analysis due to new sources and the types of modern research, the emphasis has shifted requiring the researcher to engage in

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[18] Vick, n.8, at n.86, pp.177-178; see also Warrington and Van Hoecke state that doctrinal forms an essential part of any legal system, n.4, at p.522.
[19] Warrington M and Van Hoecke, n.4, at pp.523-528.
[20] Rhode, n.15, at p.1340.
[21] Vick, n.8, at p.179.
[22] Collier R 'The Changing University and the (Legal) academic Career – Rethinking the Relationship between Women, Men and the 'Private Life' of the Law School' (2002) 22 Legal Stud. 1, at p.19.
[23] Ibid, at p.27.
[24] Bradney, n.16, at p.71, however claims that this statement does not mean that doctrinal analysis is no longer done.
[25] Ibid, at pp.76-78.

a wider context rather than a restrictive doctrinal research methodology.[26] The trend of legal study has now changed, not only on purely "black-letter" law, but also other important approaches such as interdisciplinary, social-legal study, empirical study, comparative study etc.[27] It has been claimed also that the doctrinal research is too narrow in its scope and application because of reference primarily on the legal text, and the non-doctrinal approaches represent the broader approach taken into consideration of methods from other disciplines such as social sciences and humanities.[28]

The doctrinal analysis of legal rules is crucial for legal research and it continues to pervade legal research. This study is no exception and adopts the doctrinal analysis and approach. In relation to the IP protection for nanotechnology, the critical analysis has been engaged in analysing the appropriate and adequate legal rules protecting nanotechnology. However, the doctrinal analysis may not be able to satisfy all the questions relevant to IP protection for nanotechnology, as reflected from the criticisms of doctrinal analysis noted above and as Hutchinson's view that the researcher should be able to understand, appreciate and critique different available methodologies to build a more academic and critical view of law.[29] For this reason, this study does not attempt to treat doctrinal analysis in isolation or as the only important method for legal research but comparative analysis between Malaysian and the UK law will also be given consideration. This is because as Warrington and Van Hoecke argue doctrinal analysis provides groundwork and insights for the comparatists to reconstruct the legal landscape.[30] On the basis of

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[26] In addition to the doctrinal methodology, the legal researcher may engage in social science research such as qualitative and quantitative, comparative research, case studies, benchmarking and content analysis, Hutchinson T 'Developing Legal Research Skills: Expanding the Paradigm' (2008) 32 Melb. U. L. Rev. 1065, at pp.1082-1084; and, at p.1094.

[27] For an extended discussion of different types research in law, of not promoting or discrediting one after another see Siems, n.16 above; see also the discussion of legal research relationship at the core of humanities such as classic, history, philosophy and political theory in McCrudden C 'Legal Research and the Social Sciences' (2006) L. Q. R. 632; For an interesting exposition benefits of interdisciplinary approaches see Vick, n.8 above; for a good consideration of interdisciplinary legal scholarship, and why it develops rapidly and what future it may hold, see Posner R A 'Legal Scholarship Today' (2001-2002) 115 Harv. L. Rev. 1313; For a useful observation of the empirical legal research which is increasingly important for the policy makers, the judiciary, academics, practitioners and law reformers, see Genn, n.14 above.

[28] McConville and Chui, n.12, at p.5; See also Hutchinson T C and Burns K 'The Impact of "Empirical Facts" on Legal Scholarship and Legal Research Training' (2009) The Law Teacher, 43(2) 153, state that doctrinal legal research has never been taught explicitly to the legal researcher within the traditional legal territory, at p.161.

[29] Hutchinson, n.26, at pp.1086-1087.

[30] Warrington and Van Hoecke, n.4, at p.522.

historical and technological perspective, this study is trying to look at the scientific and legal principles underpinning nanotechnology in response to earlier technologies.

### 1.3 Comparative legal analysis

There is no decisive meaning of what might be considered as comparative law and comparative method.[31] Several attempts have been made to define the term comparative law and its method. Some scholars refer as the process of comparing legal system – Zweigert and Kötz, for example advocate that comparative law involves *"an intellectual activity with law as its object and comparison as its process"*.[32] Similarly, Gordley refers it as a process of comparing the law of different legal systems;[33] and De Cruz defines comparative law as a systematic study of the legal rules which seeks to compare two or more legal systems, legal traditions, or institutions as a method of comparing legal systems which produces results on the legal systems being analysed.[34] Some other scholars place emphasis on similarities and differences, for example Jansen claims that comparative law is a special legal subject which explores the similarities and differences of different cultural and social phenomenon.[35] Dannemann also demonstrates that *"comparing legal systems involves at least to some degree exploring both similarities and differences"*.[36] Husa notes that comparative study *"concern those who seek similarities, those*

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[31] Örücü E *Unde Venit, Quo Tendit Comparative Law?* in Harding A and Örücü E (eds) *Comparative Law in the 21st Century* (London: Kluwer Academic Publishers, 2002) at p.1 and admits that comparative law is a distinct subject on its own right, at p.4; see also comparative law has been perceived as a discipline and an independent subject in its own internal structure, see Samuel G 'Comparative Law and Jurisprudence' (1998) 47 Int'l & Comp. L. Q. 817, at p.817; but see different view by Gutteridge which emphasises that comparative law is a study and research in law, and not a distinct branch of law, Gutteridge H C *Comparative Law: An Introduction to the Comparative Method of Legal Study and Research* (Cambridge: CUP, 1946) at p.1. Gordley J 'Is Comparative Law a Distinct Discipline?' (1998) 46 Am. J. Comp. L. 607 states that comparative law is not a distinct disciplines, at p.607; Palmer V V 'From Lerotholi to Lando: Some Examples of Comparative Law Methodology' (2004) Global Jurist Frontiers, Vol. 4, Issue 2, 1 emphasises that comparative law is only a method and not a substantive body of knowledge, at p.2.

[32] Zweigert K and Kötz H *Introduction to Comparative Law* (2nd edn) (trans. Weir T) (Oxford: Clarendon Press, 1998), at p.2 add that should put extra dimension of internationalism, that is comparative of different legal system of the worlds rather than comparison of different rules in a single legal system; Örücü, n.31, disagree with this definition, states rather *"circular and vague",* at p.1.

[33] Gordley, n.31, at p.607.

[34] De Cruz P *Comparative Law in a Changing World* (London: Routledge and Cavendish, 2007) at p.232 and at p.4; see also Palmer, n.31, at p.2.

[35] Jansen N *Comparative Law and Comparative Knowledge* in Reimann M and Zimmermann R (eds) *The Oxford Handbook of Comparative Law* (Oxford: OUP, 2008), at p.306.

[36] Dannemann G Comparative Law: Study of Similarities or Differences? In Reimann M and Zimmermann R (eds) *The Oxford Handbook of Comparative Law* (Oxford: OUP, 2008), at p.384; see also Schlesinger R B 'The Past and

*who stress differences; those interested in western law, those interested to non-western law; those who are generalists and those who are country-specialists".*[37] Some include international dimension, for example Rheinstein discusses that *"comparative law has something to do with world outside of our own country, ... that it is concerned with law as a supra-national phenomenon".*[38] Similarly, Sacco explains that *"comparative law examines the way in which legal institutions are connected, diversified and transplanted from one country to another*".[39] Likewise, Wilson argues that comparative law provides advantageous for future development of the national legal systems.[40] Furthermore, as pointed out by Green comparative law provides special significance for the international lawyer.[41]

The growing interest for comparative legal research has become increasingly important. There is a large volume of studies describing the significance of comparative legal research. For example, Koopmans claims that the twenty-first century may be considered as the era of comparative methods and explains that:

> "Over the least ten or fifteen years the legal climate seems to be changing. There is more awareness that comparative methods may lead the lawyer somewhere, and that comparative materials may be a source of inspiration for legal decisions – whether by legislative bodies or by the courts. This evolution may be influenced by the process of European integration; it may also just result from the fact that we are living closer together (the "global village" situation); it may, finally, be an autonomous process, occasioned by the lawyer's search for fresh perspectives, in particular when completely new legal problems are to be solved".[42]

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Future of Comparative Law' (1995) 43 Am. J. Comp. L. 477 who states that *"to compare means to observe and to explain similarities as well as differences"*, at p.477.

[37] Husa J 'About Methodology of Comparative Law – Some Comments Concerning the Wonderland…' Maastricht Faculty of Law Working Paper 2007/5 downloadable via http://ssrn.com/abstract=1085970, visited on 12 January 2009, at p.5.

[38] Rheinstein M 'Comparative Law – Its Functions, Methods and Usages' (1968-1969) Ark. L. Rev. Vol. 22, No.3, 415, at p.415.

[39] Sacco R 'Legal Formants: A Dynamic Approach to Comparative Law (Installment II of II) (1991) 39 Am. J. Comp. L. 343, at p.388.

[40] Wilson G *Comparative Legal Scholarship* in McConville M and Chui W H *Research Methods for Law* (eds) (Edinburgh: Edinburgh University Press, 2007), at p.87.

[41] Green L C 'Comparative Law as a "Source" of International Law' (1967-1968) Tul. L. Rev. 52, at p.54, further explains that this purpose could be served by allowing him to seek a common rules of the local law and this form a basis for the international unification; in term of the universal concept of justice, it avoids lacunae for the court to decide upon international disputes; and in term of the development of the legal rules, it provides the general principles of laws with the aim of clarifying the existing law or allow the existing law to adjust to new social conditions, at p.66.

[42] Koopmans T 'Comparative Law and the Courts' (1996) 45 Int'l & Comp. L. Q. 545, at p.545.

Legrand also highlights the same contention that *"it is apt to say that Europe, or at least the Europe of the European Union is currently experiencing a comparative moment"*.[43] It is also worth observing Lord Goff's view on this that *"comparative law may have been the hobby of yesterday, but it is destined to become the science of tomorrow. We must welcome, rather than fear, its influence"*.[44] In addition to this, the growing interest in comparative study is witnessed over the last ten years, a period in which the number of article on comparative law has quadrupled.[45]

The main aim of comparative law is to acquire knowledge of different rules at comparison[46] that comparative legal research goes beyond the theoretical context.[47] The comparative method has considerable value and is of practical significance in assisting the court to fill the gaps in the legislation and case law or in matters that are not covered by statute or case law.[48] Furthermore, comparative legal research provides a greater range of solution because of different systems that are compared; in comparison to the analysis of a single legal system.[49] As far as the international dimension is concerned, comparative legal research facilitates in the discovery, elucidation and application of the *"general principle of law"* for the national and international courts to apply.[50] The comparative analysis also acts as a tool for the researcher towards universal theory of law, and to achieve international unification and harmonisation of the law.[51] This means that the investigation of the knowledge from other countries assists the researcher in better understanding the functions of the rules and principles of the law.[52]

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[43] Legrand P 'How to Compare Now' (1996) 16 Legal Stud. 232, at p.232.
[44] Lord Goff of Chieveley 'The Future of the Common Law' (1997) 46 Int'l & Comparative L. Q. 747, at p.748.
[45] Örücü, n.31 at p.2.
[46] Zweigert K and Kötz, n.32, at p.15; see also Sacco, n.39, at pp.4-6.
[47] Legrand, n.43, at p.233.
[48] Gutteridge, n.31, at pp.37-40; De Cruz, 34, p.21; Wilson, n.40, at p.88. In observing gaps of the law, according to Dannemann is like a blind spot in the eyes, which is very difficult to detect from within, unless such blind spot is compared with other system, n.36, at p.416-417. This is because comparative law is considered as blue prints models for legal reasoning and also models of law reform for better understanding of changing concepts, Örücü, n.31 at p.14.
[49] Zweigert and Kötz, n.32, at p.15.
[50] De Cruz, 34, at p.25.
[51] These objectives sometimes have been categorised as practical, sociological, political, or pedagogical, Örücü, n.31, at p.2, at n.7; see also Sacco, n.39, at pp.2-3.
[52] This aids the courts as a method of construction and interpretation of the disputed subject matters, Örücü, n.31, at p.14.

One of the most significant discussions among scholars is the right approach for comparative method. Zweigert and Kötz advocate a "functionalist" approach[53] which suggest that in comparing individual legal systems or groups of legal systems *"comparatist must strive to grasp these legal styles"*, and the factors which crucial to legal styles include historical background and development; characteristic mode of thought in legal issues; type of legal sources and the way to handle them and ideology.[54] Husa examines that the functionalist approach for comparative law should not be limited to the written law only, but should be prepared to consider a larger cultural, social, economic and ideological issues as a whole.[55] However, the functionality approach has been refuted by Palmer on the basis that one may not necessarily be interested to explore the function of the legal rules and principles, but instead it is only to understand, preserve and trace the evolution of another law.[56]

On the other hand, Palmer strongly suggests that comparative law should expand more on a practical level and submits that the strategies for comparative methodology should be viewed pragmatically, especially on the law in action and not merely the law in the book.[57] Palmer concludes that the best approach should be concerned, for example the specific purposes of the research.[58]

Similar to doctrinal analysis, comparative analysis has also received many criticisms. Gutteridge, points out that it is difficult for the comparative process to take place because comparative law employed broad areas and it tended to serve many purposes[59] Glendon describes *"the problem*

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[53] *"the basic methodological principle of all comparative laws is that of functionalist",* n.32, at p.34.
[54] Zweigert and Kötz, n.32, pp.67-68 (emphasis in the original).
[55] Husa, n.37, at pp.8-9.
[56] Palmer, n.31, at p.23, further argues that to claim functionality as a basic method for comparative law is actually an artificial restriction on the scope of one type of comparison over the other, at p.24.
[57] Ibid, at pp.33-34; see also Rheinstein states that comparative law is intellectually challenges and "a field of practical utility" n.38, at p.424.
[58] *"it cannot be a single exclusive method that comparative law research should follow. The tasks of teaching, research of law reform, or historical investigation are too varies and contingent to be achieved by a single approach. It would be a serious blow if all matters had to be analysed from one angle or perspective, or treated with the same detail and depth, or prepared to the same degree or in the same way",* n.31, at p.29.
[59] Gutteridge, n.31, at p.72; see also Legrand notes that *"before we talk about method, we need to know what is the point of the whole enterprise"*, Legrand 'John Henry Merryman and Comparative Legal Studies: A Dialogue' (1999) 27 Am. J. Comp. L. 2, at p.50; see also Leyland *"important to consider first what we are trying to achieve by undertaking comparative work"*, Leyland, *Oppositions and Fragmentations: In Search of a Formula for Comparative Analysis* in Harding A and Orucu E (eds) *Comparative Law* (Cheltenham: Edward Elgar Publishing, 2006), at p.221.

*of comparative law is one word "context" – to understand legal rule in any system, one must have some understanding of its social and economic background and its practical consequences in operation".*[60] She further emphasises that to compare means that one should go beyond comparing the rules as she points out that:

> "no matter how carefully limited the scope of project may be, one runs the risk of missing real functional similarities and differences unless one compares not only the rules themselves, but their social context and the manner in which they actually operate within their surrounding legal system".[61]

Legrand, queries on the basis the limit of comparison by asking that *"where law begins and where it ends and to what extent the contextual element ought to be pursued"*.[62] On the other hands, Glendon lists the problems of comparison in determining the subject matter of comparison, the validity of comparison, the efficiency of one model legal systems from the other legal systems and the policy consideration of the legal systems may not be similar.[63] The differences of language and uncertainty of the legal terminology are also the obstacles that comparatist encounters throughout the process of comparison especially when the foreign law is not given a proper definition.[64] The lack of rich intellectual range is one of the problems of comparative analysis, because comparatist fails to appreciate the comparison beyond a mere description of the legal rules.[65] Other than these obstacles, *"legal transplant"*[66] may also be perceived as one of the problems of comparative law. The relationship of comparative law and legal transplants has been recognised and explained by De Cruz:

> "comparative law remains useful and challenging enterprise that provides the methodological basis for identifying, interpreting and evaluating legal transplants; it thereby provides a vital step towards a

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[60] Glendon M A *State, Law and Family: Family Law in Transition in the United States and Western Europe* (Amsterdam-New York-Oxford: North-Holland Publishing Company, 1977), at pp.17-18.

[61] Ibid, at pp.17-18; This has also been suggested by Legrand to look beyond a mere legal rules where states that *"the danger of superficial comparison that overlooks the socio-cultural or the socio-historical context have been demonstrated by reference to examples that might suggest that deeper comparative inquiry is essential to avoid serious misconceptions",* n.43, at p.235; see also Leyland, n.59, at p.221.

[62] Legrand, n.43, at p.234.

[63] Glendon, n.60, at p.18.

[64] Gutteridge, n.31, at p.119; see also Leyland states that *"at practical level the translations of terminology can present a formidable obstacle"*, n.59, at p.215.

[65] Legrand, n.43, at pp.233-234; see also Leyland, n.59, at p.220.

[66] Watson refers "legal transplants" as *"the moving of a rule or a system of law from one country to another, of from one people to another. – have been common since the earliest recorded history",* Watson A *Legal Transplants* (Edinburgh: Scottish Academic Press, 1974) at p.21; *"at most times, in most places, borrowing from a different jurisdiction has been principally way in which law has developed",* Watson A *Society and Legal Change* (Edinburgh: Scottish Academic Press, 1977), at p.98. Other terminology for legal transplants is *"legal transposition",* Örücü, n.31, at p.13; *"borrowing and imitation"*, Sacco, n.39, at p.394.

> deeper and more understanding of the cross fertilisation of ideas across different jurisdictions, legal systems and cultures".[67]

Nevertheless, the importance of legal transplants has been emphasised as *"the most fertile source of development"*[68] and *"borrowing and imitation is therefore of central importance to understanding the course of legal change"*.[69] It is also importance to find a quick answer to similar legal problems[70] or having similar economical development between the countries.[71]

Comparing the laws means that it is necessary to look at other legal systems, however as warned by Lepaulle careful consideration should be observed when there is legal transplantation.[72] This is because as Shah illustrated the moving of legal rule from one place to the other as advocated by Watson seems not to consider the role of the culture of the "sending" or "receiving" society.[73] Fedtke notes certain difficulties that may occur when legal transplantation takes place such as to determine the types of law concerned, the extent to which legal transplantation takes place, the translation of the foreign language and the technical aspects of applying the new rules to the existing rules.[74] Legal transplantation may also be perceived as problematic because the lawyers failed to tackle the complexities of the law.[75]

In utilising a comparative analysis in this thesis, this study does not intend to follow any particular comparative approach, but rather analyse more flexibly and adopt contextual or practical analysis whenever deemed appropriate. This accords with Husa who emphasises that there should not be one method or approach, but comparatists should adopt many methods and

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[67] De Cruz, n.34 at p.119. See also "importance of "legal transplant" is central theme in current comparative law Schlesinger, n. 36, at p.13.
[68] Watson, n.66, at p.21.
[69] Sacco, n.39, at p.394; the same view that it is common situation of transferring one legal system to the other, and legal transplant has become the sources for legal change, Wise E M 'The Transplant of Legal Patterns' (1990) 38 Am. J. Comp. L. Supp. 1, at p.5.
[70] Atar N 'The Impossibility of a Grand Transplant Theory' (2007) Ankara Law Review Vol. 4, No. 2 177, at p.195
[71] Kahn-Freund O 'On Uses and Misuses of Comparative Law' (1974) 37 M.L.R. 1, at p.23.
[72] Lepaulle 'The Function of Comparative Law' (1922) 35 Harv. L. Rev. 838, at 839; see for example criticism of legal transplantation in Legrand P 'European Legal Systems are not Converging' (1996) I.C.L.Q. 52, at p.79.
[73] Shah P 'Globalisation and the Challenge of Asian Legal Transplants in Europe' (2005) S.J.L.S. 348 at p.348.
[74] Fedtke J *Legal Transplants* in Smiths J M (ed) *The Elgar Encyclopedia of Comparative Law* (Cheltenham: Edward Elgar Publishing, 2006), at pp.435-436.
[75] Comments on case Soo Boon Siong @ Saw Boo Siong v Saw Fatt Seong & Soo Hock Seang [2005] 5 M.L.J. 129 (High Court); [2008] 1 M.L.J. 27 (Court of Appeal), Salim M R 'Are Legal Transplants Impossible' (2009) Journal of Comparative Law, downloadable at http://ssrn.com/abstarct=1444684, at p.1, visited on 27 April 2010.

approaches that are contingent to the purposes of their research.[76] Since comparative legal study seeks to explore similarities and differences of the subject matters it will be advantageous for Malaysia because it has already shared the legal historical background with the UK.[77] From the perspective of IP protection in Malaysia, the earlier laws enacted were closely linked to the law in the UK. For example, before the introduction of the indigenous Malaysian Patent Act 1983 (PA 1983)[78], there were four pieces of laws governing patent system: the Registration of United Kingdom Patents Act 1951 for the Federation of Malaya; the Patents Ordinance for the State of Sarawak; the Registration of United Kingdom Patents Ordinance 1937 for the State of Sabah and the Patents (Rights of Government) Act 1967. This provides a good basis of comparative analysis of IP laws between Malaysian and the UK law. Similarly, before the introduction of the Malaysian Industrial Design Act 1996 (IDA 1996),[79] industrial designs were protected under different statutes: the United Kingdom Designs (Protection) Act 1949 for West Malaysia; the United Kingdom Designs (Protection) Ordinance for the State of Sabah; the Designs (United

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[76] Husa, n.37, at p.18, further explains that it would be more useful if comparatists define concretely the idea of flexible methodology.

[77] The reception of English law to Malaysia has been made through the section 3 and section 5 of the Civil Law Act 1956. Section 3 reads as follow:

(1) Save so far as other provision has been made or may hereafter be made by any written law in force in Malaysia, the Court shall –
   (a) in Peninsular Malaysia or any part thereof, apply the common law of England and the rules of equity as administered in England on the 7 April 1956;
   (b) in Sabah, apply in common law of England and the rules of equity, together with statutes of general application, as administered or in force in England on 1 December 1951;
   (c) in Sarawak, apply the common law of England and the rules of equity, together with statutes of general application, as administered or in force in England on 12 December 1949, subject however to subparagraph 3(ii);

Provided always that the said common law, rules of equity and statutes of general application shall be applied so far only as the circumstances of the States of Malaysia and their respective inhabitants permit and subject to such qualifications as local circumstances render necessary

Section5 reads:

(1) In all questions or issues which arise or which have to be decided in the States of Peninsular Malaysia other than Malacca and Penang with respect to the law of partnerships, corporations, banks and banking, principals and agents, carriers by air, land and sea, marine insurance, average, life and fire insurance, and with respect to mercantile law generally the law to be administered shall be the same as would be administered in England in the like case at the date of the coming into force of this Act, if such question or issue had arisen or had to be decided in England, unless in any case other provision is or shall be made by any written law;

In all questions or issues which arise or which have to be decided in the States of Malacca, Penang, Sabah and Sarawak with respect to the law concerning any of the matters referred to in subsection (1), the law to be administered shall be the same as would be administered in England in the like case at the corresponding period, if such question or issue had arisen or had to be decided in England, unless in any case other provision is or shall be made by any written law.

[78] Act 291, as amended in 1986 and 1993. The similar historical legal connection is also shown in industrial design and trade marks laws.

[79] Act 552.

Kingdom) Ordinance for the State of Sarawak.[80] Another example concerns trade mark law. Before the Trade Marks Act 1976 (TMA 1976)[81] came into effect, there were also different laws governing the trade marks: Trade Marks Ordinance 1938 for Straits Settlements which was closely modelled on the UK Trade Mark Act 1938; Trade Mark Ordinance 1950 for the Federation of Malaya; Trade Mark Ordinance 1949 for Sabah and Trade Mark Ordinance for Sarawak.[82] These examples provide a good basis of comparative analysis of IP laws between Malaysian and the UK law.

Other than the legal historical development, this study also examines the historical development across the technology. One of the methods was conducted by employing the qualitative interview between Malaysian and the UK key scientists. This study also investigates similarities and differences issues between nanotechnology with the previous technology, such as biotechnology and semiconductor chip and how the previous technological issues could be potentially relevant to nanotechnology. Both similarities and differences are also useful from the international perspectives. Other than comparing between the two legal systems (Malaysia and UK), the international treaty which is mostly relevant throughout the thesis is the Agreement of Trade-Related Aspects of Intellectual Property Rights 1994 (TRIPS). The comparative legal study also examines the approaches adopted in other Commonwealth countries for instance, Australia.[83] Thus, both similarities and differences either in terms of the legal or technological development between Malaysia and the UK jurisdiction, as according to Dannemann yields the best result when the researcher balances between discovering the common features and detecting contrasting features.[84] Moreover, the newly developing legal areas like Malaysia are inevitably concerned to adopt a more matured legal system like UK.[85] Whilst technological and economic developments in the UK are more advanced, however, both may share similar technological cycle although to some extent they may not be identical. Thus, the historical and technological

[80] For a general introduction of the historical background of industrial designs law in Malaysia, see for example Abdul Jalil J *Industrial Designs Law in Malaysia: Cases and Commentary* (Petaling Jaya: Sweet & Maxwell Asia, 2004), pp.1- 9.
[81] Act 175, as amended in 1994 and 2000.
[82] For an extensive discussion of the historical background of the trade marks law in Malaysia, see for example Kwang T B *Trade Mark Law and Practice in Malaysia* (Kuala Lumpur: Butterworth Asia, 2001) at Chapter 1.
[83] See Chapter 3 specifically relevant discussion for breach of confidence and nanotechnology on the basis of common law approach, judgment and cases from Australia will be treated persuasive.
[84] Dannemann, n.36, at p.401.
[85] Zweigert and Kötz, n.32, at p.41.

development as the basis for "transplants" between both systems, suggest that in the future the "transplants" could thrive in either way (from UK to Malaysia or Malaysia to UK).

The technique of comparing both similarities and differences is significant as part of an effort to improve legal rules which have been recognised as a problem by referring how other systems have solved the same problems.[86] The technique suggested by Zweigert and Kötz will be relevant to this study. In applying the technique in this study, the question is whether IP law relevant to nanotechnology creations has been successfully established in the UK; and followed by whether, the models law adopted from the UK could potentially work in Malaysia. In applying the second ~~questions~~, all the relevant context of Malaysia should be taken into consideration. These two questions are likely to be answered if, as quoted from Dannemann, the

> "unifying legal rules makes sense only if the problems experienced by the legal systems involved are at least roughly similar, and unification is more easily justified if the rules in the different systems involved produce identical or at least similar results".[87]

Despite these advantages, comparative approach may be criticised, for example the propriety of legal transplantation that is, of recommending imposing a law from one country into another. In applying and receiving a law from another country, there may occur incidents of less likely to consider the differences of culture, social, political and economy context of the receiving country.

Despite the difficulties in comparative law, it is nevertheless an importance tool for a better development, amendment and modification of the laws. The legal researcher plays a crucial role in examining and interpreting the function of the legal rules and principles.[88] Furthermore, the comparative legal analysis is significant when the law in one country is still new or rather non-existent, like Malaysia, to adopt the legal rules which has been established in other country, like UK particularly in the areas of IP protection for nanotechnology.

### 1.4 Interview technique

[86] Dannemann, n.36, at p.403.
[87] Ibid, at p.402.
[88] According to Palmer all lawyers by nature are comparatists, when they look, differentiate and deduce of the legal point, n.31, at p.1.

The interviews were combined with other methods of equipping the researcher with important technology and upcoming legal issues. A period of literature study and attendance at a conference in Leuven[89] which reported on the progress of an extensive EU funded programme and presented the views of scientific and legal experts for the US and Australia, as well as EU member states were undertaken. This combination of approaches enhanced the technical level of dialogue during interviews, thus optimising their effectiveness. The combined programme also facilitated a critical approach to the content of conferences and interviews (Table 1.1). This integrated approach of programme and interviews has worked successfully and interviewees' responses have been valuable to inform legal analysis and recommendations.

**Table 1.1: Approach of qualitative methodology**

| **Schedule** | |
|---|---|
| Activity | Date |
| Reading the scientific literature, under guidance of Prof Emeritus Peter Jones | Continuing until 2009 |
| Interview A | 3 June 2008 |
| Interview B | 25 September 2008 |
| Leuven Conference – Nanotechnology and the Law: The Legal Nitty-Gritty for Nanofoods, Nanocosmetics and Nanomedicines | 8 and 9 December 2008 |
| Interview C | 21 April 2009 |
| Interview D | 28 April 2009 |

### 1.4.1 Justification for qualitative interviews

From the interviews it was hoped to gain some insight into nanotechnology both under Malaysian and UK scientific development and legal jurisdiction as well as to equip the

[89] Conference on "Nanotechnology and the Law: The Legal Nitty-Gritty for Nanofoods, Nanocosmetics and Nanomedicines", Katholieke Universiteit, Leuven, 8 – 9 December 2008.

researcher with the scientific background and identify relevant legal issues of the technology. This is particularly important for new subjects because, as Stedward notes interviews may provide contemporary data on subjects which have not been thoroughly studied elsewhere or in which accessible literatures is still limited.[90] It is also a greater informative experience for the researcher to be able to observe the attitude of the interviewees to supplying the information which could be helpful in order to evaluate the information supplied.[91] The interview is flexible and encourages the researcher to probe any question or to follow up any questions which are relevant to the study or to turn back to the questions which need further clarification. Another reason for undertaking interviews was that it may provide the opportunity to motivate the interviewee to give accurate and complete information immediately.[92] Moreover, the opportunity is provided in the interview to guide the interviewee to interpret complex and abstract issues in the questions.[93]

The privilege of the interview however is balanced by certain disadvantages. For example, other considerations need to be taken into account, not only the time consumed[94] and the higher cost, but also the preparation for an interview, obtaining and setting up the interview, writing up the transcription and the notes as well as analysis of the content.[95] This can also be very difficult from one interview to another because of different situations and variables, for example, it all depends on the speed of the speech, clarity, pacing, complexity of vocabulary, accents of the interviewer or respondents, background knowledge and technical skill.[96] In this study, interviews were conducted with comparatively few key figures with a view to gaining expert insights into the field as well as optimising resources and minimising disadvantages, given the need to balance qualitative and doctrinal aspects of the thesis.

### 1.4.2 The objectives of the interview

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[90] Stedward G *On the Record: An Introduction to Interviewing* in Burnham P (ed) *Surviving the Research Process in Politics* (London: Printer, 1997) at p.151. At the outset of the research, legal analysis of nanotechnology issues was scarce and rather superficial in the published literature.
[91] Gorden R L *Interviewing: Strategy, techniques and Tactics* 3rd edn (Illinois: The Dorsey Press, 1980) at p.62.
[92] Ibid, at p.61; in contrast for example to a postal questionnaire.
[93] Ibid, at pp.61-62.
[94] Especially on the transcription of the interview, writing and translation if the interview conducted in a language other than English.
[95] Stedward, n.90, at p.152.
[96] Gorden, n.91 at p.223.

The use of interviews can be challenging and informative, but acts as a vehicle for bringing the research topic to life.[97] This type of qualitative research allows for greater expression and insights of the information than a self-completion questionnaire[98] and other non-face-to-face techniques[99] because people may talk and present their perspective in their own terms freely.[100] The same submission espoused by May, that conversations with people on a range of topics generate rich insights on issues such as biographies, experiences, opinions, values, aspirations, attitudes and feelings.[101] Thus, the aim of these interviews was to provide some insights for the researcher in analysing legal aspects along with confirming and augmenting scientific understanding of the technology[102]. Gorden contends that the purpose of the interview should be explained in a manner that the respondent understands because if the explanation is too narrow or too vague the respondent may not appreciate or connect the questions with the purpose of the interview.[103]

To make the process of interviewing successful, Harrison emphasises four basic requirements:[104]

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[97] Stedward, n.90, at p.151. The interview is referred as a tool of research by way of intentionally learning other's feelings, thoughts and experiences, Rubin H J and Rubin I S *Qualitative Interviewing*: *The Art of Hearing Data* (London: Sage Publications, 1995) at p.2.

[98] Because no one present to clarify any difficulty to respondents and having no opportunity from respondents to elaborate the point asked, see further in Bryman A *Social Research Methods* 3rd ed (Oxford: OUP, 2008) at pp. 218-219. Gray D E *Doing Research in the Real World* (London: SAGE Publications, 2004) states that interview approach is favoured where (a) need to acquire high personalized data; (b) having opportunity for probing; (c) a highly response rate, at pp.214-215. Bell J *Doing Your Research Project: A Guide for First-Time Researchers in Education, Health and Social Science* 4th edn (Berkshire: Open University Press, 2005) points out that adaptability in interview means that *"a skilful interviewer can follow up ideas, probe responses and investigate motives and feelings, which the questionnaires can never do"*, at p.157.

[99] For example survey and observational methods. Jones contrasts qualitative interview and survey interview as less structured in their approach and allowing individuals to expand beyond *'yes'* and *'no'* responses which are more common in case of survey interviews, Jones C *Qualitative Interviewing* in Allan G and Skinner C (ed) *Handbook for Research Students in the Social Sciences* (London: RoutledgeFalmer, 2002) at p.203.

[100] Harrison L *Political Research: An Introduction* (London: Routledge, 2001), at pp.74-75.

[101] May T *Social Research: Issues, Methods and Process* (Buckingham: Open University Press, 2001), at p.121. Kvale S and Brinkmann S *Interviews: Learning the Craft of Qualitative Research Interviewing* 2nd (London: SAGE, 2009) regard interview as conversational interest between parties involved whereby the knowledge is created "inter" the points of view of both interviewer and interviewee, at p.123.

[102] The researcher spent months in studying the relevant technology, so as to be able to understand the legal issues from a technologically informed standpoint and to conduct the interviews with a general understanding of the interviewees' work.

[103] Gorden, n.91, at p.215. The purpose of the interview should be clear and honest, Harrison n.100, at p. 97.

[104] N.100, at pp.96-97. Kvale and Brinkmann argue that there are no fixed criteria for good quality of interview, except rests upon the craftsmanship of the interviewer to gain knowledge of the research topic, sensitivity of the social relation between the interviewer and interviewee, an epistemological awareness as well as ethical consideration in conducting interview, n.101, at pp.174-175.

(a) Accessibility – the question on how to gain access to the relevant interviewees; and how to control the access through the gatekeepers;
(b) Objectivity – the 'closeness' of the interviewer and interviewee; and the objectivity of the language used and phrasing of the question;
(c) Cognition – the interviewee understands the purpose of the interview and the expected information obtained from him/her; and she/he must have access to relevant information;
(d) Motivation – to value the response from the interviewee and to maintain the interest of the interview session; the rules and the language used for the questions asked need to be taken into consideration.

Other than the process of the interview itself, similarly the researcher needs to posses certain traits to make the interview a successful one. A good example of these traits is set out by Gorden. He argues that the interviews need:[105]

(a) Flexibility – the interviewer to behave actively when it is called for, and passively when needed to facilitate communication;
(b) intelligence – allow the interviewer to clearly appreciate the objective of the interview; evaluate the information critically and probe the clarity and completeness; and
(c) emotional security – alleviate the interviewee from anxiety so that one may direct full attention to the flow of the response and keep up a good interpersonal relationship.

These criteria favour face-to-face meetings between the researcher and interviewees, on the interviewees' 'home' territory, with a set of carefully prepared questions that are comprehensive but designed not to 'lead' the interviewee to a particular response, with the flexibility to follow promising lines of conversation and avoid repetition.

### 1.4.3 The selection criteria

The sample used in this research partly followed the model of a snowball sample. Bryman states that this sample is a *"form of convenience sample"*.[106] The procedure is that the interviewer

[105] Kvale and Brinkmann, n.101, at pp.172-173.
[106] Bryman, n.98, at p.184.

contacts a small group of people relevant to the research and uses their information to make contact with others.[107] This study applied the same process by providing the initial interviewee with a table-list of scientists and seeking advice as to whether the people in the list were appropriate to interview or whether there were others who the initial interviewee thought could be a relevant person to interview. This approach led to the second interview. One might perceive that there could be a problem using of snowball sample, for example according to Bryman that it is very unlikely to be representative of a population.[108] However, this may be counteracted in a limited way by presenting interviewees with a pre-prepared list selected by reference to area of scientific interest.

The first interviewee (A) was identified based on his qualifications and his position in a particular nanotechnology department. In this regards, this interviewee was considered as the key person to inform the researcher comprehensively because he was able to speak across a full range of information. Drawing on the technique of the 'inverse snowball sample' advice from the first expert interviewed, along with the comprehensive nature of the information received in the first interview, informed and enabled the next selection to be made.[109] Thus, the second interviewee (B) was chosen to represent his position on business and the commercialisation dimension of nanotechnology. The first two interviewees were sufficient to meet the objectives of the interviews[110] and therefore, there was no need to extend the sample further.

The interviews were also conducted in Malaysia to gain comparative on the scientific development and the legal analysis. There were two interviewees chosen in Malaysia. The third interviewee (C) was identified based on his own qualification and experience, scientific networking as well as likely acquaintance himself with inventions and other forms of IP. His institution is a prominent nanotechnology institution and has been identified by the government of Malaysia among the established six nanotechnology centres. In parallel, the fourth interviewee

[107] Ibid, at p.184.
[108] Ibid, at p.185.
[109] When he has been given a list of the next person, he was not only agreed with the list, but also suggested the second interviewee. He also eliminated few names in the list. This is inverse snowball sample.
[110] The reasons for the selection of the first and the second interviewees were because there are departments dedicated to nanotechnology and the range of divergent of expertise in the Newcastle University. This is an independent valuation of their expertise and standing in a wider community because apart from their being located at the University where the researcher is doing her PhD, comparison of their profiles with those of scientists at other UK universities suggests that their expertise was the best suited to this research. The easy accessibility to researcher also supported the justification for choosing the institution.

(D) was also recognised on his distinct position in the institution as well as the training he received in nanotechnology related subject matter. Both were associated to contribute on the policy consideration for nanotechnology in Malaysia. The four interviewees ultimately chosen were considered leading nanotechnology experts and can explain the scientific and legal regime for nanotechnology both in Malaysia and UK.

They may be considered as special respondents because according to Gorden, they hold unique positions in their organisations which qualify them to give special information which are directly relevant to the objective of the study.[111] One interviewee, for example, characterised his own approach as "top-down" and another interviewee as "bottom-up" approach. This suggests that although the very small number of interviewees nonetheless reflects the variety of approach.

### 1.4.4 The significance role of an expert

Harrison states that *"in qualitative research, all interviewees are regarded as 'experts', that is, they have information in which we as students or researchers are interested"*.[112] The technique of the interview process to be analogous with the role of the scientific expert[113] in the courts. Prominent scientists are often called as such as those the researcher interviewed. In UK and Malaysia, expert witnesses in patent cases help to shape new development in the law by informing the courts understanding of new technologies.[114] Thus, evidence from technical experts is of considerable importance in developing and interpreting IP law. The researcher wished to adopt similar standards for the gathering of evidence for the thesis. In this concern, the process of the examination-in-chief in the court is perceived relevant in particular the avoidance of non-leading questions to the current study. That the court has given great significance to the

[111] Gorden, n.91, at, p.136 provides interesting guidelines criteria for selecting respondents - (a) who has the relevant information; (b) are they physically and socially accessible to have the information; (c) which persons are the most willing to offer the information?; (d) which persons are most able to give an accurate accounting of the information?, at pp.146-147.

[112] N.100, at p.98.

[113] An interesting experience in dealing with high technical patent cases and make a concluding remarks that *"there is no perfect way of going about expert evidence"*, Jacob R 'Court-Appointed Experts v Party Experts: Which is Better?' (2004) C.J.Q. 400, at p.407.

[114] SmithKline Beecham Plc v Apotex Europe Ltd [2004] EWCA Civ 1568; [2005] F.S.R. 23, at 543. The expert is important in patent cases to; (a) explain the technical terms; (b) instruct the court pertaining scientific principles; (c) show the scientific knowledge at the time of the grant; (d) explain the nature and characteristics of the invention, Malek H M et al. (eds) *Phipson on Evidence* 16th edn (London: S&M, 2005) at p.1025.

role of an expert relates not only to facts, opinions and experiences in the evidence adduced.[115] Their duties and responsibilities have been set out in particular detail in the case law and should be widely applicable.[116] They should possess relevant qualifications and experience in the relevant field of dispute, ability to draw logical opinion from the facts and have the quality to view a problem impartially.[117] The greater weight should be emphasised in giving their opinion independently, unbiased and truthfulness.[118] Lord Wilberforce in Whitehouse v Jordan[119] upheld the role of an independent expert:

> "it is necessary that expert evidence presented to the court should be, and should be seen to be, the independent product of the expert uninfluenced as to form or content via the exigencies of litigation. To the extent that it is not, the evidence is likely to be not only incorrect but self-defeating".[120]

Equally, experts may provide valuable assistance to the court by giving a series of seminars in the relevant aspects of technology and it has been perceived to be adopted in the future if the

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[115] As, in court, judges find the demeanour of witnesses gives a guide to the weight to be given to their evidence. The skill and training of the experts enable them to form opinions, to deduce conclusion from the observed facts and to identify facts which may be obscured from the eyes of lay witnesses, Malek et al., n.114, Ch 33 at p.972. Where the expert opinion is properly adduced, the tribunal may take into consideration of an expert's qualification, how has the expert obtained the qualification, the expert's credibility and the extent to which his evidence is based, Keane A *The Modern Law of Evidence* 7th ed (Oxford: OUP, 2008). The law has treated experts special sorts of witness whose power flowed from his own special knowledge, Jones C A G *Expert Witnesses: Science, Medicine, and the Practice of Law* (Oxford: Clarendon Press, 1994). Although the courts have increasingly relied on the scientific and expert evidence, the problem might be encountered by the courts on qualifications of experts, probative helpfulness of expert evidence, how to weight the novel and contested "scientific" findings and the role of experts in testifying the ultimate issue, Anderson T et al *Analysis of Evidence* 2nd edn (Cambridge: CUP, 2005). Dennis queries whether English law should have any specific threshold requirements for the reliability of the expert witnesses. The development of experts technique for analysing and interpreting evidence suggests to adopt a pragmatic approach in order to make expert witnesses are more reliable in the future, at pp.858-860, Dennis I *The Law of Evidence* 3rd edn (London: S&M, 2007). The higher standard of accuracy and objectivity should be required and seem to be provided due to the fact that the evidence of experts carries more weight than ordinary witnesses, Tapper C *Cross & Tapper on Evidence* 11th edn (Oxford: OUP, 2007). For an interesting discussion on the effect of ill-served of expert witnesses in the adversarial system of trial see McEwan J *Evidence and the Adversarial Process – The Modern Law* 2nd edn (Oxford: Hart Publishing, 1998); a good discussion of expert opinion in a monograph see Redmayne M *Expert Evidence and Criminal Justice* (Oxford: OUP, 2001).

[116] National Justice Compania Naviera SA v Prudential Assurance Co Ltd (The Ikarian Reefer) [1993] 2 Lloyd's Rep. 68.

[117] Mildred R H *The Expert Witness* (London: Long Group Ltd, 1982), at p.7. Their role as educator to assist party, lawyers and judges, see Bond C et al. *The Expert Witness in Court: A Practical Guide* 2nd edn, Burn S ed (Kent: Shaw & Sons, 1999) at p.61.

[118] Holborn C J et al. *Health Care Professionals as Witnesses to the Court* (London: Greenwich Medical Media Ltd, 2000), at p.30.

[119] [1981] 1 W.L.R. 246, at 256-257.

[120] This principle has been adopted in The Ikarian Refer [1993) 2 Lloyd's Reports 68.

technology was *"complex and undisputed"* and the parties have consented to it.[121] If the subject matter involved is highly technical, it is important that the expert put forward all relevant considerations to the issue to be decided because the court warned of the dangers of an expert acting as an advocate or holding back relevant information.[122] However, the court should give careful consideration not to accept the expert's personal view, instead of his reasons for that view.[123] Thus, the reception of such evidence resembles qualitative research techniques. By contrast the court tend to be impatient of qualitative or statistical techniques in IP cases for example the market survey evidence[124] as of little significance because of concerns on the technical flaws whilst preparing questions for the interview.[125] Put another way, the courts have been doubtful as qualitative methodologies and questionnaires. There seems here a clear parallel between legal literature of evidence and the research methodology literature.

### 1.4.5. Semi-structured interview

Bryman has contrasted the interview in qualitative research and quantitative research to the effect that qualitative interview is less structured because it emphasises generality in the formulation of initial research ideas and interviewees' perspectives.[126] Bryman further asserts that the flexible approach of the qualitative interview allows the interviewers not to stick to one particular schedule or guide; that they are free to ask new questions or follow up questions; and they may also emphasise in the research result important issues in the course of interview because what is important at this stage is that researcher expects rich and detailed answers.[127]

[121] Lord Hope of Craighead in Kirin Amgen Inc v Hoechst Marion Roussel Ltd [2004] UKHL 46, para 135.
[122] Cantor Fitzgerald International v Tradition (UK) Ltd [2000] R.P.C. 95, at 127.
[123] SmithKline Beecham Plc v Apotex Europe Ltd [2004] EWCA Civ 1568, at 543.
[124] Usually confined to trademarks and passing-off case.
[125] Lea G 'Masters of All They Survey? Some Thoughts upon Official Attitudes to Market Survey Evidence in U.K. Trade Mark Practice' (1999) I.P.Q 191 and suggests that the questions should be phrased in clear, simple language and elicit only necessary information to the subject matter concerned and if possible to encourage the interviewee to actively participate in survey proceedings, at p.225.
[126] Bryman, n.98, at p.437. The general accepted view that there are structured interview and semi structured interview. Some may refer to less structured interview or unstructured interview, however, the terms *'unstructured-interview'* is misnomer because it is impossible to have completely unstructured interview as it will always have structure and the interviewer is still keep control on the process of the interview, Wilson, n.40, at p.98; Salter and Mason, n.7, at p.62. Harrison categorises that unstandardised interview as including informal, focused, unstructured and free interview, unstructured-interview, n.100, at p.92.
[127] Bryman, n.98, at p.437.

Rubin and Rubin have submitted that qualitative interview is distinguished from data collection in social and political research because:[128]

(a) qualitative interviews are modifications and extensions of ordinary dialogue,
(b) qualitative interviews are more concerned with the understanding, knowledge and insights of the interviewees,
(c) the content, the flow of the idea and the choices of the topic may change in order to meet the interviewee's knowledge and feeling.

This research employed semi-structured interviews because, as May has pointed out, the interviewer is more flexible and freer to probe beyond the acquired answers and consequently enter into a very helpful dialogue with the interviewee.[129] This category of interview is non-standardised where the interviewer has prepared a list of issues or questions to be asked, but did not necessarily deal with all of them in each interview.[130] This interview approach was considered imperative because the researcher was interested to know the *'whys'*, the *'hows'* and the *'whats'* of the respondent's clarification and elaboration of the response.[131]

### 1.4.6 An introductory statement

Once the interviewees had indicated their willingness to participate[132], they were provided with an 'introductory statement'. This was to inform them briefly of the nature and approach of the interview and to ask for an appropriate date for the interview. The introductory statement was sent to the interviewee before the interview briefly to sketch out for the interviewee the nature, context, and expected result and the topic which will be covered in brief; outline the justification of the chosen topic; the selection criteria of the interviewee; the confidentiality issues of the

[128] Rubin and Rubin, n.97, at p.6.
[129] May, n.101, at p.123.
[130] Gray, n.98, pp.215-217 and explained that the flexibility may allow the order of questions to be changed or adding an additional questions including issues which were not anticipated at the beginning of the interview.
[131] Harrison, n.100, at p.92.
[132] The researcher is grateful for the assistance of her supervisor, Professor Alison Firth who initially sent selected potential interviewees emails approaching them for the interview. The emails were to inform the prospective interviewees of the purpose of the interview: to discuss on the scientific aspects of the technology and how the information obtained from the interview will allow the researcher to focus on her legal analysis of the IPRs for nanotechnology. The supervisor attended Newcastle interviews to effect introductions and she remained in attendance. This did not seem to affect the successful dynamic of the interviews. The supervisor was given opportunity to ask supplementary questions for her own interest and enlightenment but otherwise did not participate actively during the interviews. Subsequently she was able to assist with completing the record at one or two points where the tape recordings were not completely clear.

interview; the research and development of nanotechnology; the possible IPRs for nanotechnology.[133]

Introductory statement explained the emerging status of the technology draws the attention not only for being contentious but also the status of legal discussions especially in the context IP, is still at the very basic. For this reason, introductory statement explained that the interviews were very significant because they sought to examine the trend and development of the technology based on experiences of both Malaysia and the UK. To inform the interviewees attentively, the introductory statement gave an overview of the current trend of the research and development of nanotechnology including US, Japan and Europe. Moreover, the importance of IP protection was explained along the lines of general justification and problematic challenges posed by the current state of the law.

### 1.4.7 During interview

Normally, when the interview started[134] the researcher asked interviewees whether in particular they have understood, or would need further clarification on anything which was still unclear for them in the IS.[135] If the answer was affirmative, then the researcher dealt with any issues that arose before proceeding to the next step of giving the assurance on the issue of the confidentiality of the information given. The researcher gave assurance that the interviewees' names would be kept anonymous unless and until they gave permission to be cited explicitly. The interviewees were also given an assurance that the material they provided in the interview will be kept confidential until it was included in the thesis. The researcher then sought the interviewees' permission to be tape-recorded during the interview and asked further whether they would like to have a copy of the finding of the research from the interview.

[133] For some tips on good introductory statement see Bryman, n.98, at p.210.
[134] The first few minutes of an interview are important that the interviewer should show interest, understand and respect to the subject matter before the interviewee uncover his information and talk freely, Kvale and Brinkmann, n.101, at p.128.
[135] For example, interviewee C asked the relevancy the researcher with a legal background interviewing the scientist

In approaching[136] the interview, the researcher then outlined briefly the topics which to be covered in the interview. During the session, there should be strategies for establishing and maintaining good relationships between interviewer and interviewee.[137] Only then the atmosphere of the session becomes more neutral and free. For example, the session with interviewee C was conducted in the staff room in an informal setting. Normally the interview was conducted with little prompt[138] and the researcher should be aware of what is being said and be prepared to explore some issues in greater depth.[139] In the interview, the researcher skimmed through the sub-theme of the questions because with little prompt sometimes the interviewees have already covered the information although initially they have not been asked. At the end of the session, the researcher asked the interviewees permission to proceed with the transcription. The researcher asked all interviewees if they would like to have a copy of the finding of the research at the end of the study.

The interviews were very exciting, enriching and enjoyable experiences for not only an excellent cooperation during the interview sessions, but for the most important part is that they served the main purpose of doing interview. For example one of the interviewees in the Newcastle University was very generous with his time and information and he was volunteering to disclose very exceptional information in response to the prompting questions**.** In discussing the concept of nanotechnology too, one of the interviewees showed the researcher his invention on rice husk at the range of nanoscale, and another interviewee explained his booklet "the law of scale" quite extensively. He also kindly shared his experience and views on the technological development in Malaysia as well as gave the researcher copies of other documented reports on his institutional research and development.

Interestingly, the researcher also found fascinating with the used of certain techniques during the interview, for example as suggested by Bryman on the flash cards or show cards.[140] This technique seemed to work very well especially when the interviewee has been given a choice to

[136] There are considerably wide approaches to produce effective materials such as writing it down, or prompting, simple key-issues or an aid-memoire, Jones, n.99, at p.204.
[137] Jones, n.99, at p.208. The interviewee is unwilling to answer the question or may possibly cut the interview short if the interviewer has little rapport, Gray, n.98, at p.223.
[138] Jones, n.99, at p.205.
[139] Ibid, at p.204.
[140] Bryman, n.98, at p.207, this reasonably works well when the respondent is given a list of possible answers.

opt for the three different definition of nanotechnology quoted from the Royal Society and Royal Academy of Engineering, UK; the European Patent Office and the National Nanotechnology Initiative, US.

At the end of the interview, in order to make to that everything was covered in the interview, the researcher asked the question *"is there anything we have not covered in this interview that you think relevant to my research"*. According to Stedward this augments the rich generation of the original information.[141] This could be a back-up too if the interview has gone astray to deliberately balance the good points which have not been covered as well as to take advantage of the interviewee's knowledge.[142]

After the substantive interview session ended, the researcher thanked the interviewees for sharing their thoughts and interesting views and for bringing some helpful knowledge to the study. The researcher felt indebted for the time spent and gain fruitful conversation throughout the interview session.

### 1.4.8 The use of tape recording and the transcription of the tape

The researcher was granted permission to use tape-recorder during all the interview sessions. Inevitably, this device is helpful because the chance of getting the whole information is minimal unless the person is well-versed with shorthand.[143] Hence, the interview data in the interview was interpreted by verbatim transcription. As Jones emphasise that *"ideally interviews are transcribed verbatim"*.[144] One of the interviewees in Malaysia used Malay in the interview and the other one partly used English and partly Malay. Both of these interviews were transcribed verbatim, translated into English and paraphrasing the essence of relevant information. In view

[141] Stedward, n.90, at p.155. This gives interviewee additional opportunity to deal with issues he has been thinking or worrying him during the interview session, Kvale and Brinkmann, n.101, at p.129.
[142] Stedward, n.90, at p.158.
[143] Because the quality of the interview sometimes is undermined for deliberately focusing on note-taking rather than actually listening to what has been said which of course affect for verbatim text, Harrison, n.100, at p.93. Kvale and Brinkmann note that rather than involve a simple clerical task, transcription is considered as an interpretative process where series of practical and principal issues arise in transforming oral speech into the written text, n.101, at p.177. It also allows the interviewer to concentrate on listening, interpreting and re-focusing the interview, Gray, n.98, at p.227.
[144] Jones, n.99, at p.210.

of that, the time required for transcription was greater.[145] In this study, the shortest time took for the interview was approximately 60 minutes, and the longest time took for about 120 minutes. Hence, the average time taken for transcription almost 8 to 10 hours of verbatim text for at least 13-15 long typed pages. Ideally because of its laborious works, it is advisable to transcribe while the mind is still fresh with the interview and by reference to the notes taken during the interview session.[146] However, using the tape recorder may not always be practicable, especially in a noisy environment.[147] Furthermore, the technical interruption may occur using tape recorder for run malfunction, or miss a crucial sentence or respondent who speak very softly.[148]

### 1.4.9 Ethical and confidentiality issues

Finally, it is worth noting that in these interviews the ethics of confidentiality[149] was given utmost importance. In certain situations the confidentiality issue can be really difficult to maintain and the reason why the respondents are reluctant to have information published is because to a certain extent his position may in some way be identified.[150] If this happens, it has been suggested that the researcher needs to further mask identity or seek approval for disclosure from the interviewee.[151] To that effect, the researcher gave reassurance the interviewees names will remain anonymous unless permission was given to reveal the information. In this respect, at the end of the interview session, the researcher asked each of the interviewees if they would like

[145] Harrison, n.100, at p.102.
[146] Ibid, at p.102. In addition to the tape-recording, note taking and transcribing into the text, Stedward suggests effective note taking may be in the form of contextual information, for example with the inclusion of the impression, observation and expansions of the interview, n.90, at p.161. Ideally, in the qualitative report, the writing style has to be rich, convincing and readable, Rubin and Rubin, n.97, at p.268. See also the reflexion on the feminist research in interviewing women MPs by Puwar N 'Reflections on Interviewing Women MPs – Sociological Research Online (1997), available online at http://ideas.repec.org/a/sro/srosro /1996-19-1.html , visited on 18 Feb 2009.
[147] Stedward, n.90, at p.152.
[148] Jones, n.99, at p.207 and suggests to back-up with note taking although arguably it will affect eye-contact during the session.
[149] More often present in psychological experiments or sociological or social anthropological field, Rees R *Ethical Issues* in Allan G and Skinner C (ed) *Handbook for the Research Students in the Social Sciences* (London: RoutledgeFalmer, 2002) at p.142. The protection involves *"secure storage data; restricting access to raw data; obtaining permission for subsequent use of data; publication of research findings in a manner that does not allow for ready identification of subjects; destruction of raw data"* O'Leary Z *The Essential Guide to Doing Research* (London: SAGE Publications, 2007) at p.54.
[150] Gorden, n.91, at p.219.
[151] O'Leary, n149, at p.54. Kvale and Brinkmann argue that in certain situation, for example journalistic interview, interviewees might wish to be credited with their full name for the time spent and information provided, n.101, at p.73.

to approve the transcription of the interview. One interviewee kindly allowed the researcher to proceed with the transcription, stating that he would like to have a copy of the findings at a later stage. On another occasion the interviewee expected an explicit permission if the information is very likely involved confidential information of the institution.

### 1.5 Conclusion

The doctrinal analysis plays an important role in the development of the legal system. Doctrinal research has become the prominent method for the legal research and continues to be a popular method among legal researchers. However, it was also subjected to criticism for being too theoretical and of no real world application. Thus, as a complement to the doctrinal analysis, the comparative legal study is adopted in this thesis. The comparative approach extends not just to law, but also to scientific and practical considerations. In this thesis, the contrasting comparison of the technological experiences and views of the Malaysian and UK scientists enable the researcher to better appreciate the significant interplay of the law and science in the two jurisdictions. Furthermore, this comparison provides a focus for the researcher by which the gaps in Malaysian law may be identified and analysed.

Although interviews conducted in this study were treated as anecdotal rather than substantive, nonetheless they offer a rich analysis and some insights for this thesis. The interviews acquainted the researcher with significant technological and legal issues that are helpful in this thesis.

# APPENDIX 2
# CENTRE OF EXCELLENCE FOR NANOTECHNOLOGY AND PROPOSED ACTIONS IN MALAYSIA

**Table 2.1: Centre of excellence for nanotechnology in Malaysia**

| **Institute /University** | **Application** | **Funding (RM million)** |
|---|---|---|
| Institute of Microengineering and Nanoelectronics (IMEN), UKM[1] | MEMS | 38.2 (MOSTE) |
| Ibnu Sina Institute for Fundamental Science Studies (IIS), UTM[2] | Nanochemistry | 20 (IDB)[3]<br>11(MOSTE) |
| Combinatorial Technology and Catalysis Research Centre (COMBICAT), UM[4] | Catalysts | 15 (MOSTE) |
| Glycolipids Research Centre, UM | Nanomaterials/Surfactants | 11.2 (MOSTE) |
| Advanced Materials Research Centre (AMREC), SIRIM Berhad | Nanocomposites | Unknown |
| School of Physics, USM[5] | Electronics (Blue LED) | 22.5 (MOSTE) |
| School of Medical Sciences, USM | Molecular Nanotech | 2.2 (MOSTE) |
| Institute of Advanced Technology (ITMA), UPM[6] | Electronics, Nanomedicine | Unknown |

Source: The SIRIM Report[7]

There is also a new institute established called Institute of Nanoelectronics Engineering, in UniMaP.[8] This has become one of the focused regional centres in nanoelectronics engineering for the Northern Corridor Economic Region (NCER)[9] in the areas of nanobiochips, photonics, non-volatile memory devices, novel devices and smart sensors.[10]

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[1] National University of Malaysia.
[2] Technology University of Malaysia.
[3] Islamic Development Bank.
[4] University of Malaya.
[5] Science University of Malaysia.
[6] Putra University of Malaysia.
[7] Final Report, Research Survey for Implementing Nedo's International Cooperative Research Project for Development Support Projects in Asian Countries (Malaysia) Environmental and Bioprocess Technology Centre, (2006) ETC237/16/586 (R045/06) SIRIM Berhad available http://www.tech.nedo.go.jp/PDF/100008942.pdf (SIRIM REPORT).
[8] Perlis University of Malaysia.
[9] It is government initiatives to maximize economic potential at the northern regions of Peninsular Malaysia and to bridge the economics gap between regions.
[10] Hashim U et al. 'Nanotechnology Development Status in Malaysia: Industrialisation, Strategy and Practices' (2009) Int. J. Nanoelectronics and Materials 2, No. 1, at p.7.

The tables below show the research undertaken in various research groups on given prioritized areas.

**Table 2.2: Advanced materials and sensors**

| Application | Areas | Head/Institute | Funds |
|---|---|---|---|
| Metal Industry | Metal Composites | AMREC | MOSTI |
| Chemical industries<br>- acrylic acids<br>- oleochemicals<br>- surfactants | Catalysts,<br>Catalyst support,<br>Adsorbent | COMBICAT, UM | MOSTI |
| | Catalyst<br>Adsorbent | Institut Ibnu Sina, UTM | MOSTI<br>MOHE[11] |
| Nanoelectronics | Chemical sensor | UTP[12] | MOSTI |

Source: The MNNI[13]

**Table 2.3: Electronics and communications**

| Applications | Areas | Head/Institute | Funds |
|---|---|---|---|
| Automotive | MEMS and Microsensors/ Organic Electronics | IMEN UKM, UPM, VLSI | MOSTI |
| GMR | Electronics | AMREC | MOSTI |
| Blue Light Emitting Devices | Electronics | USM | MOSTI |
| Advanced optical crystal for electro-optic application | Electronics | UTM, UM, UPM | MOSTI |

Source: The MNNI[14]

**Table 2.4: Medicine and Health**

| Application | Areas | Head/Institute | Funds |
|---|---|---|---|
| Biopharmaceutical proteins for human therapeutics drugs and vaccines | Nanomedicine | UPM | MOSTI |
| Bone graft substitutes | Nanomaterial | MINT[15], SIRIM, USM, UKM, UIA[16] | MOSTI |

[11] Ministry of Higher Education.
[12] Petronas Technology University of Malaysia.
[13] http://www.nano.gov.my.
[14] http://www.nano.gov.my.

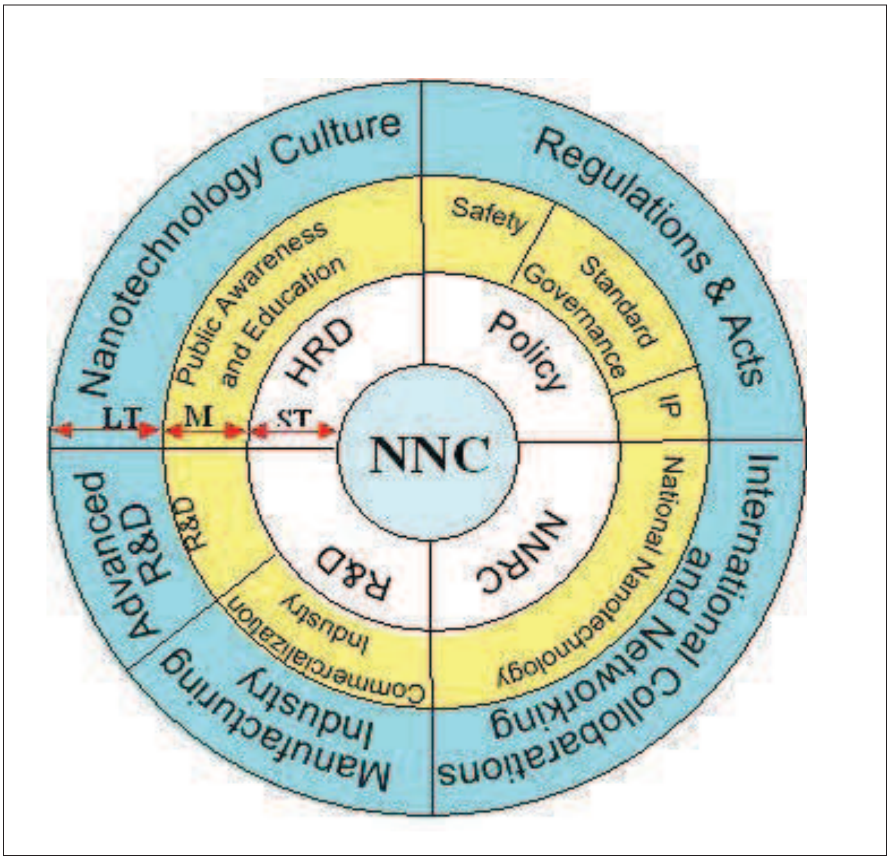
| | | | |
|---|---|---|---|
| Diagnostic kits for infectious diseases | Nano-device Molecular Nanotechnology | USM | MOSTI |
| Antioxidants in preventing degenerative damage in Down syndrome and ageing | Nanomedicine | UKM | MOSTI |
| Vaccine production against infectious diseases | Nanomedicine | USM | MOSTI |
| Oncology: Liver cancer | Nanomedicine | UM | MOSTI |
| Diagnostic kit for diabetic vasculopathy | Nanomedicine | UM | MOSTI |
| Antibiotic resistance | Nanomedicine | UM, USM, VRI[17], MOH[18] | MOSTI |
| Drug Synthesis | Nanomedicine | UiTM[19] | MOSTI |

Source: The MNNI[20]

Figure 2.1 below shows the key actions for nanotechnology that have been proposed for Malaysia in the Short Term, Medium Term and Long Term

**Figure 2.1: Key proposed actions for nanotechnology**

[15] Malaysian Institute of Nuclear Technology Research.
[16] International Islamic University of Malaysia.
[17] Veterinary Research Institute.
[18] Ministry of Health.
[19] MARA Technology University of Malaysia.
[20] http://www.nano.gov.my.




Source: The MNNI[21]

[21] http://www.nano.gov.my.

# APPENDIX 3
# THEORY OF PROPERTY

The court in the UK and Malaysia are reluctant to accept proprietary rights in information. Furthermore, the implied and equitable obligation for ex-employee may have the potential of difficulty for the court to determine the obligation that arises between the parties. Furthermore, in the cross-border movements and exchange of ideas and information the proprietary analysis may provide a useful ground of protection.

This **Appendix 3** examines theory of property by Honoré and to what extent it applies to nanotechnology context; discusses the rights, duties, limitation and other elements which form part of the standard incidents of ownership.[1] He also suggests that an individual must at least hold some of these incidents for the rightful ownership, although does not necessarily mean that he should hold all of them. A property framework provided by Honoré may be an effective method of exploring issues arising from nanotechnology and confidential issue. This theory shows that how nanotechnology information might be controlled and used. Since nanotechnology involves collaborative research project, this theory of property may be important in determining the ownership of nanotechnology information.

## The right to possess

According to Honoré, the right to possess means that the person has an exclusive physical control over the thing. He divides the legal control into two; (a) the right to be put in exclusive control of a thing; (b) the right to remain control. He maintains that the other should not have the right without the permission, or unless the laws provide otherwise. The question that relevant here whether the parties able to have physical control over the information? The word "exclusive physical control over the thing" seems very unlikely to fit well with nanotechnology information. This is because it is very unlikely to prove that the person has physical control over the confidential information of nanotechnology. Nonetheless, an important element of the case law is the efforts made to keep information secret. For example, when the information has been treated

[1] Honoré T *Making Law Bind* (Oxford: Clarendon Press, 1987) original version published in Oxford Essays in Jurisprudence, Guest A G (ed) (1961) at pp 161-192.

with limited access, or put it under locked or key access, or has been encrypted with secret or special code, this situation could satisfy the criteria of "right to possess" because unauthorised person would not have the right to control over the information.

**The right to use**

The right to use includes the "use", "management" and "entitlement to income" which overlap with the right to manage and the right to income. He also refers the right to use encompasses owner's personal use and enjoyment of the thing owned. This is likely relevant to nanotechnology information because it gives right to the owner to enjoy and use of the information.

**The right to manage**

This right demonstrates how and by whom the thing owned shall be used. The right to manage for the use and exploitation according to Honoré may includes for example the right to licence, the right to make contract, the right to use of others' things. In the nanotechnology information, this could mean that the owner of the information has the power to determine the terms regarding to licence, make contract or use. The existence of know-how licensing suggests that this could be satisfied.[2] Know-how is used to describe a license of confidential information with some level of accuracy i.e. the licensee should be shown the means on how to use the information into practicality.[3] This is because simply disclosing the information does not make the licensee to make effective use of the information.[4] Thus, in nanotechnology, the licensee should be shown the practicality of the information for example by exhibiting that the properties behave differently at nanoscale.

**The right to income**

[2] See 3.2.
[3] Hull J 'Trade Secret Licensing: The Art of the Possible' (2009) J.I.P.L.P, Vol.4, No.3, 203, at p.206.
[4] Ibid, at p.206.

The income is derived from the use of a thing. Honoré refers this right as surrogate of use; where allowing other to use the thing in return for a reward. With regards to nanotechnology information, this occurs when the owner allows other persons to use the information. In return, the owner would receive a kind of reward, for example in term of the money or any commercial investment for example as in Douglas v Hello![5] where commercial interest of photographic images of a celebrity wedding were recognised by the court.

**The right to capital**

According to Honoré this right is having an economic aspects consists the most important right - the power to alienate; and the liberty to consume, waste and destroy either whole or part of a thing. The person can exercise the right during his life or on his death by way of sale, mortgage, gift or other mode. In nanotechnology information, the person may choose to publish the information, thereby destroying confidentiality, or may choose to keep it secret thereby to accord the protection.

**The right to security**

The right of the owner to remain in the position of his property and entitle for adequate compensation for any expropriation made. In other words, without adequate compensation, the owner will not be forced to give up his property. This right may not be applicable to nanotechnology information, because any expropriation will make the information available and lose its confidentiality. However, the question may arise here, whether the owner of the information has to be forced for the disclosure, such as for the interest of the public? This means that if it is proved that the information has considerably affected the interest of the public; the owner of the information will not have the right to secure his information.

**The rights of transmissibility**

[5] [2005] EWCA Civ 595; [2007] UKHL 21.

This right is described as the owner of having interest in transferring his ownership to another person by of giving them away, through its sale or at the owner's death through a will to successors. In nanotechnology information, it has been argued that the information may involve by more than one person and this would rather difficult to maintain the secrecy once the information has been transmitted to another person, by giving it away, or by sale or upon the death of the owner. The information can be transmitted, but it is difficult to "alienate" in the sense of original holder losing knowledge of it.

**The incident of absence of term**

The right is given to the owner to enjoy the right for indeterminate of time without appearing some contingencies such as bankruptcy, sale in execution or state expropriation. For this, the owner has indeterminate duration of ownership to enjoy his right without unjustifiable reasons regarding his right over his property. This right may be applicable to nanotechnology information if the information has been kept secret for indeterminate of time. But the problem may arise in nanotechnology as multidiscipline and a lot of people involved and is very difficult to maintain the confidentiality as some people may disclose the information.

**The duty to prevent harm**

This is the duty of the owner not to use the thing owned that may harm others and duty to prevent other from using to harm other members of society. This right may be relevant to nanotechnology information on the basis that the owner of the information does not have the right to use the information that harms others. For example, the use of nanotechnology information should be prevented if it is believed that it can violate or risk the environment.

**The liability of execution**

The right concerns with the liability of the owner's interest in their debts either can be taken away by execution for a judgement debtor or insolvency. Their property may be liable to be seized for the payment of the debt. This is unlikely to be relevant to the discussion for confidential information generally or in the nanotechnology context.

**The incident of residuary character**

The ownership of the property may be expired or abandoned, and in certain circumstances the other person will have the corresponding right of the property. In relation to nanotechnology information, information abandoned in the sense of lost; nobody is capable of possessing the right. If confidential information is abandoned, i.e. the information made available to the public, third party cannot claim for breach of confidence.

The adaptability of Honoré's theory shows that the rights, duties and other elements are required to give account on ownership are indeed may be applicable to nanotechnology information. This theory shows that nanotechnology information may be considered as property in the sense of controlling and using as well as determining the ownership of the information. For example, in case of ex-employee who wishes to move to another company, the theory can protect the information if the implied or equitable obligation are not able to solve the issues. Furthermore, in the cross-border transmission and exchanging of information and ideas, this theory may be helpful to protect the flow of the information. Thus, if the court moves to characterise the information, although it is not much hope in the UK, the court in Malaysia might be influenced by the decision in the Hong Kong's court,[6] to take the proprietary lead will be sound.

[6] In Linda Chih Ling Koo, John Ho Huang Chiu v Lam Tai Hing where the Hong Kong's Court took the view that confidential in university researchers' questionnaires could be protected as proprietary analysis. In this case Bokhari J considered that proprietary rights can be used to restrain the use of confidential information, and concluded *that "a man's entitlement to keep his confidential information confidential, and to recover compensation of such information is misused, is not confined to what can be achieved under contract or through the intervention of equity where the information was imparted trusting the recipient to keep the same confidential. There is a proprietary interest in confidential information; and there is jurisdiction in the Courts to intervene to preserve such interest or award compensation for harm done to it*." (1993) 23 I.P.R. 607, at 632. See comment on this case, Hull J 'Proprietary Rights in Questionnaires: An Academic Question in the Hong Kong Court of Appeal' (1994) E.I.P.R. 104; see also Loh E 'Intellectual Property: Breach of Confidence?' (1995) E.I.P.R. 405.

Nevertheless, this may not be possible to achieve in the near future since both jurisdictions, Malaysia and UK have reluctance to accept the stance of proprietary analysis of the information.

# APPENDIX 4
# THE EUROPENA PATENT OFFICE NANOTECHNOLOGY CLASSIFICATION

**Table 4: 1 The EPO nanotechnology classification**

| Code | New Code | Class/Fields | Example |
|---|---|---|---|
| Y01N2 | B82Y5 | Nanobiotechnology | *Nanocapsules as carrier systems for therapy and pharmaceutical treatment<br>*Biomolecular motors<br>*Molecular arrangements for biocatalysts<br>*Pre-targeting with peptides or antibodies<br>*Host-guest complexes in targeted drugs<br>*Ultrasound imaging or radioactive pharmaceutical preparations |
| Y01N4 | B82Y10 | Nanotechnology for information processing, storage and transmission | *DNA computing<br>*Quantum computing<br>*Single electron logic<br>*Nanotube displays<br>*Biomolecules for electronics and data storage<br>*Read heads with nm precision |
| Y01N6 | B82Y30 | Nanotechnology for materials and surface science | *Nanoparticles, nanocomposites, dendrimers, nanotubes and fullerenes<br>*Supramolecular systems<br>*Ultrathin functional films<br>*Self assembling monolayers (SAM)<br>*Hydrogen storage in nanostructured materials |
| Y01N8 | B82Y15 | Nanotechnology for interacting, sensing or actuating | *Measurement of physical, chemical, biological properties at surfaces with nm-resolution<br>*Measurement of interfaces with lateral resolutions in the nm-range<br>*Normalisation routines for nanoanalytics<br>*Measurements of size distribution of nanoparticles<br>*Tools for ultraprecision engineering like Scanning Probe Microscopes<br>Use of quantum dot labels for analysis biological material |
| Y01N10 | B82Y20 | Nanooptics | *Optical quantum well structures<br>*Photonic crystals<br>*Quantum optics<br>*Optical surfaces with nm surface precision |
| Y01N12 | B82Y25 | Nanomagnetics | *Low dimensional magnetism |

| | | | |
|---|---|---|---|
| | | | *XMR technologies such as magnetoimpedance, anisotropic magnetoresistance, giant magnetoresistance, tunnelling magnetoresistance |
| | B82Y35 | Methods or apparatus for measurement or analysis for nanostructures | |
| | B82Y40 | Manufacture or treatment of nanostructures | |

Source: Scheu M et al., at p.207; and the EPO[1]

[1] Available at http://www.epo.org/topics/issues/nanotechnology.html

# APPENDIX 5
# INTERVIEW ANALYSIS

## 5.1 How to define nanotechnology?

For this question, one of the interviewees expressed the view that to define nanotechnology is not difficult for scientists because they are the ones who work in this field. Two of the interviewees defined nanotechnology as the ability to manipulate things at the scale of 1nm to 100nm, and at this scale there is sudden change of the properties with different characteristics such as strength and chemical reactivity.

## 5.2 What is the effect of sudden change of properties from macro-scale to nano-scale?

All of the interviewees agreed that the effect of sudden change of the quantum effect would bring the properties to behave differently. According to them, many properties can be exploited at this scale with new particles, different structure and a lot of opportunity. The opportunity would also give advantage to develop novel products, different functionality, accessible new areas, manipulating new areas and new process.

## 5.3 What are areas of interest in nanotechnology (in general)?

For this question, all of the interviewees viewed the important areas in nanotechnology being medical applications. One of the interviewees gave as an example sensory device in detecting molecules in the blood or detecting diseases that quickly bring the result as compared to the normal diagnosis system, and drug delivery system. The other two interviewees gave the example of developing nanomachine called “nano-bot” that manages to go through the blood and detect the cell system, for example cancerous cells. Other examples given by the interviewees were analysis of the DNA by developing a lab-on-chip system, as well as the application for agricultural, environmental and clean energy.

Three of the interviewees agreed that other than medical application, nanotechnology is also important in consumer products such as nano-cream that helps skin cell preventing from acne and scars, or the using of titanium oxide in compact powder. One of the interviewees viewed upcoming areas of interest in nanotechnology as the micro-system business areas, in particular contract of manufacturing; defences application and electronic systems.

### 5.4 What are their personal areas of interest?

The personal interests of the interviewees were different. One of them is involved in nano-electronics, another involved in the business type of contract of manufacturing, one involved in chemistry working on the zeolite, and aerogel using rice husk at the range of 1 to 100nm. One of the interviewees works in photonics and bio-mimetic (the technology that mimics nature).

### 5.5 Is nanotechnology new?

Two of the interviewees pointed out that nanotechnology are not new because it has been around us for many years, for example clay involving nano-composites was used during Greek period and the Egyptians preserved the dead people using nanotechnology. But one of the interviewees agreed that it is new now in the way we understand the technology and this technology is expected to mature in the next 100 years. They all agreed that it is only recently that nanotechnology has been actively explored.

### 5.6 What is the nature of nanotechnology?

All of the interviewees agreed that nanotechnology is not a single or focused discipline as compared to other disciplines. They mentioned that because of the different areas involved in nanotechnology it might engage people to work collaboratively and across disciplines including persons from medicine, science and engineering. One interviewee mentioned that nanotechnology not only involved people from technical and engineering aspects, but should also involve persons from legal, religious and social sciences fields. Another interviewee had a similar view by stating that nanotechnology is different from other technology because it integrated between sciences and its application and people involved are have different background and they must work in a team.

### 5.7 Are there any safety, environment and health (SEH) issue that nanotechnology could pose?

One interviewee mentioned that the ethical and environmental issues are likely to occur in the chemistry field, for example the use of nano-particles in sunscreen and other beauty and cosmetic treatment, on the issue whether they have toxicological effect. The same interviewee has also queried whether nano-particles would have the similar effects like asbestos. The same interviewee also doubted whether it is ethical to the use the materials until the effects are known or whether the precautionary principle should be adopted. However, according to this interviewee there is less concern of SEH in medical technology and nano-electronics. The interviewee doubted whether currently there is any toxicological effect of nanotechnology to the environment and mentioned that the UK government are working hard on this issue. The interviewee suggested that there should be a serious study on chemical engineering to see whether there was any nanotechnology risk in that area.

One of the interviewees pointed out that with the effect of quantum mechanics, where there are sudden changes of properties; nanotechnology behaves differently with different function, effect and properties. He stated that it is unlikely that they would be informed about something which is unsettled like nanotechnology on its health and environmental issue. One of the interviewee also stated that there is likely more concern with the danger of nanoparticle especially when inhaled to the body in terms of its health and safety. For that reason, according to him, there are people who study nano-safety. One of the interviewees stated that whether nanotechnology is dangerous depends upon how it is handles. Therefore, according to this interviewee people are intimidated by nanotechnology and fear the term “nano-bot” that could have the dangerous effect. However, he expressed that nano-bot is just DNA molecule acting as a robot that can go through the body, for example in detecting some disease.

## 5.8 Are there any activities or steps taken to minimise the potential risk posed by nanotechnology?

In prompting this issue, one of the interviewees stated that in two or three years time the environmental toxicological data at nanoscale should be recognised. He added that there is activity for the engagement of the public such as works done by the Policy, Ethics and Life Science Centre (PEALS). The other activities made, as one of the interviewees mentioned was that through conferences, seminars and workshops on nanotechnology. One of the interviewees mentioned a company which had written in its Annual Report on the impact of nanotechnology particularly in the industrial sectors and predicted the applications of nanotechnology on the consumer products.

### 5.9 What are the trends and development of nanotechnology?

One of the interviewees stated that he was involved in the contract of manufacturing for process development, i.e. to do things that incorporated new development process. Therefore, as he commented further, there are a lot of collaborations with the industry and joint fund with the government agency. One of the interviewees suspected and hoped that there should be a nanotechnology policy for Malaysia in the future and currently Malaysia is the member of the Asia Pacific Nano Forum (APNF) to form a nanotechnology working committee. One of the interviewees regarded nanotechnology as the "technology in the 21$^{st}$ century" and stated Malaysia should identify the niche areas that researchers can participate to do research. Another interviewee stated that the niche areas that Malaysia needed to identify must be the areas that other countries have not explored yet. He opined that this is a good opportunity for Malaysia and would bring advantages for Malaysia.

### 5.10 What are the intellectual property rights that are relevant to nanotechnology?

Two of the interviewees viewed patent as the most relevant for protecting nanotechnology, one of the interviewees agreed that all forms IP protection are relevant for protecting nanotechnology, one interviewee mentioned that the most IP best timing for nanotechnology is non-disclosure in the contract of manufacturing. In other words, he involved in maintaining of the confidential information by way of non-disclosure agreement between customers. Another interviewee agreed where he stated that the post-graduate students will be required to sign the non-disclosure agreement to make sure that all information relevant to the research conducted are being kept in confidence and not flowing out from the university. He warned that whenever someone has good information about something, based on his own personal experience, the information should not be disclosed to anyone. This is because the information might have some value which is worth IP protection. Two interviewees mentioned that trade marks in particular are relevant, for example concerning the shape of carbon nanotubes and the used of the word "nano".

### 5.11 Whether the current IP system is sufficient protection for nanotechnology?

One of the interviewees held the view that some element of nanotechnology related to intellectual property can be tackled using the existing framework, and some of the elements are challenged by the existing system. He analogised to the semiconductor industry (for example in Texas Instrument), because at the beginning of technology patent protection was not regarded as important until the technology matured. One of the interviewees held the view that nanotechnology has to fit to the existing regulation, because new technology has to cope with the existing regulation, and that it is undesirable to have specific regulation for nanotechnology.

### 5.12 To what extent is the current IP system sufficient to address the issues related to nanotechnology?

For this question, one of the interviewees mentioned the challenge of the different size of nanotechnology could bring. He gave the example of metal alloy at the macro scale with the range at centimetre level; he queried whether metal alloy at nano-scale can be patented again? He understood that the matter is still not fully settled, and according to him this is the big issue and important to consider i.e the length scale from macro to nano scale is relevant, and it could be argued also that there is no important different between the two scales. He also queried whether it can be patented or not when the only difference is in size? He stated that since a lot of investment is needed to develop products at nano level, if the patent is not allowed, the useful technology might be inhibited (because the function of patent is promoting innovation and creating incentive). Thus, according to this interviewee, many companies may close down and the product would never reach the market.

Another interviewee made the point that it will always be a guess as to whether the current IP system is sufficient or not... He expressed the view that whenever new technology emerged, there would be a lack of experts at the patent office in accessing the documents. Thus, according to this interviewee, this could affect whether or not the patent is broadly granted. He further stated that as the new technology progresses to the application, the early patent will lose its value. This is because according to him generally a lot of time required to develop new invention. He gave the example in software industry on how to write the code using microscope and in genetic patent on the issue whether the discovery in genetics could patented? He however expressed doubts as to whether these issues are fundamental to nanotechnology.

When prompted with this issue, one of the interviewees pointed out that the patent examiners need to have the expertise so that whenever application is made they have the ability to distinguish whether the product is novel or not, and not simply to reject any application that looks similar between macro-scale products and nano-scale products, for example his product on nano-membrane was rejected because it was stated that it was not new. He also mentioned that in term of nanotechnology standardization, he expected that Malaysia will adopt the standard for nanotechnology under ISO TTC/299.[1] This matter of adoption of standardisation is still under discussion in Malaysia. According to this interviewee standardization is very important for nanotechnology especially in term of the size, particle and safety.

As to the word "nano" one of the interviewees held the viewed that nowadays the word "nano" is very popular and everyone is rushing to put the word "nano" in their products. He suggested that if the word "nano" is to be used, it has to make sure that the "nano" enhancement has been put in the products. This is because, people are simply put nano word, for example in cosmetic for example "Nano Silver". The interviewee gave the example of Taiwan which has already introduced the "Nano Mark" to control the use of "nano" word, that if the word "nano" is to be used, the product needs to go a testing in order to make sure that it actually contains nanotechnology. He suggested that this could be adopted by the Standards and Industrial Research Institute of Malaysia (SIRIM)[2] for nanomaterials testing and measurement. The popular use of the word "nano" was also an issue raised by another interviewee. The other interesting issue relevant to trade marks mentioned by one of the interviewees was the shape of carbon nanotubes either in single-walled, double-walled and multi-walled, and current law was sufficient to address the issue.

[1] This is standard for classification, terminology and nomenclature; metrology and instrumentation; science-based health; safety and environmental practices; and nanotechnology products and processes, see more at Hatto P ISO/TC 229 – Nanotechnologies, ISO Committee Chairs Conference, Geneva, 5 June 2008, available at http://www.iso.org/iso/search.htm?qt=ISO%2FTC+229&searchSubmit=Search&sort=rele&type=simple&published=on; see also at http://www.iso.org/iso/iso_technical_committee?commid=381983; http://www.who.int/ifcs/documents/forums/forum6/ppt_nano_hatto.pdf accessed on 22 February 2010.

[2] Especially relevant for nanotechnology may be providing technical standard and quality, and certification, inspection and testing for nanotechnology, see generally at http://www.sirim.my/web/core.

### 5.13 How did they compare nanotechnology with previous technology?

One of the interviewees analogised nanotechnology with the semiconductor chip industry. According to him, at the early time, as happened to Texas Instruments, patents were not very popular until the technology matured. During this time, companies were not worried to patent their products, and they would wait until the technology matured. One of the interviewees stated that naturally biotechnology is nanotechnology because of the working on DNA. According to him, it has been predicted that after biotechnology there would be nanotechnology and there is strong relationship between nanotechnology and biotechnology for example as in biosensors, genomic and proteomic. Another interviewee agreed that biotechnology is part of nanotechnology.

### 5.14 Does nanotechnology enjoy strong commercialisation?

Two of the interviewees viewed that in Malaysia nanotechnology does not enjoy strong commercialisation because commercialisation is still low in Malaysia. The area which has enjoyed some commercialisation is in nanoparticle, but this does not yet apply in the high technology. One of the interviewees pointed out that his department has enjoyed a lot of commercialisation in nanotechnology; has developed and considered his department as commercialisation organised system.

# APPENDIX 6
# QUESTION FOR INTERVIEW

**QUESTION 1: Interview subject information**

This section is to learn about the expert (warm-up questions). This section represents the general question including interviewee's background, their qualification (training or experiences), their divergent of disciplines, the role play and their responsibilities.

1a. What is your title?

1b. How long have you been in this current position?

1c. Would you like to tell me something about your work and your responsibilities? (Please comment on how far your responsibilities extended throughout the organisation)

1d. How did you qualify? Did you qualify by training or by experiences?

1e. What is your areas of interest? (omit if already answer under 1c)

**QUESTION 2: Organisation's information**

This section is to learn more of the organisation in investigating the different disciplines involve in the organisation. The goal is to identify research conducted in various areas of nanotechnology with specific expertise. This will determine/indicate the specific and forthcoming areas of interest in nanotechnology at the organisation.

2a. Would you like to tell me something about your organisation's works?

2b. What different types of nanotechnology does your organisation works with?

2c. Which areas would you say are the most important areas of nanotechnology in your organisation?

2d. What would be the forthcoming areas of interest of nanotechnology in your organisation or other spheres that you know? (for example Malaysia)?

2e. Why do you think the trends of discipline have evolved in such a way? (the underlying factors)?

**QUESTION 3: Defining nanotechnology**

This section examines the effect between classical and quantum physics at the nanoscale. This is to understand how nanoscale structures behave differently as compared to the macro-scale.

3a. How do you explain the effect of sudden changes that have novel properties and functions at nanoscale is different at macro scale level? (*the large surface area to volume ratio at the nanoscale leads to chemical reaction, where the law of physics change to quantum effects*)

**QUESTION 4: Own perception of the technology**

This section is to get interviewee own perception on the impact of nanotechnology. This is to identify the key benefits of nanotechnology and potential problems of nanotechnology could pose.

4a. What is the impact of nanotechnology in general?

4b. What do you think the beneficial impact of your own area of technology?

4c. Is there any potential problem of your own area of technology?

**QUESTION 5: Risks to Health, Safety and Environment (HSE)**

The section is to identify the potential risks that nanotechnology could pose to HSE. This uses as an indication of what is happening in the field and which might be useful of patent refusal on the ground of public order.

5a. Do you think that nanotechnology could pose any risk to human health, safety and environment? (this question is conditional upon Question 4.c)

Follow up: Whether the risk poses to your own areas or as a whole?

Follow up: If the answer in 5a is NO, then ask any dangers that nanoparticles/artefacts could cause diseases like mesothelioma as in asbestos case.

5b. Are there any programs or activities initiated to anticipate the matters so far?

Follow up: Would you suggest any programs or activities relevant to that?

**QUESTION 6: Trends and development of nanotechnology**

This section is to get the view of the trends and development of nanotechnology. The interviewees may provide with any statistical data, funding sources, projects under development/already developed, publications and research and development (R&D)

6a. What are the trends and development of nanotechnology at your organisation?

6b. What relevant scientific research at your organisation most significant to date?

6c. What types of research needs might be relevant to your organisation? (this may include the equipment and tools necessary to conduct the research in the technology)

6d. Does your organisation receives any funding from national and international organisation? (this includes the funding from the government and the industrial sectors)

6e. Does your organisation have strong collaboration with government and industry?

**QUESTION 7: Legal regime for nanotechnology**

This section examines whether the interviewees have any experience in IP system. This section asks whether to have specific legal regime for nanotechnology or otherwise.

7a. Do you have any personal experience in dealing with IP system? (for example as patent examiner or as an expert to give evidence in litigation)

7b. (if the answer is YES in 7a)... Do you think that current IP system is sufficient to govern the issues relating to this technology? (then go to Question 7d)

Follow up: Do you think that the research exemption enforcement is adequate?

7c. (If the answer is NO in 7a)... Then ask whether regulation related to environment and IP are relevant to nanotechnology? (then go to Question 7e)

7d. What are other types of regulation which could possibly be applicable to nanotechnology?

7e. How do you compare nanotechnology and other technology that preceded it for example...

(a) Biotechnology

(b) Semiconductor chips

**QUESTION 8: Commercialisation of nanotechnology**

This section is to know the practices of commercialisation aspect (strong or otherwise) at interviewee's organisation.

9a. Do you think that your organisation enjoys strong commercialisation of nanotechnology?

9b. What problems does commercialisation of nanotechnology raise? (*note whether interviewee aware of the copyright research exception)*

**QUESTION 9: The closing questions**

10a. Is there anything we have not covered in this interview that you think that relevant to my research/survey?

# APPENDIX 7
# INTRODUCTORY STATEMENT OF THE INTERVIEW

My name is Norain Ismail, having law background, and currently a PhD student at the Newcastle law school. My research concerns with the intellectual property rights over nanotechnology. The topic draws my attention because being an emerging status of technology it involves contentious issues and yet the discussion is still on the basic legal aspects of the law. The aim of my research is to assess the scope and development of nanotechnology in different selected legal jurisdiction and how it can be applicable to Malaysian context. In other words, the central idea of my research is to propose a legal framework to nanotechnology in Malaysia based on the approaches and experiences from other legal jurisdiction.

I am working at the university which encourage the staff to acquire knowledge relevant to the niche area of the university. This is in line with the university aspiration to become the world leading innovative and creative technical university. This conforms to the national aspiration to produce highly competent professionals. I believe undertaking of this research will enhance further contribution especially in the legal aspects of engineering and technology.

Nanotechnology is believed to have diverse effect and wide range application to human life. Worldwide research and development (R&D) has allocated a large sum to the technology investment. For example, a number of patent applications have increased, where United States takes a leading role, followed by Japan and Europe. Consulting literatures through European Patent Office website, suggests that by 2004, about EUR8 billion was devoted in nanotechnology Research and development (R&D) worldwide. Accordingly, by the year 2015, nanotechnology is expected to reach market amounted EUR1 trillion. Realising of the future importance of this technology, European Commission finances nanotechnology projects with approximately EUR500 million a year, which is likely to double over the next decade or two.[1]

Many view that intellectual property plays a vital role in protecting the new emerging technology like nanotechnology. The current state of intellectual property law will be tested for example involving the invention at the atomic and molecular scale. The inherent unique

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[1] Available at http://www.epo.org/topics/issues/nanotechnology.html

characteristics will eventually create a challenge in determining the right and possible legal avenue for nanotechnology. There are discussion concerning the comparative study relating to nanotechnology among Trilateral Offices members of the United States Patent and Trademarks Office (USPTO), EPO and Japanese Patent Office (JPO), at the 24th Trilateral Conference, Tokyo, 17 November 2006, which attested a comparative study concerning examination practices and exchange for information about the definition and classification in the field of nanotechnology.[2]

This interview will be conducted among the selected expert scientist. The experts are important because they represent a different scientific background across the range of disciplines (the expert is in line with the admissibility of expert opinion in the court). The experts are hoped to assist in identifying sources of information, and they are expected to give relevant weight of question of fact, opinion, experience and perception on the technology. In so doing, this interview hopes to learn the divergent discipline, the role play and the responsibilities of an expert; the interest and forthcoming interest of the technology as well as the trends of nanotechnology; the potential impact of nanotechnology and possible legal regime to nanotechnology. The selection criteria of those scientists are based on multidisciplinary in nature, patent listed, no overlapping publication, science and international networking.

[2] Available at http://www.trilateral.net/conf_sum/2006.pdf