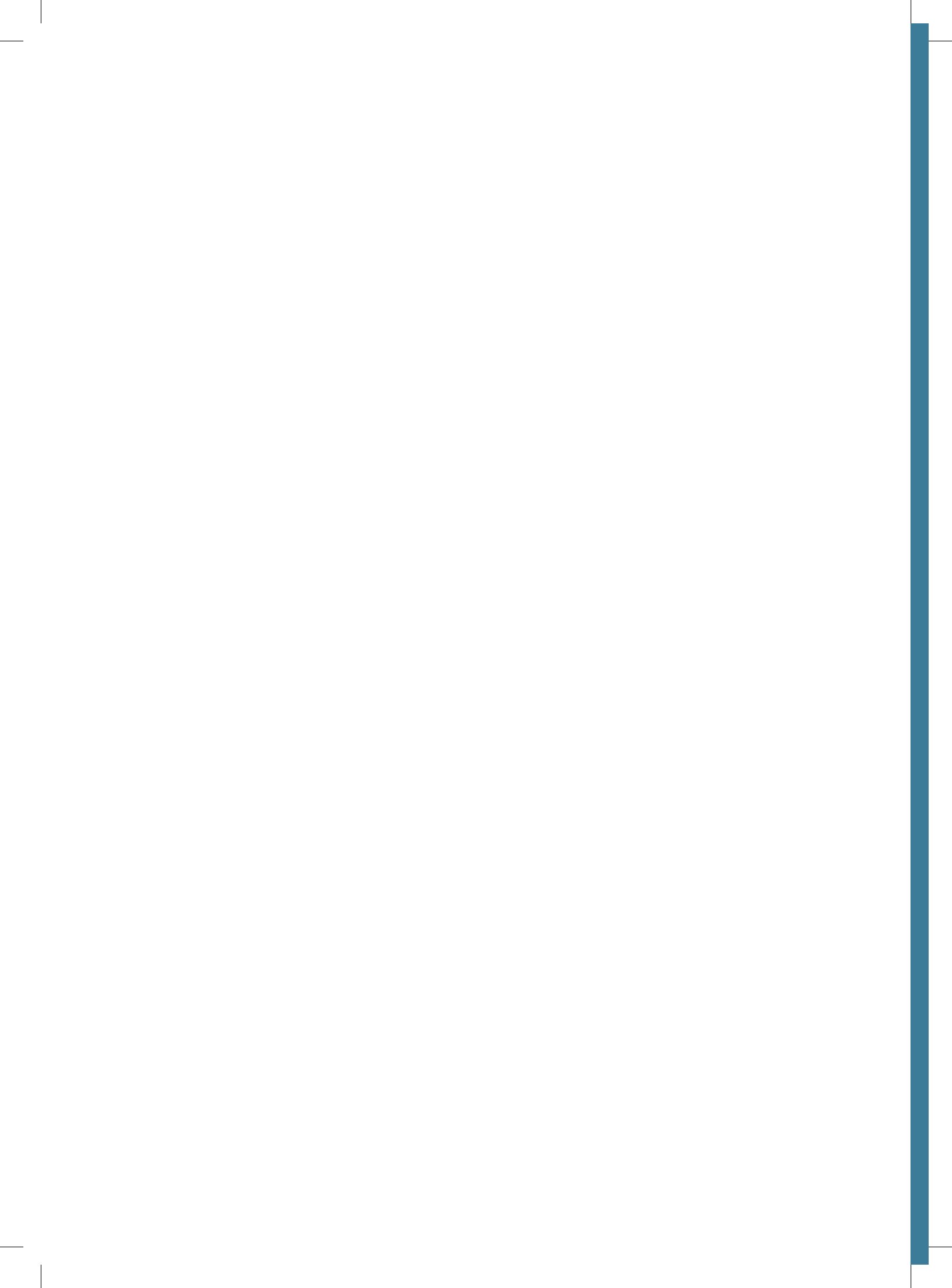


## RESEARCH PERSONALITY

Distinguished Professor  
Datuk Dr. Harith Ahmad

## RESEARCH HIGHLIGHTS CENTRE OF EXCELLENCE

## RESEARCH FOR THE BETTERMENT OF SOCIETY



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**Professor Dr. Noorsaadah  
Abd. Rahman**  
*Acting Deputy Vice  
Chancellor, (R&I)*

Dear All,

It is time again for us to keep you informed and updated on some of the activities that have happened in UM pertaining research and innovation. Firstly, on behalf of the IPPP's community, I would like to take this opportunity to thank Prof Awang Bulgiba for all his services and contribution to research and innovation in UM while servicing as the Deputy Vice-Chancellor for Research and Innovation. Prof Awang now holds a new portfolio as the Deputy Vice-Chancellor for Academic and Internationalisation as of April 1<sup>st</sup> 2015. We wish him all the best helming the academic and internationalisation activities of UM. He will be missed at the R&I office but I am sure he will continue to be with us in many of our activities.

Back to some news at the R&I office, we were once again audited for our research performance of 2014 by the Malaysian Research Assessment (MyRA) team from the Ministry of Education. This time they are only looking at only at the 2014 data so the task was not so odious for us at IPPP. However, we urge researchers to continue

to work with us on ensuring we keep the standard of research up and all records and evidences of output and outcome of products are in order for the upcoming 3 year MyRA audit next year. Since the ministry promises that funding for research to the research universities will be based on merit, it will be in UM's interest to stay at the top of the ladder.

In 2014 also we began funding some research activities under our Grand Challenges Programs. Some of these activities have begun taking shapes and have produced unexpected output. We hope some of the highlights of these Grand Challenges Programs as well as other output from other research initiatives can be showcased at the University of Malaya Research Carnival that we are planning for October 2015. I would like to invite the campus community to come to this carnival which will be held in the IPPI complex and perhaps learn new things or help generate new ideas for future research. Meanwhile, keep up the good work and let's keep UM's flag flying high.

Thank you.



**Professor Dr.  
Thong Kwai Lin**  
*Chief Editor  
UMR Bulletin*

Researchers in UM are encouraged to do research that has impact on society and thus we have looked beyond a single discipline mode to a multi- or trans-disciplinary approach to solve problems. This issue highlights some of the research endeavours carried by our academics that truly bring some benefits to the community and economy. Some work done by CERiA, TIDREC, and the Equitable Society Research Centre engage the community directly. For example, the Humanities Research Cluster, through the collaboration with the ASEAN economic community, helps in capacity building in selected public and private higher institutions in Cambodia and Laos. Researchers from IOES took the lead

in solving the massive fish kill in Johor. Members from the NANOCAT earned the Elsevier's prestigious 'Atlas Award' for their publication on Desalination Technology. The exciting innovative research at the other Research Clusters and Centres of Excellence are also highlighted in this bulletin.

This issue also profiles our esteemed Professor Datuk Dr Harith Ahmad who shares with us his academic journey and thoughts on how to do excellent research.

We thank all the contributors. Enjoy reading and we welcome your feedback.

Thank you.



**Professor Dr.  
Awg Bulgiba Awg Mahmud  
Former Deputy Vice Chancellor  
(R&I)**

**O**n 1 April 2015, I was told that I had been appointed as the new Deputy Vice-Chancellor for Academic and International Affairs for a three-year term effective that same day. My heart is heavy at having to leave the Research and Innovation (R&I) portfolio as there is still much to do.

Over the past 3 years, UM has made significant strides in R&I. Our innovative grant schemes and new research and development strategies, with its emphasis on multi- and trans-disciplinary as well as translational research has accelerated inter-faculty collaborations within UM and with international partners. These new innovative strategies have resulted in huge increases in research performance all round exceeding all expectations and are now being copied by other universities in Malaysia. Between 2013-15, UM scored the highest marks in the Malaysian Research Assessment (MyRA) I and II instruments with the gap between UM and other Malaysian universities widening each year.

These stellar research performance milestones were in no small measure responsible for UM's 151st place in the QS World University Rankings, 32nd place in the QS Asian University Rankings and 301-400 band in the Academic Ranking of World Universities. Community and sustainability efforts have also been strengthened during the last few years and UM jumped a massive 141 places to reach 72<sup>nd</sup> in the Green Metric Rankings.

UM staff won numerous national and international research and environmental awards during the past

few years. Dedicated funding for student competitions introduced in 2014 enabled UM students to enter 30 local and 17 international competitions, with wins in 23 local and 11 international competitions in 2014 alone.

Our UMCoE programme is now the envy of many other universities. In this programme, 6 research centres were singled out and given special support. This consequently resulted in the tripling of HICoEs in UM (from 1 to 3) in just 2 years. UM also set up the National Centre for Particle Physics together with the Academy of Science Malaysia (ASM) in 2013, the second such centre with ASM making UM the only university to have collaborative national centres with the Academy.

I would like to take this opportunity to thank all of you for your contributions to UM research and innovation over the past 3 years. I would also like to thank all the staff in the R & I portfolio (whose names are too numerous for me to list), including from the DVC (R&I) Office, IPPP, UMCoEs, research centres, Deans and Research Deputy Deans who have tolerated me and supported the R&I agenda with such dedication. Without these people, it would have been impossible for UM to move its R&I agenda.

I would like to especially thank Professor Dr. Noorsaadah Abd Rahman for her willingness to shoulder the burden of Acting Deputy Vice-Chancellor (R&I) and I would like to urge everyone to give her the same kind of support that you have given me.

Thank you.

# Distinguished Professor Datuk Dr. Harith Ahmad

By: **Dr Ahmad Ibrahim**, UM Adjung Professor

Anyone who has the opportunity to meet up with Professor Datuk Dr Harith Ahmad would not at first sight expect him to be among the nation's top scientific minds. With his tousled hairdo and red knee hugging slacks, he would more often than not be mistaken for a folk country singer. In fact he looks more like Bob Dylan than Albert Einstein. That is why they always say appearance can sometimes be deceiving.

But for those who are familiar with Professor Harith's research, many would vow for a fact that he is truly passionate about science, especially the discipline he is most associated with, laser. It therefore came as no surprise when he was recently elevated to become among the few "Professor Ulung" in the country. There are only four of them at the moment. In fact he can be considered the first in pure science to have gained such prestigious recognition. A few years earlier he was also awarded the Merdeka Award for his outstanding achievements and contributions to scientific R&D.

Professor Harith in 2005 was at the tail end leading the nation's five year research consortium on photonics. The plan was for Malaysia to become a leading player in the world photonics industry. Professor Harith made important contributions to that aspirations. There were some progress made to produce our own photonic devices. But the desire to create a vibrant photonic industry for the nation remains unfulfilled.

"At that time we were ahead of China's Hua Wei. Unfortunately the support from the local telco consumers was lukewarm. In contrast Hua Wei, now a leading world player, succeeded because of the nation's strategic procurement commitment and the sustained investment in photonics research", lamented Professor Harith.

Professor Harith Ahmad was born on November 2, 1954 in Alor Star, Kedah. He received his undergraduate education at University of Malaya where he obtained a first class degree in physics and went on to do his master's



degree in High Voltage Technology and a doctorate in Laser Technology from the University of Wales in the United Kingdom.

He began his academic career at the University of Malaya in 1983 as a lecturer and is currently a Professor of Photonics at the University. His other appointments and positions include:

- Programme Head, National Top-Down Project on Photonics, MOSTI (since 1999)
- Programme Head, Optical Planar Waveguides Project (since 2001)
- Senior Principal Analyst, Malaysian Industry-Government Group for High Technology (MIGHT), Prime Minister's Department (since 2001)


 I am glad to be able to develop good research in Malaysia and have produced many PhDs who are now working in other universities where they can pass on their knowledge."

- Professor Datuk Dr. Harith Ahmad

- Reviewer, IEEE Photonics Technology Letters (in the US)
- Fellow, Academy of Sciences, Malaysia.

Professor Harith's areas of expertise are Fibre Optics and Waveguides (Planar Lightwave Circuit), Quantum Electronics and Lasers (Laser Technology) and Fibre Optics & Waveguides (Fibre Optic Technology). He has over 300 journal publications and conference proceedings in his name, all of which are recognised by the International Citation Index. He has also obtained 10 patents jointly with Telekom Malaysia and has supervised more than 10 PhD students and over 30 MSc students.

Professor Harith has been interested in physics and mathematics from an early age.

"Physics was something I enjoyed most as a student- physics and maths were my strong points. If you look at what happens around you, it is all based on physical principles. Of course there are other opinions, but physics is the mother of all sciences," he said.

Professor Harith has worked in the semiconductor industry prior to a career in academia.

"I thought it was more interesting to work in the academic field, and I would like to encourage young people to join academia as it provides freedom to pursue your hobbies, passions and interests," he said.

"We were the first in Malaysia to initiate work in optical fibres in the mid 1990s. In early 2000, we moved into fabrications of optical circuits," he said.

Never one to rest on his laurels and always pushing the boundaries of knowledge, Professor Harith was also instrumental in initiating and developing a photonics laboratory and the only planar lightwave fabrication facility in the region.

Professor Harith is currently researching nano photonics because of its many potential applications. It also provides an inroad to new areas of research and new

products. His research contributions in laser technology, optics and optical fibres include the design and fabrication of semiconductor-pumped solid-state lasers, developing techniques to study laser shadowgraphy, researching the interaction of electromagnetic waves in crystals, designing a fibre laser and developing tuneable solid state lasers. Professor Harith enjoys spending time in the laboratory. "You should enjoy what you are doing, and if you think you cannot enjoy it and there is no passion, it would be better to look for something else to do," he said.

He is delighted to have been selected as a joint recipient of the 2010 Merdeka Award in the Outstanding Scholastic Achievement category. He cites his contribution in the development of research in the country as his greatest achievement.

"I am glad to be able to develop good research in Malaysia and have produced many PhDs who are now working in other universities where they can pass on their knowledge," he added.

When asked for his views about the state of science in the country, he offered his frank assessment on a few of the nation's institutional think-tanks.

"The Academy of Sciences Malaysia, (ASM), needs to seriously re-strategise itself to become a respected opinion leader in science. As it is, ASM views have yet to be taken seriously by the relevant stakeholders. Many of ASM's reports have failed to become mainstream reference documents in national planning".

"The Majlis Professor Negara, (MPN), provides an excellent platform to harness the country's top intellectual minds. Unfortunately this has yet to happen. Much of the blame lies in the lacking in objectivity in appraising most of the issues confronting the nation".

"MIGHT, the Malaysian Industry Government Group for High Technology, has strayed away from its earlier mandate. In order to be more effective in delivering the HiTech agenda of the country, MIGHT, must exploit the expertise teeming within the nation's academic circle. This is not happening".

"The Government- Linked Companies, GLCs, should play a more active role in championing the HiTech agenda of the country. I would suggest that each GLC hosts one high technology area to develop as new growth engines for the economy".

On the growing concern over the lack of interest among students to take up science, Professor Harith is doing his bit. He is now working on a programme with some schools in Terengganu. Students from the schools will be hosted by his photonics centre to actually experience first hand how scientific research is undertaken. He is approaching ASM to support this initiative which in the longer term promises to be an excellent platform to get students to truly appreciate life as a researcher.

There is no denying Professor Harith's passion for scientific research. Given the support he may one day emerges as the country's Nobel Prize winner in Physics!

## WELLNESS RESEARCH CLUSTER

# Cure and Care Service Centre Kerinchi and CERiA

By: **Veena Pillai & Nur Afiqah Mohd Salleh**  
Centre of Excellence for Research in AIDS (CERiA), University of Malaya

CERiA's role and research at the Cure and Care Service Centre Kerinchi (CCSC Kerinchi) is an excellent example of the potential of research through service delivery. CCSC Kerinchi is one of 11 centres around Klang Valley run by the National Anti-Drug Agency (NADA/AADK) whose aim is to provide methadone maintenance treatment (MMT) for people who are opioid dependent. Methadone a medication for people dependent on opioids such as heroin. It prevents people with heroin addiction from undergoing withdrawal, and allows them to function wholly and contribute to society. In addition, methadone reduces HIV transmission by reducing injecting behaviour among people who use drugs (PWUD).

*Addiction had robbed more than 20 years of his life. Heroin consumed him, as it does many. He was unable to work, provide for his family, and spent his days avoiding prison, being in prison, getting out of prison. Prison had come to feel like it was his second home.*

includes medical reviews, regular check-ups, screening for blood-borne viruses (BBV), BBV counselling, methadone counselling, and the dispensing of methadone. In addition, we also provide social assistance by providing help with applications to Baitulmal or Kebajikan, and by trying to build our networks of employers who are PWUD friendly. The CERiA team provides a holistic approach to methadone delivery, and our research will reflect the importance of the holistic approach.

*His involvement in drug activities started in his childhood, and worsened since he dropped out from school after SRP. He had been in prison many times, all charges due to drugs, even if it was crime committed just to get some money to buy some more. He had also been involuntarily detained for drug rehabilitation at PUSPEN on four occasions, and was given counseling and placed on an abstinence program. This never worked for him, and he relapsed quickly once released.*

**Photo 1:**  
Patients await their daily methadone

**Photo 2:**  
CCSC Kerinchi Activity Room

CCSC Kerinchi differs from the regular AADK MMT centres; CERiA works together with AADK to manage this centre. While AADK manages the administration and the shelter situated on the second level of the centre, the CERiA team coordinates the clinical and research side of the clinic. The clinical section

Through the services provided by the CERiA team, we are able to collect data on many aspects of these patients that constitute a very marginalized and vulnerable population, i.e. PWUD, as well as collate information on the impact and effectiveness of methadone as a treatment in Malaysia. This is a great example



1



2



## WELLNESS RESEARCH CLUSTER



3

**Photo 3:**  
Regular Medical  
Reviews and  
Treatment

**Photo 4:**  
A life changing  
and empowering  
treatment

of research in service delivery, and proves the excellent opportunities every service provider has by continuously improving themselves and their services through research and development.

*The constant burden of the consequences and complexities of drug-dependence, on him and his family, had at times immobilized him. He was unable to work; all the while being consumed with heroin and thoughts on how to purchase his next hit.*

### People who use drugs- what makes them vulnerable?

Many of the patients we see at Kerinchi are vulnerable in many ways; whether due to poverty, lack of stable housing or employment. They face constant risks of discrimination and harassment by authorities; often, simply by virtue of them being on MMT and being PWUD. With this constant threat, the barriers to health care access, including MMT, are further heightened.

*He was guilt-racked from bringing tears to his mother's eyes, the same mother who never stopped hoping for the best. He needed help.*

### How can research help?

Given the negative perceptions of our society on PWUD, it is extremely helpful to gather data and proof that there is an available treatment that is safe and efficient for people suffering from drug dependence. The negative perceptions often cause stigma and discrimination that become a massive barrier to healthcare and social assistance



4

for this group of people. Our research can help alleviate the negative perceptions and the barriers to healthcare by showing how MMT can impact their lives and improve our society as a whole. MMT has been shown to alleviate unemployment, homelessness, and poverty. This, in turn, reduces criminal activity, detention and re-incarceration. In a related study conducted by CERiA, MMT together with the Needle Syringe program in Malaysia (also known as the Harm Reduction program) have been shown to be effective in preventing HIV infection. The study also demonstrated that the program was cost-effective in that it was able to help the Malaysian government save approximately RM 40 million in health costs alone, since its implementation in 2005.

*During his last imprisonment, he was started on MMT, under another research project by CERiA (HARAPAN). MMT allowed him better access to healthcare, and he was able to be tested for illnesses he was at risk for. He was found to be HIV positive, and was able to start treatment at the correct time. MMT allowed him the stability he needed to get employed.*

### He is now married with a child.

"My life only becomes stable at the age of 40. I missed 20 years of living a normal life. Methadone gave that to me."

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## HUMANITIES RESEARCH CLUSTER

# Empowering the Academic Community with Knowledge and Skills in ELT and Education-Based Research

## Capacity Building in Selected Public and Private Higher Institutions in Cambodia/Laos

By: **Professor Dr. Azirah Hashim**  
Humanities Research Cluster

### Introduction

Cambodia and Laos, two of the last few members to join the Association of Southeast Asian Nations (ASEAN) in the late 1990's, are amongst the nations that have much to accomplish in higher education development. Both are in need of highly educated and skilled people for social and economic transformations in order to keep up with their neighbours and thrive and benefit from the ASEAN Economic Community (AEC). Hence, substantial human resource development and capacity building are essential to narrow the gap in the developmental divide in ASEAN.

A team from UM has, in the last few years, been involved in the CLMV (Cambodia, Laos, Myanmar and Vietnam) programme in English language teaching (ELT) and education from 2013-2015 and prior to that from 2011-2013, in tandem with the National Higher Education Strategic Plan (PSPTN Phase 2, 2011-2015) of Malaysia for global outreach and engagement, especially in the ASEAN region. This involvement further aligns with the goals of the Initiative for ASEAN Integration (IAI) Strategic Framework and the objectives of the ASEAN University Network (AUN) for regional mobility and cooperation in terms of teaching, research collaborations, and training and development.

This CLMV project seeks to address the challenges and issues in higher education, develop capacity building activities to transfer expert knowledge and skills, and explore strategic sites for cooperation between universities in Malaysia, Cambodia and Laos. The focus of this project is on ELT and education-based research. The project aims to empower Cambodian and Laotian academic communities with knowledge and skills to assist with meeting the demands of the AEC and strengthen university networks and alliances. Ultimately, this project will create positive goodwill between academics in Malaysian, Cambodian and Laotian higher education, uplift Malaysian higher education brand equity, and gather a talent pool of experts and academic leaders from Malaysia, Cambodia and Laos for global engagement and future collaborations; at the same time, these

outcomes would facilitate regional mobility and cooperation as well as intercultural understanding. Such endeavours will also promote and position Malaysia as a caring and sharing country by improving international academic relations and research development.

This programme has seen a series of outreach activities that were conducted by the ELT/education team from the Humanities Research Cluster in the University of Malaya and associates from other universities; these included research and teaching seminars, involvement in a World Bank research project, co-writing of a research paper (recently published in an ISI journal), international exchanges of staff and academic visits between Malaysia, Cambodia and Laos, curriculum development workshops on tourism and hospitality, and so on.

### Success Stories and Achievements

A total of about 30 teaching and research seminars have been conducted in universities in Cambodia and Laos to help empower the communities with knowledge and skills in ELT and education-based research. Lectures and training sessions on specific topics have been conducted several times at the universities in both countries:

Through research discussions and seminar question and answer sessions, the UM team has developed closer ties and friendships with both Cambodian and Laotian counterparts and will continue the goodwill to collaborate on future joint-projects and co-writing of papers for research publication. This exchange has benefited all parties in terms of research networking, intercultural understanding, capacity building, promotion of Malaysia as a potential hub for higher education, and is a contribution in narrowing the gap among ASEAN countries.

Ten academic representatives from Cambodia and Laos universities have also been invited to present their studies at the 17<sup>th</sup> English in Southeast Asia international conference in December 2013 in relation to higher education development in the CLMV countries. The conference has become a valuable avenue for potential researchers from

## HUMANITIES RESEARCH CLUSTER

Cambodia	Laos
<ul style="list-style-type: none"> <li>• Institute of Foreign Languages (IFL), Royal University of Phnom Penh (RUPP)</li> <li>• University of Puthisastra, Phnom Penh</li> <li>• University of Southeast Asia (USEA), Siem Reap</li> </ul>	<ul style="list-style-type: none"> <li>• Faculty of Letters, National University of Laos (NUOL), Vientiane</li> <li>• Souphanouvong University (SU), LuangPrabang</li> </ul>
Topics delivered included:	
<ul style="list-style-type: none"> <li>• Introduction to research</li> <li>• Applied linguistics for teaching/research</li> <li>• Academic writing</li> <li>• English in the Asian region</li> <li>• Postgraduate supervision</li> <li>• Questionnaire design</li> <li>• Basic SPSS</li> </ul>	<ul style="list-style-type: none"> <li>• Qualitative research – interviews, etc.</li> <li>• Literature reviews</li> <li>• Critical reading</li> <li>• Critical writing</li> <li>• Framing the research problem</li> <li>• Intercultural communication</li> <li>• Communication disorders</li> </ul>

both nations to interact with scholars from other parts of the world to exchange ideas, experiences and cultural values in areas related to teaching, learning and research in English.

As a follow-up to CLMV Phase I (2011-2012), UM in collaboration with USEA, successfully secured a World Bank grant to develop a curriculum for the tourism and hospitality programme that corresponds to the needs of the AEC and the demands of the industry through employers' survey and graduates' feedback. Two intensive workshops on curriculum development and teaching methodologies were conducted with the help of UM experts and tourism consultants. This project also involved other university partners from Thailand (UbonRatchathani University and Dhurakit Pundit University) and China (Liaoning Technical University), as well as SokhaAngkor Hotel (an employer in Cambodia) and the Siem Reap Department of Tourism.

A full week of research training seminars and workshops in UM was also conducted for 10 invited delegates from Laotian universities in May 2014. Academic representatives from Laos were given lectures and ideas about conducting research which they can hopefully impart to colleagues and students in their institutions. Field trips and visits to the Main Library, Institute of Graduate Studies, IT Centre, Museum of Asian Arts, and the Art Gallery of UM were arranged as well to promote intercultural communication.

Another achievement is the co-writing of a research paper entitled "English in higher education in Cambodia" with an academic from the Institute of Foreign Languages (IFL), Royal University of Phnom Penh (RUPP) that was recently published in World Englishes (an ISI-cited journal) in December 2014. This article discusses

English as cultural capital in the Cambodian society and an in-depth understanding of it is crucial for tertiary education and social development. This view does indeed affect perceptions of ESP (English for Specific Purposes) programmes and the development of English language skills that are needed to excel in both education and work.

### Prospects for the Future

By leveraging on the goodwill and trust built through the CLMV initiatives, UM may further collaborate with existing Cambodian and Laotian university networks to embark on a Training of Trainers (ToT) programme to develop a sustainable approach towards human resource development and capacity building. This will help to prepare these nations for regional and global demands as well as to facilitate regional mobility in terms of teaching, learning and research in higher education.

### Acknowledgments

This project is supported by the Cambodia Laos Myanmar Vietnam (CLMV) Research Funding Programme (IPPTN/KPT/FRGS/2011[06B]/UM53-02-03-1085), a Malaysian Global Outreach Programme under the Ministry of Education Malaysia.

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## SUSTAINABILITY SCIENCE RESEARCH CLUSTER

# ISLAM and Integrated Watershed Management

## Translating Theory to Practice through Rakan Alam Sekitar Masjid

By: **Dr. Zeeda Fatimah Mohamad**  
 Department of Science and Technology Studies, Faculty of Science

Integrated Water Management (IWM) can be defined more inclusively as a gradual, continuous and holistic process of short, medium and long-term decision making that takes into consideration the ongoing conflicts, competition and resolutions between various groups that have a stake on a watershed. A key element within this inclusive approach of governance is its increasing recognition in dealing with Heartware – as a process of mediating different prioritization of values placed on the watershed by different stakeholders. Therefore, a translational research is designed as an immediate response to address these needs by translating the shared values in IWM acquired from the selected group, i.e. Muslim community of Mukim Pasangan, into outreach and capacity building programmes aimed to empower the community in creating awareness on the importance of managing water resources within the context of IWM.

For Muslim, the environment or nature is an amanah from God - a bestowed trust given to man for his use. The word "water" and "river water" appear 63 and 52 times respectively in the Qur'an and is said to be God's second greatest creation after man himself. In the Qur'an, it is also mentioned that all organisms are created from water (21:30). Water which exists naturally in cycles (23:18), (30:45), (15:22) is God's invaluable creation and gift, critical for ecological balance, public health and the whole life. The Qur'an and Hadith also explain the use of water for life such as in balancing of the ecosystem. To ensure that the quality of water is sustained, Islam also teaches its followers the ethics of the use of water. Every Muslim is responsible for rational, equitable and just use of water. It needs to be managed as well as possible and this responsibility could be questioned upon in the hereafter.

Rakan Alam Sekitar Masjid 2014, a translational research by ACP UM – Kyoto University and Institute of Islamic Understanding Malaysia (IKIM)

Hence, "Rakan Alam Sekitar Masjid" was designed as part of translational research, an

outreach program aimed at developing human capital on water governance among the Muslim community of Mukim Pasangan, Kuala Selangor, focusing the mosque (a religious institution with representatives from the Muslim community; the Penghulu, head of the villages (ketua kampung), the women's affair section (muslimat), and youth. The overall objectives of the program are:

1. To provide Islamic and scientific understanding on the values and/or management of water to the Muslim community of Mukim Pasangan.
2. To "re-enchant" the Muslim community of Mukim Pasangan of their spiritual responsibility when it comes to water use and/or management.
3. To provide a platform for future collaboration and networking between the mosque and other stakeholders in Sungai Selangor watershed management.

The outreach programme consists of training (theory and practical) and creating awareness on the importance of managing water resources as one of the obligatory for Muslim (fard al-kifayah). Apart from the outreach program, "Rakan Alam Sekitar Masjid", which is a collaboration between UM-Kyoto University Asian Core Program (ACP) under Sustainability Science Cluster (SuSci) and Institute of Islamic Understanding Malaysia (IKIM), tries to embark on social transformation of the Muslims' practice in regards to the use of water, i.e. by giving an understanding on the fact that part of the religious ethics of a Muslim is to conserve water and for them to raise & strengthen their religious ethics, especially in the current water crisis. "Rakan Alam Sekitar Masjid" is a unique program, designed and conducted in two stages;

- i. training workshop - focusing the high committee members of the mosque, and
- ii. talk show, named Bicara Ad-Deen which covers the whole Muslim community of Mukim Pasangan and beyond. The talkshow was aired on radio IKIM.fm

The training workshop was held on 18<sup>th</sup> October

## SUSTAINABILITY SCIENCE RESEARCH CLUSTER

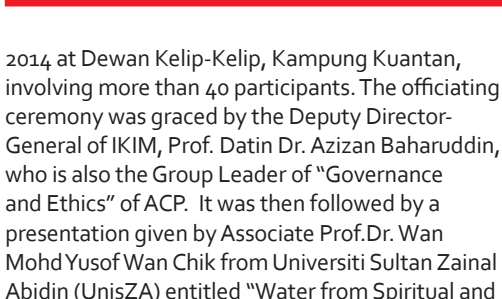
**Photo 1:** ACP members, Dr. Nobumitsu Sakai and Mr. Mohd Noor Musa explaining water monitoring activity conducted by a school in Japan



**Photo 2:** Prof. Datin Dr. Azizan Baharuddin (third from left), Group Leader of Governance and Ethics of ACP with leaders of community (penghulu)



**Photo 3:** Puan Liza, Masjid Jamek Kg. Kuantan's assistant secretary testing the Water Kit in a water monitoring (practical) session



**Photo 4:** Forum Bicara Ad-Deen, a talk show in collaboration between ACP, IKIM and Masjid Jamek Kg. Kuantan



2014 at Dewan Kelip-Kelip, Kampung Kuantan, involving more than 40 participants. The officiating ceremony was graced by the Deputy Director-General of IKIM, Prof. Datin Dr. Azizan Baharuddin, who is also the Group Leader of "Governance and Ethics" of ACP. It was then followed by a presentation given by Associate Prof. Dr. Wan Mohd Yusof Wan Chik from Universiti Sultan Zainal Abidin (UnisZA) entitled "Water from Spiritual and Worldview Understanding". He spoke on the background of water from an Islamic perspective and its importance in today's context. The program continued with its second speaker, Mr. Mohd Noor Musa, a researcher from Universiti Malaya and an ACP member with the topic "Islamic Values in Integrated Watershed Management". His talk was based on a preliminary research and findings of shared values gathered from different groups of local community in Mukim Pasangan, Kuala Selangor. The third presenter, a representative from The Solid Waste Management and Public Cleansing Corporation, gave a talk entitled "Water and Solid Waste Management: Towards a Green Mosque".

Apart from the series of talk session, participants were also trained on how to monitor the quality of water in their area. The practical session was conducted by an ACP member, Dr. Nobumitsu Sakai together with UM Water Warrior and Kelab Alami KAWA. Kelab Alami KAWA is an environmental youth club of Mukim Pasangan. This was followed by a talk show/

forum at Masjid Jamek Kampung Kuantan in the evening on "The Miracles of Water: A Bestowed Trust". The forum was moderated by Mr. Faiz from IKIMfm radio station.

The program was a success. The Muslim community was encouraged to participate and take actions to protect their water resource—the Selangor River. Some of their commitments for future activities are:

- River clean-up activities (gotong-royong)
- Environmental education on managing the river/ water resources in a sustainable way
- Visit to places with successful river-care implementation
- Setting up recycling centre at the mosque

### Acknowledgement

Community of Mukim Pasangan Kuala Selangor, Municipal Council of Kuala Selangor, Sustainability Science Cluster University of Malaya (SuSci), IKIM, volunteers, and Asia Core Group research team for providing their kind support and contributing directly or indirectly in this research.

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## EQUITABLE SOCIETY RESEARCH CLUSTER

# Islamic Medical Practice

## A Prospect of Islamic Medical Tourism

By: **Professor.  
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Hanim Dato  
Mohamad  
Zailani**

Department of  
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Management  
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Malaysia has been a top medical tourism destination for both Muslim and non-Muslim foreign tourists, with Muslims being the majority of medical tourists coming for medical care and health treatment, as well as for Islamic medical practices and procedures. Medical tourism industry plays an essential role in generating income to the country; contributing approximately 101.65 million USD to the economy in year 2010. While the percentage of medical tourist is small, the number has grown by 313.3% between 2003 and 2009; totaling up to 770,134 of medical tourists in 2013. The number indicates that medical tourism has a bright prospect particularly on the economic aspect. Although medical tourism is deemed as a high potential growth sector, it has yet to be exploited to its potential. The Association of Private Hospitals of Malaysia (APHM) predicted revenue from the medical tourism industry to increase, at the very least, by 30% annually. Malaysia has also been actively promoting its healthcare services to potential Muslim medical travelers from other countries particularly from neighboring regional countries such as Myanmar, Vietnam, Indonesia, Singapore, Brunei and China as well as Middle Eastern countries such as United Arab Emirates, Bahrain and Saudi Arabian.

The growth of Islamic compliance healthcare providers is, inter alia, driven by the increasing affluence of the Muslim population; thereby, increasing patients' demands and expectations. Despite Malaysia being recognized as a modern Islamic country, venturing into Islamic medical tourism is still a novel idea. In Malaysia, a majority of Islamic medical providers are located in major cities such as Selangor, Kuala Lumpur, Penang and Johor. In terms of services offered, most of the hospitals focus on maternity and treatment of non-critical diseases with services comprising of Islamic facilities, halal pharmaceuticals and also Islamic medical practices by doctors. An example of Islamic medical practice by a doctor is the pronouncement of prayer before a procedure or

an operation, with hospital managers believing that such practices would make patients feel better. In order to facilitate Islamic practices for Muslim patients, hospitals also provide some facilities for prayers during patients' stay in the hospital; the facilities of which, include, water spray and 'debu tayammum'. In addition to that, hospitals also facilitate in waking patients up for prayer (subuh), meet and teach patients on how to pray in the hospital, remind patients on their first day in ward on guidelines for prayer during their stay in the hospital and inform patients on the availability of debu tayammum' and water spray in the wards.

The implementation of Islamic medical practices in Malaysia is perceived to have a positive impact on the quality of human resources. An integration of Islamic values into medical practice in this case is viewed as a means that could encourage hospital staffs to carry out their duties in a respectable manner while creating more appealing working conditions. While many stakeholders noted the potential of Islamic medical practice, several challenges may deter the development of the medical tourism sector. Among the challenges faced by the industry are the small size of hospitals, a lack of financial support, and a lack of healthcare workers that are naturally attuned to Islamic values. Apart from the challenges aforementioned, a common concern from stakeholders was that the development of Islamic medical practices is not governed by specific policies or regulations, with most practices grounded on individual standards.

As a conclusion, a strong coordination and partnership must be developed among all stakeholders in order to serve the aspiration of making Islamic medical tourism a niche sector for Malaysia. Moreover, since developing such hospitals involve huge investment, the role of government is essential in coordinating financial resources and in collaborating with industry players; potentially fostering industrial innovation

## EQUITABLE SOCIETY RESEARCH CLUSTER



**Interview with Dr Ishak Mas'ud on 28th April 2014 at Hospital Pakar Al-Islam, Kampung Baru. He is the Hospital Director, which also holds another post as the Director for Islamic Hospital Consortium of Malaysia.**

for Islamic medical tourism. From our findings, it is believed that institutional arrangement and regulatory control are needed to provide some basis of guidance to service providers and facilitate in improving the services offered to patients. A lack of standards and policies in running a Shariah compliant hospital may also dampen the development of this industry since most practices are grounded on individual standards. Hence, our findings from this project could fulfil the need for an Islamic Medical Practice standard. Our research group is currently working with Standards Malaysia in proposing and establishing a standard for Islamic Medical Practices, which could be used by providers of Islamic Medical Tourism in Malaysia. With greater awareness of halal tourism, Malaysia could well position itself as a medical provider for Muslim patients, by introducing the concept of Islamic medical tourism which stresses on the use of halal medical products and services. The development of this industry however, will also generate income for other allied sectors such as food, hotel, and pharmaceutical. Nevertheless, contributions of hospitals' market share in the

Islamic medical tourism segment are relatively small in Malaysia. Hence, in order to attract more Muslim tourists particularly from the Middle East and West Asia, Islamic hospitals should enhance its value by offering halal food and medicines with good service quality and hotel facilities that are in line with Islamic teaching. There is also a need to develop more halal tourism products and services in tandem with a Shariah compliant hospital.

- i Abd Manaf et al. 2011
- iii MTJ, 2011
- iii Keynote Address by The Hon. Dato' Sri Mohd Najib Tun Razak Prime Minister of Malaysia at Invest Malaysia 2010 on 30th March 2010 at Shangri La Hotel, Kuala Lumpur
- iv APHM, [www.hospitals-malaysia.org](http://www.hospitals-malaysia.org)

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## FRONTIER SCIENCE RESEARCH CLUSTER

# Understanding the Photodissociation Dynamics of Atmospheric Molecules Using High-Level Quantum Modeling

By: **Dr  
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of Chemistry,  
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Atmospheric ozone is formed naturally by chemical reactions involving solar ultraviolet radiation and oxygen molecules. Ozone abundances in the atmosphere are determined by the balance between the chemical processes that produce and destroy ozone. Global ozone has decreased during the past several decades because the amount of reactive atmospheric gases containing nitrogen, chlorine, bromine, hydrogen and oxygen has increased in the atmosphere due to human activities. In an effort to understand the reactive atmospheric gases, our group have developed a powerful method to treat the fundamental process of the dissociation of the gases induced by the absorption of a single photon; at least for small molecules, in an essentially exact quantum mechanical way. Within the Born-Oppenheimer approximation, the method involves high level of dynamics calculations of the nuclear motions on the constructed accurate electronic potential energy surfaces as illustrated schematically in Figures 1 and 2. The calculated dynamical properties such as the total and the partial photoabsorption cross-sections were utilized to elucidate the detailed information of the dissociation process at molecular level such as the processes of bond breaking, the formation of primary fragments, the internal energy transfer

among the various degrees of freedom of the fragments, the lifetime of the intermediate complex and the radiation less transitions.

As far as the atmospheric gases are concerned, the triatomic molecules such as ozone ( $O_3$ ) and nitrous oxide ( $N_2O$ ) are ideally suited as they are small enough to allow exact quantum calculations of potential surfaces and photodynamics. Indeed, understanding photodissociation of  $N_2O$  is very crucial because a small fraction of  $N_2O$  reacts with oxygen atoms in the stratosphere to produce among others nitric oxide ( $NO$ ) which participates in the catalytic destruction of ozone. Now, our new theoretical work unveils the actual dynamic of the photodissociation of  $N_2O$  molecules leading to new calculations of the probability of an absorption process taking place; also referred to as photoabsorption cross-section as displayed in Figure 3. These calculations confirm experimental results and challenge our skills not only in designing sophisticated parallel numerical algorithms but also in advancing our knowledge on new theoretical approximation method without sacrificing the level of accuracy in the calculation.

In this work, we have introduced improvements in an established calculation approach, referred to as the time-dependent quantum wave packet method to calculate the photoabsorption cross-section of  $N_2O$ . The propagation of the wave packet is illustrated in Figure 1, corresponding to the nuclear motions of  $N_2O$  molecule at different electron configurations. The advantage of this approach is that it immediately yields the energy dependence of a cross-section or spectrum from a single calculation. By taking into account key factors such as the correct angular momentum coupling of the molecule and the components of the transition dipole moment vector (depicted in Figure 2), the theoretical model

**Figure 1:** Quantum modeling of  $N_2O$  molecule which involves a transition of the molecule from an initial ground-state to an excited-state electronic potential energy surface induced by one photon energy, leading to the product fragments  $N_2$  and  $O$ . The motions of the molecule are described by the quantum wavepacket propagation.

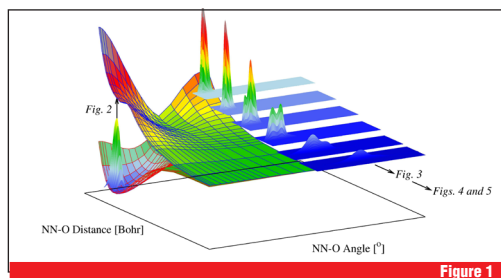


Figure 1

**Figure 2:** Transition dipole moment components represent the strength of the transition of  $N_2O$  molecule from the ground-state to the final excited-state electronic potential energy surface.

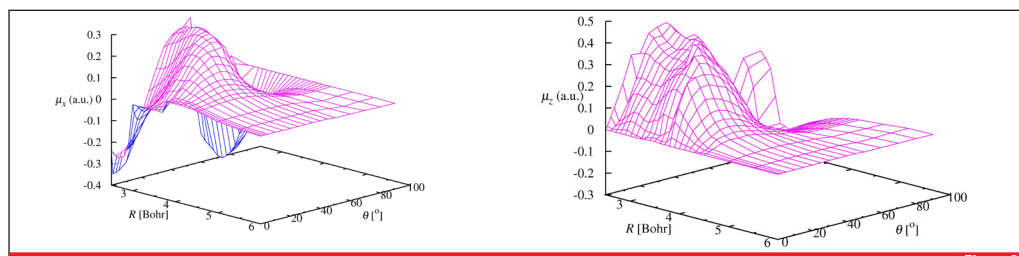
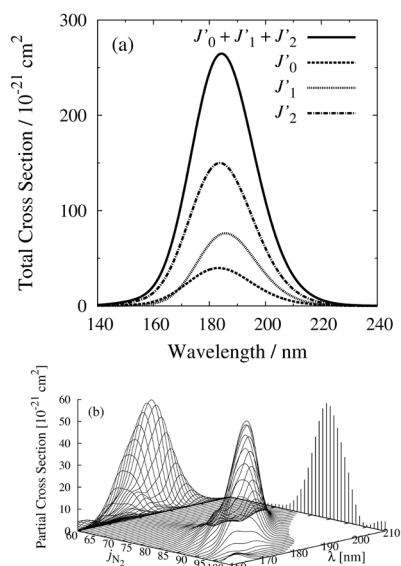


Figure 2



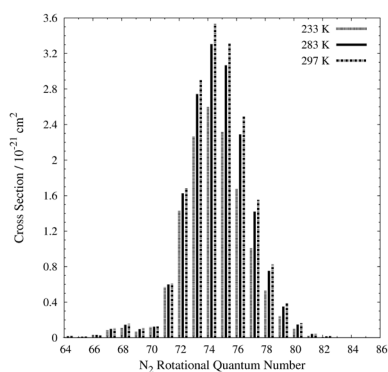
## FRONTIER SCIENCE RESEARCH CLUSTER



**Figure 3:** Total and partial cross-sections represent the dynamical properties of photodissociation process which describe the probability of the whole process and of each fragment to be formed, respectively.

of calculated spectrum has produced better results than previously obtained and more closely matches experimental observations. Hence, it provides an improved theoretical prediction on how  $\text{N}_2\text{O}$  evolves and breaks down over time to produce product fragments  $\text{N}_2$  and oxygen atom. As such processes occur in a small gap between the absorption band of oxygen and that of ozone, the predicted major dissociation pathway allows us to understand the involvement of nitrous oxide in the formation of ozone at the molecular level as elaborated in Figure 4.

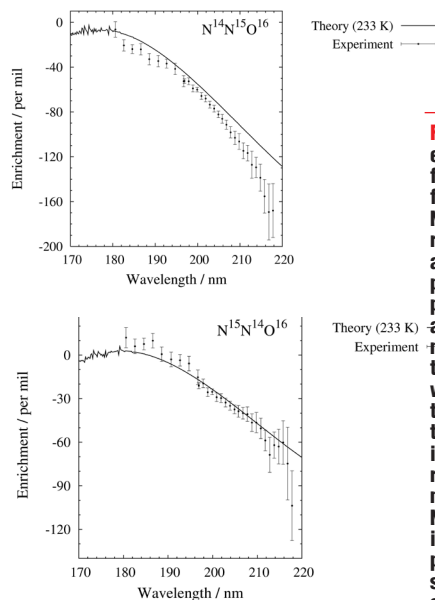
Also,  $\text{N}_2\text{O}$  actively absorbs infrared radiation in the atmosphere and thereby contributes to greenhouse warming. The discovery of isotopic fractionation of heavy stratospheric



**Figure 4:** Product quantum state distributions represent the distribution of the product fragments  $\text{N}_2$  at different rotational states which determine the kinetic energy of oxygen atom and subsequently: (a) affect the rate of the reaction with its parent  $\text{N}_2\text{O}$  molecule to form  $\text{NO}$ ; (b) affect the rate of the reaction with other oxygen atoms to form ozone molecule.

$\text{N}_2\text{O}$  in various processes suggests the process preferentially destroys light oxygen and nitrogen isotopes, where a photolytic fractionation factor is defined as the ratio of the heavy to light spectrum. In an effort to explain the heavy stratospheric  $\text{N}_2\text{O}$ , it has been suggested that the difference in the zero point vibrational energy for the heavier  $\text{N}_2\text{O}$  isotopomers causes a blue-shift in the ultraviolet spectrum, resulting in fractionation during ultraviolet photolysis. In Figure 5, the time-dependent quantum wave packet method has correctly predicted the sign of the isotopic fractionation factors of  $\text{N}_2\text{O}$  isotopomers observed experimentally around the absorption peak. The time-dependent quantum wave packet method also predicted an observable difference in  $^{14}\text{N}^{15}\text{N}^{16}\text{O}/^{15}\text{N}^{14}\text{N}^{16}\text{O}$  fractionation factors and the rotational quantum state distribution of  $\text{N}_2$ .

Nonetheless, the photodissociation of polyatomic molecule beyond triatomics such as  $\text{H}_2\text{O}_2$  and  $\text{HSO}_3$  presents new dynamical features that is absent in the photodissociation of triatomic molecule. For example, a polyatomic molecule can be fragmented into more than one molecular species and there are correlations among the internal motions of the fragments. Therefore, it has been a recent challenge to perform an exact quantum calculation on such polyatomic molecules due to the multiple increments on the degree of freedom of molecule internal motions. Such considerations would require more computational facilities and time than were used previously.



**Figure 5:** Isotopic enrichment or fractionation factors of heavy  $\text{N}_2\text{O}$  isotopomers represent the atmospheric physical properties at a particular measured temperature which describe the ratio of the heavy  $\text{N}_2\text{O}$  isotopomers with respect to the most abundant  $^{14}\text{N}^{14}\text{N}^{16}\text{O}$  isotopomers present in the stratospheric atmosphere.

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## INNOVATIVE TECHNOLOGY RESEARCH CLUSTER

# BioMEMS Sensors for Biomedical Applications

By: **Professor Ir. Dr. Fatimah Ibrahim**  
Centre for Innovation in Medical Engineering (CIME), Faculty of Engineering

### Introduction

Biomedical or Biological Micro-Electro-Mechanical Systems (BioMEMS) have become the focus of research for the last few decades because of their portability, reliability, cost effectiveness, sample/reagent volume reduction, and high-throughput detection compared to the traditional bench-top analytical devices. Therefore, the research members of Centre for Innovation in Medical Engineering (CIME) focus on the development of BioMEMS devices that increase the reliability and portability of biomedical diagnostic tools. Under the UMRG program based grant-RP009-13AET, we have developed new methods and applications in different fields such as microfluidic platforms, polymeric biochips, tele-health systems, and wireless powering and sensing. Highlighted below are some examples of the accomplished and ongoing projects which have been conducted by the research team of CIME under the support of UMRG grant.

### Microfluidic Platforms for Medical Diagnostic Systems

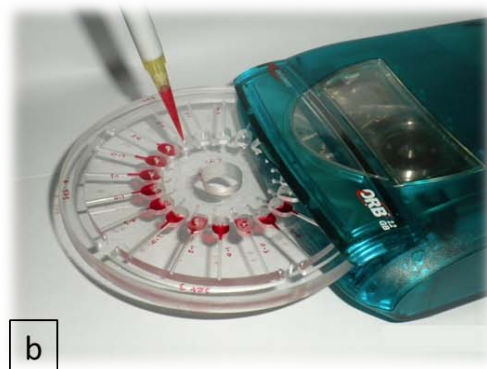
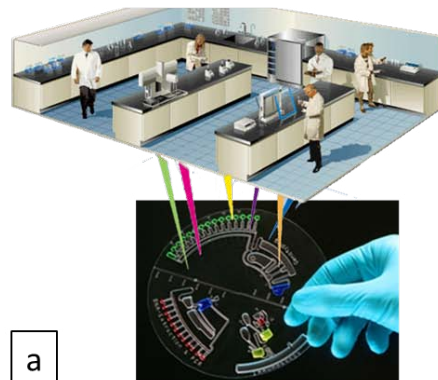
Currently, most of the laboratory tests and diagnostic tools are expensive, time consuming and require high volume of analytical reagents. Therefore, our research is focused on employing the microfluidics technology to overcome those limitations. (Figure 1) shows the microfluidic compact disc (CD) device that has the potential to replace the bulky and expensive laboratory

instruments. Our team members have successfully implemented the microfluidic CD to conduct the fundamental processes such as liquid pumping, valving, metering, and switching. In a more advanced implementation of the microfluidic CD, enzyme-linked immunosorbent assay (ELISA) for dengue fever detection has been successfully carried out. This implementation can dramatically improve the performance of the ELISA assay to be faster, cheaper, and portable for point of care (POC) applications. In the same way, the microfluidic CD can be employed to improve the performance of different diagnostic methods such as polymerase chain reaction (PCR) and loop mediated isothermal amplification (LAMP).

### Novel Polymeric Platform for BioMEMS Diagnostic Applications

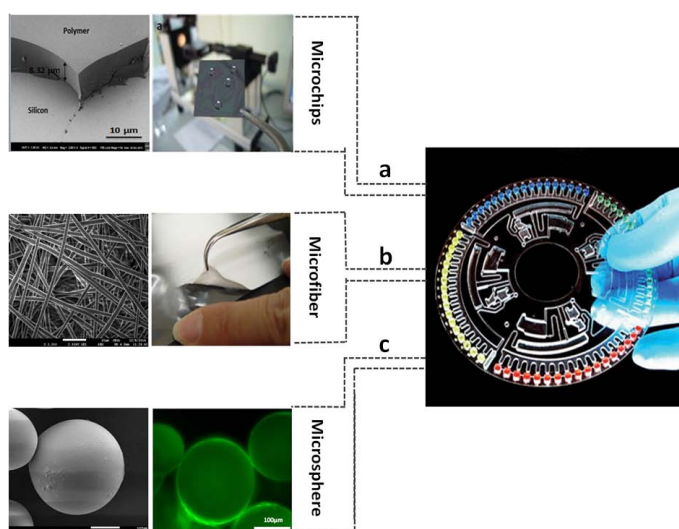
In order to commercialize our microfluidic CD as a practical choice for biomedical applications in real life, the compatibility and efficiency of the fabrication materials need to be improved. Therefore, our research team has developed a range of well-designed bio-receptor surfaces with high degree of control over surface properties. Such developed platforms which are aimed for integration into the microfluidic devices, remarkably enhance the detection signal. (Figure 2) presents some examples of the developed platforms which can be classified as follows: polymeric biochips (Figure 2a), paper-based detection platforms (Figure 2b) and microspheres

**Figure 1:**  
(a) All the conventional laboratory works are designed in a form of compact disc (CD) (b) The CD only uses small volumes of both reagents and samples (10  $\mu$ L).



## INNOVATIVE TECHNOLOGY RESEARCH CLUSTER

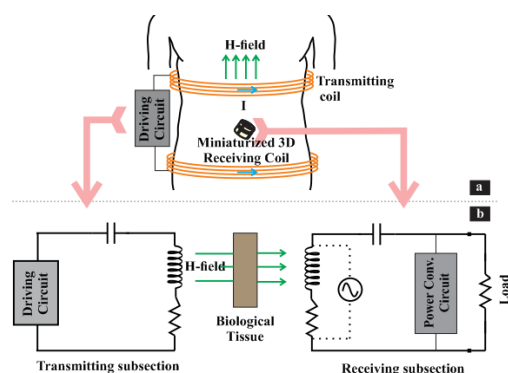
(Figure 2c). The developed bio-receptors have enhanced the detection signal for dengue virus detection up to  $\mu$  6 times,  $\mu$  10 times and  $\mu$  15 times higher than conventional ELISA, respectively. Integration of developed platforms into the microfluidic devices reduced the time of incubation from average 2 hours to 5 minutes while the sample volumes were reduced from 200  $\mu$  in conventional ELISA to 30  $\mu$  in the microfluidic system. These results are promising in order to achieve early detection results.



**Figure 2:** Developed platforms in the forms of: (a) biochips, (b) microfibers and (c) microspheres for integration into CD microfluidic devices (S. Hosseini et al., 2014)

### Miniaturized Wireless Power Transfer System for Implantable Medical Devices

The implementation of BioMEMS-based medical devices requires an external power source for their operations, in which internal batteries are typically employed. However, these batteries can increase the overall size of the device and often the battery needs to be replaced after some time. In certain applications, the replacement of the battery requires post-surgery which incurs additional risk and trauma for the patient. Other techniques such as the use of piezoelectric effects, thermal effects or nano-batteries may not provide sufficient energy to the BioMEMS devices. To overcome these limitations, there is a need to investigate other techniques such as miniaturized wireless power transfer as to provide a reliable means of power supply. Conventional approaches of wireless power transfer require the use of bulky coils. We are currently investigating novel techniques of miniaturizing wireless power transfer system (Figure 3) that will not only provide reliable and efficient power for BioMEMS sensors/devices but would also greatly reduce the overall space requirements.



**Figure 3:** Overview of miniaturized wireless powering system for robotic capsule endoscopy: (a) schematic of the application model and (b) schematic of circuit model

### Acknowledgment

Principle investigator and project members would like to thank University of Malaya Research Grant (UMRG-RP009-13AET) for supporting our research. Related articles

- S. Hosseini, F. Ibrahim, I. Djordjevic, H. A. Rothan, R. Yusof, C. van der Mareld, L. H. Koole. Synthesis and Processing of ELISA Polymer Substitute: The Influence of Surface Chemistry and Morphology on Detection Sensitivity. *Applied Surface Science* 2014;317:630–8.
- S. Hosseini, F. Ibrahim, I. Djordjevic, H. A. Rothan, R. Yusof, C. van der Mareld, L. H. Koole. Synthesis and characterization of methacrylic microspheres for biomolecular recognition: Ultrasensitive biosensor for dengue virus detection. *European Polymer Journal* 2014;60:14–21.
- M.M. Aeinehvand, F. Ibrahim, S. W. Harun, I. Djordjevic, S. Hosseini, H. A. Rothan, R. Yusof, M. Madou. 2014. "Biosensing Enhancement of dengue virus using microballoon Mixers on centrifugal microfluidic Platforms". *Biosensors and Bioelectronics* (67) pp. 424–430.
- W. Al-Faqheri, F. Ibrahim, T. H. G. Thio, M. M. Aeinehvand, H' Arof, and M. Madou. 2015. "Development of Novel Passive Check Valves for the Microfluidic CD Platform". *Sensors and Actuators A*, (222) pp. 245–254 (Q1, IF 1.943).

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## UM Power Energy Dedicated Advanced Centre (UMPEDAC) Powering the Nation through Research and Consultancy

By: **Dr. Ahmad El Khateb**

**G**lobally, electricity demand is increasing in tandem with the rapid rate of technology development. However, the uncertain global fuel price and the impact of the environment from operating conventional fossil fuel generators is threatening the construction of new fossil fuel generators to support the increasing electricity demand. Consequently, renewable and green energy generation have received encouraging response in recent years.

In Sarawak, the Sarawak Corridor of Renewable Energy (SCORE) was launched on the 11<sup>th</sup> of February, 2008 to stimulate both global and domestic investment in traditionally rural areas to create a balanced development throughout the country. The SCORE has reported that energy security and diversifying the electricity sector away from fossil fuels are very important factors to support the energy intensive

industries in Sarawak. As such, SCORE aims to grow hydroelectric capacity in Sarawak from 108 MW, equivalent to 9.7 percent share in 2006, to 20,000 MW equivalent to 71.4 percent share by 2030.

In line with its objectives, SCORE had initiated a project to integrate a new hydro generation station to the grid, to be managed by Sarawak Energy Berhad (SEB). This Hydro Electric Project (HEP) is known as the Murum HEP. The Murum Dam is located in the upper reaches of the Rajang River in central Sarawak. Upon completion, this hydro generation plant is expected to generate a total energy output of up to 944 MW. The Murum dam will supplement the Bakun dam to supply additional electricity to energy-intensive industries like aluminium and ferro-alloy smelting plants in the Samalaju Industrial Park in Bintulu. The entire project will involve several sub-projects from the building of new hydro dam, electricity generation station, power transmission lines to power substations for integration to the existing power grid in Sarawak.

Pestech Sdn Bhd had been awarded a project to design, supply, deliver, erect and commission the 275/33kV Murum Junction substation in Sarawak, Malaysia. The 275kV Murum Junction substation shown in Photo 1 will connect the Murum HEP to the Sarawak Grid and serve as a collector station for future hydropower generations from the planned Belaga HEP and the Pelagus HEP. This will increase the SCORE's power supply reliability.

**Photo 1: The actual Murum Junction Substation Site**



Photo 1

## HICoE



Photo 2

**Photo 2: Dr. Ab. Halim Bin Abu Bakar with the RTDS and Protection Relays**



Photo 3

**Photo 3: The actual relays installed at the Substation**

The design of this new generation station and the connection to the grid will require huge amount of expertise from various fields. One such area of expertise is power system protection. Any flaws in the protection relay settings resulting from incomprehensive analysis conducted will lead to major blackouts. Commonly, the finally accepted protection settings will require a lengthy and thorough simulations to be conducted such that all undesired events in the power system are accounted for. Given the vast experience in the field of power system protection in Tenaga Nasional Berhad (TNB), Dr. Ab. Halim Bin Abu Bakar (Photo 2) of UMPEDAC had been appointed by Pestech Sdn Bhd to serve as their consultant for the power system protection study between the Murum HEP and the Sarawak grid.

To ensure high accuracies in the analysis of protection relay settings, the Real-Time Digital Simulator (RTDS) has been employed to verify

the protection settings. In RTDS, the highly accurate time representations and hardware-in-the-loop capabilities allowed the grid to be precisely modelled in its operating environment. The time samples were so precise that the actual protection relays connected to the RTDS were unable to identify whether they were actually connected to a simulator or to a real power system grid. After months of protection system study and verifications, the project was finally completed in January 2015. Given that both Pestech Sdn Bhd and SEB were satisfied with the study conducted, the proposed protection settings was formally adopted shown in Photo 3.

The commissioning of this project will increase the electricity supply reliability, reduce the reliance on fossil fuels, promote renewable energy as well as facilitate the development of energy-intensive industries within SCORE in Sarawak, for a greater benefit of the nation.

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## Institute of Ocean and Earth Sciences (IOES)

### Marine Biodiversity and Ecosystem Studies Research Unit

#### Harmful Algal Bloom and its Impacts: The Scientific Efforts Towards a Better Solution

By: **Dr. Leaw Chui Pin**

**M**alaysia is one of the coastal nations in the Western Pacific regions. Sea route has served as an important mode of transportation, and coastal living resources are explored since the early civilization for human's valuable source of protein. In the past centuries, over exploitation of these resources, uncontrolled coastal development, and anthropogenic discharges from domestic, industrial and agricultural sources have led to the devastation of coastal habitats. One of these well-recognized phenomena is the occurrence of harmful algal bloom (HAB) events, in a layman's term - "red tide" (locals known as "air merah", "ombakmerah").

#### Its causes and impacts

This natural phenomenon of "red tide" occurs due to the rapid growth of the tiny phytoplankton (free living photosynthetic microalgae), and is visible by the changes of color in the waters (water discoloration; can be red, brown, blue, green, and sometimes

foamy). Eutrophication has been widely acknowledged as one of the main driving factors. While most algal blooms are considered beneficial owing to the high productivity of algae at the basal food chain that support higher trophic levels, and its role in the carbon sequestration from the atmosphere, rapid proliferation of toxic or harmful algae could be an economic disaster. When red tide occurs, edible shellfish mollusks will be contaminated by the toxic algae, and consequently cause the closure of shellfish farms and seafood ban in the market. Some harmful algae are responsible for massive fish kills by excreting fish-killing neurotoxins, ichthyotoxins.

#### The Research Group and the scientific contribution

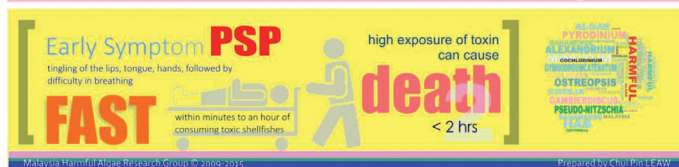
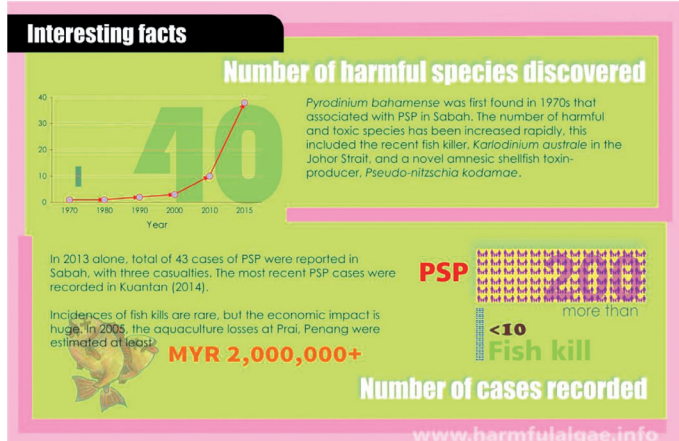
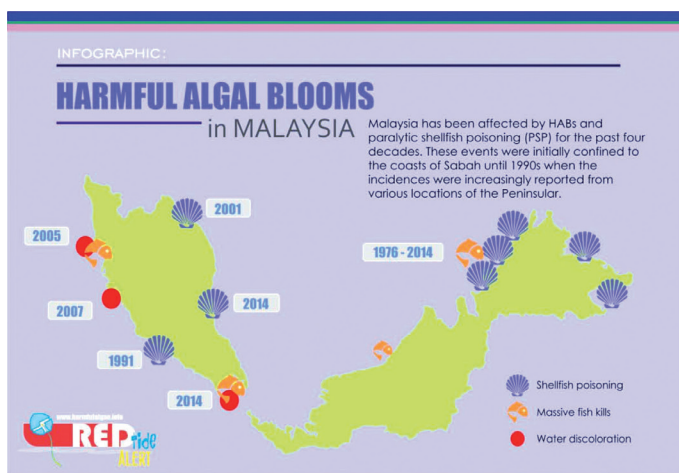
The group is led by Associate Professor Dr. Lim Po Teen and Senior Research Fellow, Dr. Leaw Chui Pin, one post-doc research fellow, Dr. Lim Hong Chang, and ten postgraduate students.

The research group works with

**Photos: February 2014, massive fish kills were spotted in Tanjung Kupang, Johor, causing losses to more than ten local farm operators. The culprit is confirmed *Karlodiniumaustrale* (Lim et al. 2014).**



# HICoE



**Infographics: 1) Harmful Algal Blooms  
2) Interesting facts**

**Contact**

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 Website: www.ioes.um.edu.my

various aspects of research in HAB studies, spanning from eco-physiology and toxin production of the toxic species, life cycle and bloom dynamics, molecular phylogenetic, systematics, population genetics to the development of rapid detection tools. By integrating their research, the group is actively involved in education and outreach on HABs. The website, www.harmfulalgae.info provides information on harmful algal blooms

in Malaysia. A variety of outreach materials has been developed, and distributed to the locals, particularly fishermen and aquaculture operators.

The group is actively taking part in capacity building, not only at the national level but also regional level, with the collaboration of UNESCO Intergovernmental Oceanography Commission sub commission (IOC) for Western Pacific Region (WESTPAC). In 2014, a training workshop on "Advanced and Systematic Monitoring of harmful algal blooms" had been successfully organized at Bachok Marine Research Station, Kelantan. With the commitment and outstanding achievement of the group, IOES has been invited, and being evaluated, for the establishment of the UNESCO Regional Training and Research Center in Harmful Algal Blooms (RTRC-HABs).

### Research Highlight

In February 2014, a massive fish kill was spotted in Tanjung Kupang, the West Johor Strait, causing millions of losses to the fish cage-farm operators. A field investigation was carried out by the group to identify the culprit of the incidence. Plankton and water samples collected showed extremely high abundance of monospecific small dinoflagellates. Rapidly the culprit was identified as Karlodinium australe; this could be achieved with the group's vast experience in electron microscopy and molecular techniques. Fish necropsy confirmed the symptom of ichthyotoxicity. This is a novel finding of the species associated with fish mortality. [The work has been published in Harmful Algae, vol. 40 (2014)]

One of the accomplishments of the group is the discovery of several novel toxic species, including new records of the occurrences of harmful species in Malaysia. Up till now, at least 40 harmful species have been discovered throughout the Malaysian waters. With the progression of the information, the group has developed a global harmful species database with a web-based interactive key to species. This web interactive tool will serve as a national as well as an internationally-recognised knowledgebase in HAB field.

## Photonics Research Centre (PRC) UM Photonics Research World Class

By: **Dr. Ahmad Ibrahim**,  
UM Adjung Professor

**M**any may not realize that photonics technology is a key factor behind many of today's everyday gadgets. Not many appreciate the fact that without the advancement made in photonics research, technologies which make possible the performance of smart phones, laptops, medical instruments and the lighting that we always take for granted. Over the years, UM has successfully built a world class centre in photonics research which boasts many state of the art analytical instruments and facilities. Some of the key equipments at the centre include:

1. E-beam evaporation system,
2. Flame hydrolysis deposition system,
3. DC sputtering Cr deposition system,
4. ICP RIE dry etching system,
5. Ultra-high resolution optical spectrum analyzers,
6. Fiber Bragg grating fabrication facility,
7. Tunable laser sources covering O, E, S, C, L-band and 2um region,
8. High-power supercontinuum broadband light sources,
9. High power optical amplifiers,
10. Real-time terahertz spectrometer.

Through the visionary leadership of the centre's Head, Professor Datuk Dr Harith Ahmad, the centre has made significant contributions to the global knowledge on photonics. The many papers published by the centre have attracted worldwide citations of its

excellent research outputs. In addition, the centre has successfully trained many photonics researchers in the country. In fact most of the leading photonics researchers in the other universities in Malaysia had their initial training at the UM Photonics Centre. Many were students of Professor Harith.

The Centre's programs include:

- Photonics Engineering
- Photonics Sciences
- Light wave Engineering
- Laser Sciences
- Optical Sensors Technology

### What is photonics...

Photonics is the science and technology of generating, controlling, and detecting photons, which are particles of light. If electronics was a key driver of development in the 20th century, then most people agree that the 21st century will depend as much on photonics. Photonics offers enormous potential for humanity. The characteristics of the waves and photons can be used to explore the universe, cure diseases, and even to solve crimes. It all started in the 17<sup>th</sup> century when Sir Isaac Newton showed that white light is made of different colors of light. At the beginning of the 20th century, Max Planck and later Albert Einstein proposed that light was a wave as well as a particle, which was a very controversial theory at the time. Later experimentation confirmed this duality in the nature of light. The word Photonics appeared much later around

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## HICoE



Photo 1



Photo 2



Photo 3

**Photo 1:** Dr. Lim Kok Sing is working on CO<sub>2</sub> laser for regeneration of FBGs.

**Photo 2:** Mr. Lee carrying out refractive index and thickness measurements of a Ge:SiO<sub>2</sub> thin film using prism coupling technique.

**Photo 3:** Mr Rajibul is fabricating FBG

1960, when the laser was invented by Theodore Maiman. This again goes to show how the fundamental research in science would eventually lead to the development of gadgets which have become part of everyday living.

### Delivered Its Mandate..

The UM Photonics Research Centre has certainly delivered much of what it was earlier established for. This includes the formation of a research network with world class facilities for innovation in the field of photonics (optical guided-wave), and the transfer of knowledge to the public and private sectors. It aims to be the centre for international standard in optical guided-waves research.

Based on the achievements so far, the centre has proven its worth in the investments put over the years not only in research funding but also the supporting equipments and instruments. The Centre has also established its international credibility

through the centre's collaborative projects with other world class photonics laboratories. The centre is now a major recipient of research grants in the country.

A recent visit to the centre provides the opportunity to better appreciate how and why the centre has become a pride of the UM. The research undertaken by the centre has kept pace with the latest advancement in global photonics R&D. One area getting attention at the centre is the research on compact ultrafast fiber lasers. This has become the focus of research around the world recently. This is because of the many range of applications possible including communications, metrology, manufacturing, materials processing as well as medicine and health. The team at UM has been working on how to reduce the complexity and the costs of such devices. Their graphene based fiber laser is definitely showing promise.

## Potential HiCoE

# Tropical Infectious Diseases Research & Education Centre (TIDREC) Scientists Introduce New Technology to Control Mosquitoes



Photo 1

By: Prof. Dr. Sazaly Abu Bakar,  
Jefree Johari,  
Juraina Abd. Jamil

### Contact

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Dengue has claimed over 150 lives and infected more than 53,000 Malaysians since the beginning of this year. An effective method for controlling dengue is desperately needed. Researchers at the University of Malaya have introduced a new technology platform to control mosquito population.

Using mosquito coils impregnated with an attracticidal, the scientists were able to reduce the number of mosquitoes in the Orang Asli village of Kampung Dusun Kubor in Jelebu, Negeri Sembilan.

The unique coils, one of its kinds in the world, are lit and placed outside the house instead of the usual indoor use. Under the Knowledge Transfer Program of the Ministry of Education, the entire village consisting of 50 houses received two units of ceramic pots and mosquito coil holders (Photo 1). The villagers were instructed to burn the coils at dusk and place them in the provided ceramic pots on the mosquito coil holder. The specially designed pot and holder allow the mosquito coil to be safely used outdoor where the lit coils are protected even when it rains.

## Potential HiCoE

The scientists explained that the technology is more superior to the conventional mosquito coils since it attracts and kills mosquitoes instead of warding them. Together with the specially designed ceramic pots and holders, the new invention can be used all year round with minimal supervision from the users. The new invention also reduces the chances of mosquito breeding within the usage compound as mosquitoes are killed once attracted to the coils. This feature is important especially in areas with high vegetation where complete elimination of trapped water is difficult to achieve.

In a ceremony held in Kg Dusun Kubor, Professor Awang Bulgiba, University of

Malaya's Former Deputy Vice Chancellor for Research & Innovation presented the villagers with a year's supply of the new invention of mosquito coils. Professor Awang mentioned that the villagers will also be engaged in the manufacturing of the especially hand-made coil holder.

The next step is to introduce the technology to the entire country especially in areas where dengue cases are high.

The lead scientist of the project, Professor Sazaly Abu Bakar said that we may finally have an effective tool to combat dengue.



## Potential HICoE

# Nanotechnology and Catalysis Research Centre (NANOCAT) Winning a Top Award from Elsevier

Researchers from the University of Malaya's Nanotechnology and Catalysis Research Centre (Nanocat) Have Earned Elsevier's Prestigious "Atlas Award" for their Ground Breaking Research Into Desalination Technology.

By: **Dr. Eaqub Ali**

### DID YOU KNOW?

More than 98% of our water is salty and only 2% is fresh. Of this 2% fresh water, 70% is snow and ice, 30% is hidden in ground, less than 0.5% is on surface such as in rivers, lakes and basins and less than 0.05% is in the atmosphere.

Sea water is unlimited but you can't just drink it straight from the ocean. But it is possible to use water from the seas once the salts are removed. Currently, desalination plants provide much of the water for domestic and industrial uses in many parts of the world, especially in Israel, Saudi Arabia, and Australia.

Climate change is only increasing the demand for desalinated water as greater evaporation, ice-melting, storms and heavy rainfall as well as the rising seas further dwindling the freshwater supplies for a growing world population. But climate change and global warming are either impossible or extremely difficult to control.

Some coastal and low lying areas such as Bangladesh, Maldeep and parts of India and Sri Lanka are already facing massive sea water intrusion and increased salination in their estuaries, rivers, lakes and other forms of surface water. Much of the developed countries including the US, Canada, Australia,

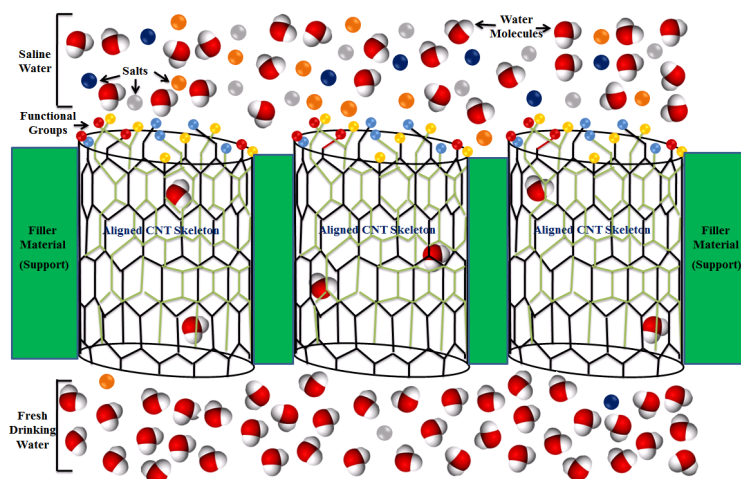
and Europe have to cope with draughts and on growing risk of storms, floods and forest fire. Asia has already been the worst region of storm, flood and draught stricken area of the world with poor infrastructure facilities to cope up the on growing stress.

Currently, about 400 million people are using desalinated water and it has been projected that by 2025, 14 percent of the global population will be forced to use sea water. But today's desalinated water comes at a very high cost in terms of energy, which means more greenhouse gases and more global warming.

Professor Dr. Sharifah Bee Abd Hamid, Dr. Md. Eaqub Ali and Rasel Das from the [University of Malaya's Nanotechnology and Catalysis Research Centre](#), say in their award winning article "[Carbon Nanotube Membranes for Water Purification: A Bright Future in Water Desalination](#)" published in the journal "[Desalination](#)", Volume 336, 3 March 2014, Pages 97–109" that carbon nanotube (CNT) membranes have a bright future in helping the world's population to meet the need for purified water from the sea.

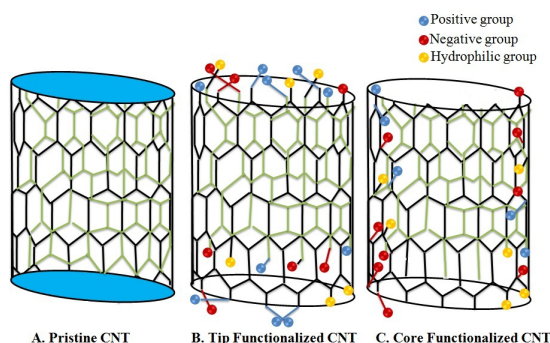
Carbon nanotubes are tiny hexagonal tubes, made by rolling sheets of graphene. They require little energy and can be designed to reject or remove not only salt, but also common pollutants. The hollow pores of the CNTs are extremely, extremely tiny. However, because of their amazing chemical and physical properties, they allow frictionless passes of water through the pores, but reject most salts, ions, and pollutants, giving us purified water, probably in its best form (Figure 1).

**Figure 1: Removal of salts from water using aligned CNT membrane.**



# Potential HiCoE

**Figure 2:**  
Functionalization of CNT membranes.



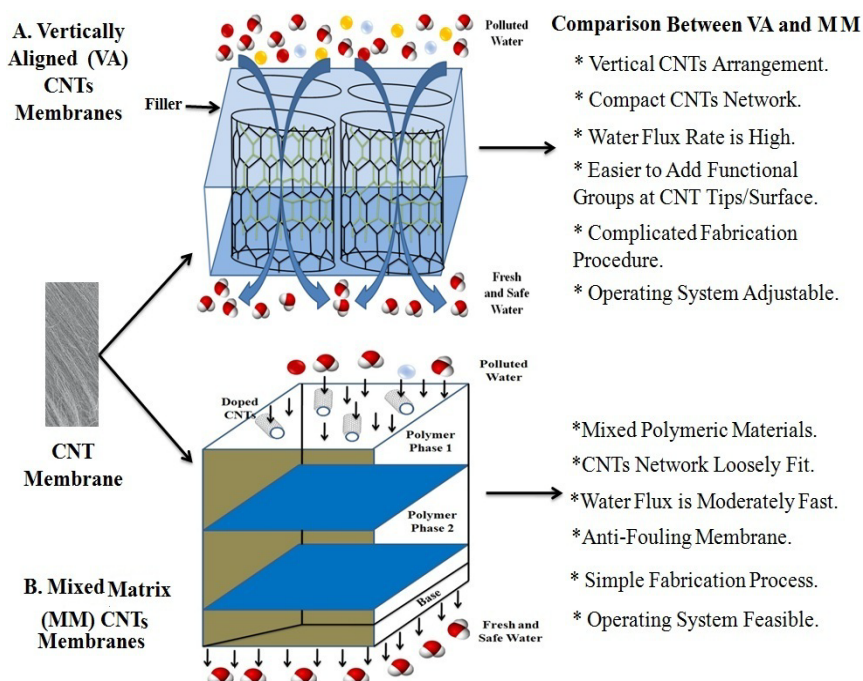
The interior pore surface of CNTs is hydrophobic, which allows water molecules to pass through the pores with minimum friction, eliminating the need of much energy. The tips of the tubes could also be functionalized with various chemical and receptor, which act as gatekeepers to selectively trap, reject or breakdown a particular pollutant or the most common pollutants (Figure 2).

CNT membrane fabrication process needs optimum alignment of CNTs on a specialized support (Figure 3). Specifically aligned CNT membranes have self-cleaning properties, such as cytotoxic properties to hinder the growth of microbes in the CNT membrane. This inhibits biofouling and increases membrane lifespan. Self-cleaning is a challenge to reverse osmosis and other water purification technologies and CNTs have the potentials to

overcome this hurdle. Unfortunately, CNT membrane technology for water desalination is still at the developmental stage. No commercial unit has been announced. However, tremendous progress has

been made to demonstrate the ability of CNT membranes to remove salts from water, and the cost of producing CNTs has come down dramatically. Technical challenges do still exist.

Most progress in desalination research is focused on demonstrating the capability of CNT membranes at a small scale. For larger scale operations, work is needed to produce CNT membranes on thin films or fiber cloth composites. Getting CNT membranes ready for use will require effort on material design, operational requirements, and more. If someday, these membranes can be put to use in water-filtering pitchers or bottles to directly treat salty water at point of use, it is a dream come true for many.



**Contact**

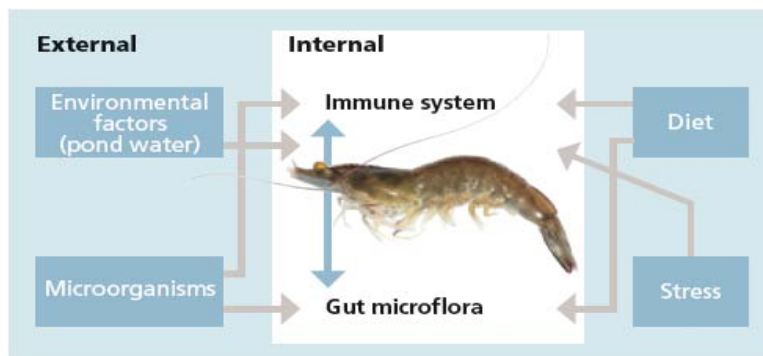
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Each month, Atlas's advisory board selects a research article for the Atlas Award, based on suggestions from the publishers of Elsevier's 1,800+ journals. The key criterion is the social impact of the research. Atlas's science writers summarize the winning article in an easy to understand story for Atlas, and the article is also made freely available on ScienceDirect.



From left Dr Eaquib Ali, Rasel Das and Prof. Sharifah Bee

## Centre for Research in Biotechnology for Agriculture (CEBAR) Aquatic Molecular Biology and Biotechnology Group



By: Associated Professor Dr.  
Subha a/p Bhassu

### Introduction

Scientific research in aquatic molecular biology and biotechnology has been an interest for CEBAR as these aquatic resources are major food sources for most nations. The prime objective of research is to understand the functional roles and the importance of these genes from an aquatic genome that have been selected as a protein source in developing and developed nations. On that note, we believe that molecular biology and biotechnology research will serve as a platform for the betterment of these aquatic resources, particularly in relation to food safety. Thus, our research approach focuses on the investigation of a host (aquatic organism), possible pathogens related to the host and key environment parameters. Our group is working towards developing products and patents that will benefit the aquaculture industry.

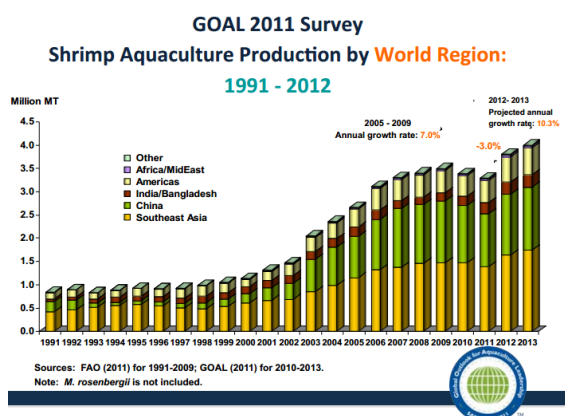
Our interests in aquatic animals are focused on shrimps as they are consumed as a source of protein. Shrimps are easily infected by bacteria and contaminated by toxins

in a polluted aquatic environment; hence, the need for a study on shrimps and the related food safety issues. Food safety inherently involves the handling, preparation, and storage of food in ways that prevent foodborne illness. In addition, it is also important to ensure that the food we consume is clean, hygienic and of good quality.

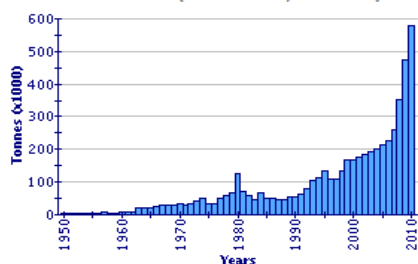
Seafood consumption in the United States is said to have increased by about 50 percent since 1980 and is expected to increase in the next 20 years. Other countries such as China and Japan are also categorized as countries with high shrimp consumption (Nissui, 2002). With the increase in shrimp consumption, the number of countries exporting seafood also increases. However, some exporting countries have poor internal control systems, or are located in tropical areas where toxin and bacteria hazards are higher (Ahmed, 1991). Toxin, bacteria and heavy metals contamination in seafood can cause allergy and other diseases in consumers. The U.S. Food and Drug Administration (FDA) conduct sample inspection of imported seafood at their port of entry. Thus, it is important to know the best environment and other conditions required for the growth and production of high quality shrimps in large quantities. An increase in world shrimp aquaculture production between 1991 and 2012 is shown in Graph 1 (FAO, 2011). It can be seen that there is an increase in shrimp production from 1993 to 2009, a slight decrease in 2010 and 2011,

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**Reported aquaculture production in Malaysia (from 1950)**  
(FAO Fishery Statistic)



**Graph 1: Shrimp aquaculture production by world region**  
**Graph 2: Reported aquaculture production in Malaysia**

followed by a projected increase in 2012 and 2013. Reported aquaculture production in Malaysia, from 1950 to 2010, is shown in Graph 2 (FAO, 2014) with a steady growth observed from 2000 to 2010.

In Asia, aquaculture contributes more than 90% of the world production. The total aquaculture shrimp production, such as Black Tiger shrimps, has increased from 200,000 tonnes in 1988 to 700,000 tonnes in 2010, valued at more than USD 3.2 billion (FAO, 2012). Furthermore, a lack of proper bio-security measures involving commercial and export stocks usually create problems in the value chain analysis of marine shrimp production. There has been no report on an implemented sustainable biomarker detection system in the South East Asian region to address the issue of serious losses due to disease faced by the shrimp industry. Notably, disease impediment in marine shrimp aquaculture that are of high commercial value, result in huge losses to small

farmers and commercial producers. The recent outbreak of early mortality syndrome and viral diseases in China, Malaysia, Thailand and Vietnam caused 80% losses to the industry. Heavy metals such as lead (Pb), mercury (Hg), cadmium (Cd) and arsenic (As) are very toxic to humans, animals, fishes and the environment. Their bio accumulation in organisms causes toxic effects and death in most living beings. Certain heavy metals become toxic due to formation of soluble compounds. Although some of the heavy metals are essential micronutrients, they have their toxic effect via metabolic interference and mutagenesis. Heavy metals are significant pollutants for aquatic organisms because these constituents are not eliminated to the aquatic systems through natural means. These contaminants enter water through drainage, soil erosion, atmosphere and human activities. Metal contaminants mixed into the aquatic system via sewage, effluents and leaching of garbage can also harm the aquatic system. Waste water from effluents has endocrine disruption effects which is potentially hazardous to aquatic organisms. The tannery industry also causes the addition of pollutants in aquatic environment. The tanners use a huge number of chemicals during processing that may be hazardous if the toxic materials being discharged into the water are not properly treated. When heavy metals are concentrated in an environment, they enter into a biogeochemical cycle which leads to toxicity.

Thus, CEBAR's role in this intervention is divided into FIVE strategies:

1. To ensure that shrimps and prawns production is grown in a sustainable manner that complies with environmental regulations.
2. To develop biomarkers for disease and contaminants that will threaten the shrimp industry;
3. To develop synthetic peptides to be incorporated into plant feed to enhance the immunity of shrimps;
4. To assist in the development of breeding line for shrimps for industry as national coordinative project along with other industries and universities for sustainable nucleus seed bank for shrimp species;
5. To be an important arm for shrimp industry in Asean region in terms of endorsement on food safety to ensure it is safe for public health through comprehensive value chain analysis and creating a HACCP critical review center for shrimps.

## UStartup ASEAN 2015 Startup Managers Network Meeting. A Programme by University of Malaya and Partners for the 1 Asean Entrepreneur Summit

By: **Professor Dr. Rofina Yasmin**, University of Malaya Centre of Innovation & Commercialization



Photo 1

**Photo1: Tan Sri Irwan Serigar Abdullah giving speech on the stage.**

UStartup ASEAN 2015 successfully launched a regional to global network event during the mini 1AES summit on March 20<sup>th</sup> 2015 towards building an ASEAN UNIVERSITY START UP COMMUNITY driven by the top academic and research talents and technology in ASEAN. The first of such events saw more than 50 senior technology transfer professional from Universities throughout the ASEAN region gather to form a first of its kind network, exchange professional views and chart the future forward for a community driven strategy to increase output and outcome from university research through a focused entrepreneurial strategy. Among the

delegates included technology directors from Singapore (NUS), Thailand (Chulalongkorn and Mahidol), Brunei (University Brunei Darul Salam), Indonesia (Institut Teknologi Bandung) and Myanmar (PS Business School) and the Asean University Network based in Bangkok (AUN). While Malaysia was represented by its research universities (UM, UPM, UKM, UTM and USM) as well as UiTM, UNM and UMK .

Papers outlining the university startup experience from all the represented ASEAN states were presented as well as papers from the Innovation and Technology Managers Association of Malaysia (ITMA) and AUN





Photo 2

**Photo 2: The ASEAN University Start Up Delegates.**

**Photo 3: Dr. Arham Abdullah launched the ASEAN U-START network meeting.**



Photo 3

after a welcome speech by Dr Arham, Director of Industry Liaison Division Ministry of Education Malaysia. Participants were also treated to a rousing speech by the Secretary General of the Treasury Malaysia, which put well into context the scope of the network and reminded the group of the tremendous market that the ASEAN region offered to startups.

Much has been said about creating strategies that will ensure that investment into R&D finds an avenue for economic gain in application to industry and society. Startups utilizing research outputs from Universities present a value proposition that will allow for the translation of R&D ideas into action through a business friendly platform where these outputs can be translated into commercial ventures.

University startups range from those founded by academics or their graduate students, more often than not who are the technology developers themselves, to individuals who have successfully licensed University technology into their startups while maintaining a continuing relationship with the developers.

Among the issues highlighted during the network meeting included the need to create a better information database and gateway on university startups in ASEAN, to provide a structured platform for continued interaction within ASEAN, to develop co-incubation programmes for startups between ASEAN universities and to build the capacity

and capabilities of TTOs across the region through knowledge sharing and training. All the participants also agreed that a metrics for measuring the outcome of UStartups should be developed to reflect not just economic gain but social and structural impact that is relevant to the ASEAN context.

In short the inaugural meeting of the ASEAN University startup manager network was a launch pad that has established a showcase platform for excellence in University Entrepreneurship, opening regional markets through the potentials of inter university joint ventures & partnerships, and opening cross border investment opportunities in technology, IP and knowledge driven ventures. The network will be creating new partnership paradigms through a blue ocean strategy of co-access to mentoring, coaching and co-incubator facilities spanning through the ASEAN university startup managers network that will be continuously expanded to include as many ASEAN universities. The outcome of this network will be showcased in 20-22 November 2015 when USTART ASEAN 2015 will bring together more than 50 of the best ASEAN university startup companies, networking at least 200 ASEAN USTART delegates to be matched up with at least 100 ASEAN U angels and Venture funders and will have an open showcase accessible to industry and the community. For more information you can email to : [ustart2015@um.edu.my](mailto:ustart2015@um.edu.my)

**U**  
**START**  
**2015**  
**ASEAN**  
**BUSINESS**

# ASEAN UNIVERSITY START UP MANAGERS NETWORK MEETING

**KUALA LUMPUR**  
19-21 MARCH 2015

CREATING ECONOMIC AND SOCIAL IMPACT  
THROUGH UNIVERSITY STARTUPS

1AES  
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# Essential Science Indicator (ESI)

By: **Janaki Sinnasamy**, Koh Ai Peng, UM Library

**E**ssential Science Indicator (ESI) is a research tool that can assist in planning research strategies and R&D roadmaps. This research tool provides access to a unique and comprehensive compilation of essential science performance statistics and science trends. It is available as a 10-year rolling file covers 22 broad fields of research and is updated every two months.

The chief indicators of output or productivity include journal articles, publication counts, total citation counts and cites per paper to measure impact and influence. It is important to remember that the data in ESI is limited to Thomson Scientific (ISI Web of Science) indexed journal articles, the indicators from ESI can be used to identify influential individuals, individuals, institutions, papers, publications, and countries, in a specified field of study. Furthermore, Emerging research areas for future research can also be identified by the indicator.

One of the unique features of ESI is the listing of research areas called Research Fronts which are algorithmically derived topics reflecting research intensive and breakthrough areas of current science. Besides that, brief editorial discussions that provide guidance on data analysis and interpretation enhance the tables, charts, and other data sets presented in the product, institutional rankings, national rankings, and also journal rankings. ESI also features the most cited scientists and their rankings. In addition, highly cited papers are chosen from the most recent 10 years of data. Hot papers focus on very recent papers (past 2 years) that show an unusual rate of citation in the current period. These two types of papers are searchable using a variety of attributes based on percentile rankings in specific fields and time periods.

## Essential Science Indicators (ESI) can be accessed via:

- Interactive Library Portal <http://www.diglib.um.edu.my/interaktif/> or via the Library Website <http://www.umlib.um.edu.my>
- The steps are as follows:
  - 1) Login with student /staff card barcode number which starts with X .....
  - 2) Click on DATABASES and scroll down to choose ESSENTIAL SCIENCE INDICATORS (ESI). Remote access is also provided for ESI as

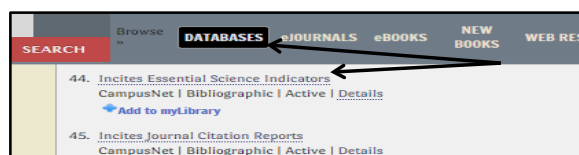


Figure I: Access of ESI Remote

highlighted in Figure I.

ESI is divided into 4 features as illustrated in Figure II:

- Citation Rankings** – rankings are determined for the most cited authors, institutions, countries, and journals, using total citation counts and cites per paper. A search can be carried out using Fields (subject area) and Name (full name or alphabetical list).
- Most Cited Papers** – provides a collection of the most highly cited hot papers. A search can be carried out using Fields (subject area), Name (alphabetical list of Scientist, Institution, Country, and Journal), and by keyword search using boolean operators.
- Citation Analysis** – includes Baselines and Research Fronts to identify criteria for highly cited papers and to track trends in current research. Baseline menu includes tables on average citation rates, percentiles, and field rankings. Research Fronts menu includes search by Fields (subject area) and Keyword terms or phrases.
- Commentary** – editorial discussions to provide guidance on data analysis and interpretation. Commentary features include; in-cites, special topics providing data on summarised publication and citation data, and sciencewatch which is a news bulletin.



Figure II: Features of ESI

### EXAMPLES OF ESI

Example 1: How many highly cited papers are published by University of Malaya in the last 10 years?

- In the feature section “Most Cited Papers”, click on “Highly Cited Papers”.
- Type “Univ Malaya” in the Institution column and search.
- The result will reveal University of Malaya has 116 highly cited papers as shown in Figure III.
- The article with the highest citation is ‘The classification of glomerulonephritis in systemic lupus erythematosus revisited’ published in the Journal of the American Society of Nephrology, vol 15(2): 241-250, Feb 2004. Professor Looi Lai Meng is one of the (23) co-authors.

HIGHLY CITED PAPERS FOR (UNIV MALAYA)	
Sorted by: Citations   SORT AGAIN	
1 - 20 (of 116)	Page 1 of 6
Citations: 439	WEB OF SCIENCE
<b>Title:</b>	THE CLASSIFICATION OF GLOMERULONEPHRITIS IN SYSTEMIC LUPUS ERYTHEMATOSUS REVISITED
<b>Authors:</b>	WEENING JJ; DAGATI VD; SCHWARTZ MM; SESHAN SV; ALPERS CE; APPEL GB; BALOW JE; BRUIJN JA; COOK T; FERRARIO F; FOGO AB; GINZLER EM; HEBERT L; HILL G; HILL P; JENNETTE JC; KONG NC; LESAVRE P; LOCKSHIN M; LOOI LM; MAKINO H; MOURA LA; NAGATA M
<b>Source:</b>	J AMER SOC NEPHROL 15 (2): 241-250 FEB 2004
<b>Addresses:</b>	Univ Amsterdam, Acad Med Ctr, Dept Pathol, NL-1006 AZ Amsterdam, Netherlands.

Figure III: University of Malaya Highly Cited Papers

Example 2: What are the Research Fronts in subject area “Food Safety”? [Research Fronts indicate current areas of intensive and breakthrough research]

- In the feature section “Citation Analysis”, click on “Research Fronts”.
- The list of related articles appeared as shown in Figure IV

RESEARCH FRONTS RANKINGS FOR FOOD SAFETY						
Sorted by: Citations   SORT AGAIN						
1 - 4 (of 4)		Page 1 of 1				
View	Fronts	Papers	Citations	Citations Per Paper	Mean Year	
1	WILL CLIMATE CHANGE AFFECT MYCOTOXINS; CLIMATE CHANGE; CLIMATE CHANGE FOOD SECURITY DEBATE; FOOD SECURITY; FOOD SAFETY	6	390	65.00	2010.0	
2	FOOD SAFETY CONCERN; FOOD INDUSTRIES; FOOD SAFETY; BIOFILM FORMATION; EMERGENT BIOFILM CONTROL STRATEGIES	4	214	53.50	2011.0	
3	SAFETY ASSESSMENT; FOOD SAFETY; ANTIBIOTIC RESISTANCE; ENTEROCOCCUS GENUS; GRAM-POSITIVE PATHOGENS	3	200	66.67	2010.0	
4	FOOD CONTACT MATERIALS; ACTIVE FOOD PACKAGING; FOOD PACKAGING; FOOD SAFETY; BARRIER MATERIALS	2	109	54.50	2011.5	

Figure IV

Example 3: What is the Minimum number of citations needed to be ranked the top 1% papers in “Clinical Medicine” for paper published in 2009?

- In the feature section “Citation Analysis”, click on “Baselines”
- View the percentiles table
- In the Clinical Medicine table, a value of 106 in the 1.00% column for 2009 indicates that the top 1.00% of papers in clinical medicine journals in that year have been cited 106 times as highlighted in Figure V.

CLINICAL MEDICINE	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	All Years
0.01 %	207	206	1255	1334	1112	1060	671	523	342	134	19	1149
0.10 %	688	621	265	479	400	352	250	167	111	41	9	390
1.00 %	215	203	175	151	128	106	80	56	33	14	4	119
10.00 %	59	55	49	42	36	30	23	17	10	4	1	30
20.00 %	36	33	30	26	22	18	14	10	6	3	1	17
50.00 %	13	12	11	9	8	7	5	4	2	1	1	5
COMPUTER SCIENCE	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	All Years
0.01 %	1694	1540	1805	966	1018	2530	649	408	113	62	14	848
0.10 %	313	201	272	218	251	188	156	82	10	17	6	100

Figure V

# Create an Online Researcher Profile on Wikiscientist

By: Nader Ale Ebrahim, PhD

## Abstract

In the digital era, visibility has become a major challenge for effective scholarly communication. Visibility is very important for researchers to control their own online presence. There are many ways to increase one's visibility online. Here is a suggestion for improving online visibility by utilizing Wikiscientist.

## Introduction

A number of strategies have recently been emerged to facilitate greater enhanced access to traditional scholarly content[1]. One of them is an Online Researcher Profile that makes a link between the list of published papers and open access versions of relevant articles. Online Researcher Profile increases researchers' output visibility to the academic community [2]. Maintaining a prominent online presence can help researchers to network with colleagues, share resources, raise money and communicate their work [3]. Once an author/paper's visibility increases, the citation will be increased at a significant rate [4]. The Online Researcher Profile, also can present other achievements and experience, as well as to keep the researcher's information updated to reflect their ongoing development. Some of the well-known Online Researcher Profile are: **ResearcherID** (set up by Thomson Reuters), **ORCID** (Open Researcher and Contributor ID), **Google Scholar My Citations**, **Publications List**, Institutional profile (Like **UMexpert**), **Microsoft Academic Search**, and **Wikiscientist**[5]. Wikiscientist is a FREE platform funded by wiki program. The Wikiscientist platform enables worldwide scientists to:

- Build online personal, academic biography
- Share research interests and research findings
- Record academic publication history
- Demonstrate academic publication list
- Find and connect with researchers, academics and scientists in the same fields in a worldwide scope.
- Be invited as a reviewer in peer review papers
- Be invited as chair in international conferences



Picture credited to: <http://www.wikiscientist.org>

The WikiScientist covers world scientists in all scientific fields, including Art Design & Architecture, Arts & Social Sciences, Business, Engineering, Law, Medicine, and Science[6].

## Create a Wikiscientist profile

Several researchers have set up biographies on the online Wikiscientist site that practically anyone can edit and include a list of their own publications. It is easy to become a Wikiscientist indexed author. To create online research profile one can simply log into the official website of Wikiscientist ([http://www.wikiscientist.org/wiki/Main\\_Page](http://www.wikiscientist.org/wiki/Main_Page)) and create it.

## References

- [1] T. Andrew, University of Edinburgh (2003).
- [2] N. Ale Ebrahim, et. al., International Education Studies6 (2013) (11) 93.
- [3] E.S. Reich, Nature.473 (2011) (7346) 138.
- [4] N. Ale Ebrahim, et. al., International Education Studies7 (2014) (4) 120.
- [5] N. Ale Ebrahim, Research World10 (2013) (4) 1.
- [6] Wikiscientist, About Wikiscientist, (2015).

## IPPP Central Laboratory Facilities

NO	FACILITIES	MODEL	TEST/SERVICES
1	Nuclear Magnetic Resonance (NMR 270 MHz)	Bruker AVANCE 270 MHz	<sup>1</sup> H, <sup>13</sup> C & others
2	Nuclear Magnetic Resonance (NMR 600MHz)	Bruker AVANCE III 600MHz	<sup>1</sup> H, <sup>13</sup> C & others 2D analysis
3	Sample Preparation (SEM)	-	Carbon/Gold Coating Chemical Treatment /CPD
4	GCMS	Agilent Technologies	Compositional Test (Scan & SIM Mode using RTX-5 Column) Compositional Test (Own Column)
5	Confocal Laser Microscope	Leica Tcs Sp5 li	Fluorescent Imaging Life cell imaging (Time Lapse)
6	Field Emission Scanning Electron Microscope (FESEM)	Quanta FEG 450, EDX-OXFORD	Imaging Compositional
7	Surface Area Analyzer (BET)	Micromeritics ASAP2020, TRISTAR II 3020 Kr	Surface Area Pore Volume Pore Size Distribution
8	Differential Scanning Calorimeter (DSC)	Perkin Elmer (DSC-8000)	Heat Flow Analysis Specific Heat Capacity (Cp)
9	Simultaneous Thermal Analyzer (STA)	Perkin Elmer (STA-6000)	Weight Loss Melting Curves
10	Dynamic Mechanical Analyzer	Perkin Elmer	Creep Test
	Particle Image Velocimetry (PIV)	Dantec Dynamics Nano L135-15piv	2D Imaging 3D Imaging
12	DNA Sequencer	Applied Biosystems (3730xl DNA Analyzer)	DNA Sequencing
13	Real Time PCR	Applied Biosystems Quantstudio (12k Flex Real Time PCR System)	Quantitative PCR Application
14	LCMS	Agilent Technologies	Qualitative
15	UHPLC	Agilent Technologies	Qualitative
16	Ellipsometer	J.A. Woollam M-2000	Change in Polarization Optical Constant Film Thickness
17	Rheometer	TA Instruments DHR-2	Viscosity Viscoelastic
18	Tensiometer	Attension Sigma 700	Surface and Interfacial Tension Powder Wettability

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