



HELSINGIN YLIOPISTO
HELSINGFORS UNIVERSITET
UNIVERSITY OF HELSINKI

INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL
TRAINING AT THE UNIVERSITY OF HELSINKI 2005–2010

RC-Specific Evaluation of LIC – Laboratory of Inorganic Chemistry

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Natural Sciences

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Title: International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of LIC – Laboratory of Inorganic Chemistry	Type of publication: Evaluations
Summary: Researcher Community (RC) was a new concept of the participating unit in the evaluation. Participation in the evaluation was voluntary and the RCs had to choose one of the five characteristic categories to participate. Evaluation of the Researcher Community was based on the answers to the evaluation questions. In addition a list of publications and other activities were provided by the TUHAT system. The CWTS/Leiden University conducted analyses for 80 RCs and the Helsinki University Library for 66 RCs. Panellists, 49 and two special experts in five panels evaluated all the evaluation material as a whole and discussed the feedback for RC-specific reports in the panel meetings in Helsinki. The main part of this report is consisted of the feedback which is published as such in the report. Chapters in the report: 1. Background for the evaluation 2. Evaluation feedback for the Researcher Community 3. List of publications 4. List of activities 5. Bibliometric analyses The level of the RCs' success can be concluded from the written feedback together with the numeric evaluation of four evaluation questions and the category fitness. More conclusions of the success can be drawn based on the University-level report.	
RC-specific information:	
Main scientific field of research: Natural Sciences	RC-specific keywords: thin films, atomic layer deposition, green chemistry, catalysis, nanochemistry, materials chemistry, organometallic chemistry, electronic materials
Participation category: 1. Research of the participating community represents the international cutting edge in its field	
RC's responsible person: Leskelä, Markku	
Keywords: Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community	

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Foreword

The evaluation of research and doctoral training is being carried out in the years 2010–2012 and will end in 2012. The steering group appointed by the Rector in January 2010 set the conditions for participating in the evaluation and prepared the Terms of Reference to present the evaluation procedure and criteria. The publications and other scientific activities included in the evaluation covered the years 2005–2010.

The participating unit in the evaluation was defined as a Researcher Community (RC). To obtain a critical mass with university-level impact, the number of members was set to range from 20 to 120. The RCs were required to contain researchers in all stages of their research career, from doctoral students to principal investigators (PIs). All in all, 136 Researcher Communities participated in this voluntary evaluation, 5857 persons in total, of whom 1131 were principal investigators. PIs were allowed to participate in two communities in certain cases, and 72 of them used this opportunity and participated in two RCs.

This evaluation enabled researchers to define RCs from the “bottom up” and across disciplines. The aim of the evaluation was not to assess individual performance but a community with shared aims and researcher-training activities. The RCs were able to choose among five different categories that characterised the status and main aims of their research. The steering group considered the process of applying to participate in the evaluation to be important, which led to the establishment of these categories. In addition, providing a service for the RCs to enable them to benchmark their research at the global level was a main goal of the evaluation.

The data for the evaluation consisted of the RCs’ answers to evaluation questions on supplied e-forms and a compilation extracted from the TUHAT – Research Information System (RIS) on 12 April 2011. The compilation covered scientific and other publications as well as certain areas of scientific activities. During the process, the RCs were asked to check the list of publications and other scientific activities and make corrections if needed. These TUHAT compilations are public and available on the evaluation project sites of each RC in the TUHAT-RIS.

In addition to the e-form and TUHAT compilation, University of Leiden (CWTS) carried out bibliometric analyses from the articles included in the Web of Science (WoS). This was done on University and RC levels. In cases where the publication forums of the RC were clearly not represented by the WoS data, the Library of the University of Helsinki conducted a separate analysis of the publications. This was done for 66 RCs representing the humanities and social sciences.

The evaluation office also carried out an enquiry targeted to the supervisors and PhD candidates about the organisation of doctoral studies at the University of Helsinki. This and other documents describing the University and the Finnish higher education system were provided to the panellists.

The panel feedback for each RC is unique and presented as an entity. The first collective evaluation reports available for the whole panel were prepared in July–August 2011. The reports were accessible to all panel members via the electronic evaluation platform in August. Scoring from 1 to 5 was used to complement written feedback in association with evaluation questions 1–4 (scientific focus and quality, doctoral training, societal impact, cooperation) and in addition to the category evaluating the fitness for participation in the evaluation. Panellists used the international level as a point of comparison in the evaluation. Scoring was not expected to go along with a preset deviation.

Each of the draft reports were discussed and dealt with by the panel in meetings in Helsinki (from 11 September to 13 September or from 18 September to 20 September 2011). In these meetings the panels also examined the deviations among the scores and finalised the draft reports together.

The current RC-specific report deals shortly with the background of the evaluation and the terms of participation. The main evaluation feedback is provided in the evaluation report, organised according to the evaluation questions. The original material provided by the RCs for the panellists has been attached to these documents.

On behalf of the evaluation steering group and office, I sincerely wish to thank you warmly for your participation in this evaluation. The effort you made in submitting the data to TUHAT-RIS is gratefully acknowledged by the University. We wish that you find this panel feedback useful in many ways. The bibliometric profiles may open a new view on your publication forums and provide a perspective for discussion on your choice of forums. We especially hope that this evaluation report will help you in setting the future goals of your research.

Johanna Björkroth
Vice-Rector
Chair of the Steering Group of the Evaluation

Steering Group of the evaluation

Steering group, nominated by the Rector of the University, was responsible for the planning of the evaluation and its implementation having altogether 22 meetings between February 2010 and March 2012.

Chair

Vice-Rector, professor **Johanna Björkroth**

Vice-Chair

Professor **Marja Airaksinen**

Chief Information Specialist, Dr **Maria Forsman**

Professor **Arto Mustajoki**

University Lecturer, Dr **Kirsi Pyhälä**

Director of Strategic Planning and Development, Dr **Ossi Tuomi**

Doctoral candidate, MSocSc **Jussi Vauhkonen**

Panel members

CHAIR

Professor Jan-Otto Carlsson

Materials science in chemistry and physics, nanotechnology, inorganic chemistry
Uppsala University, Sweden

VICE-CHAIR

Professor Jan van Leeuwen

Computer science, information technology
University of Utrecht, the Netherlands

Professor Caitlin Buck

Probability and statistics, archeology, palaeoenvironmental science
University of Sheffield, Great Britain

Professor David Colton

Mathematics, inverse problems of acoustic and electromagnetic scattering
University of Delaware, USA

Professor Jean-Pierre Eckmann

Mathematics, dynamical systems, mathematical physics
University of Geneva, Switzerland

Professor Ritske Huismans

Geosciences, geodynamics
University of Bergen, Norway

Professor Jukka Jurvelin

Medical physics and engineering
University of Eastern Finland

Professor Lea Kauppi

Environmental sciences, water research
The Finnish Environment Institute, Finland

Professor Riitta Keiski

Chemical engineering, heterogeneous catalysis, environmental technology, mass and heat transfer processes
University of Oulu, Finland

Professor Mats Larsson

Experimental molecular physics, chemical dynamics, molecular spectroscopy, astrobiology
Stockholm University, Sweden

Professor Holger Stark

Medicinal, organic and pharmaceutical chemistry, pharmacology
Johann Wolfgang Goethe Universität, Germany

The panel, independently, evaluated all the submitted material and was responsible for the feedback of the RC-specific reports. The panel members were asked to confirm whether they had any conflict of interests with the RCs. If this was the case, the panel members disqualified themselves in discussion and report writing.

Added expertise to the evaluation was contributed by the members from the other panels.

Experts from the Other Panels

Professor Barbara Koch, from the Panel of Biological, Agricultural and Veterinary Sciences

Professor Peter York, from the Panel of Medicine, Biomedicine and Health Sciences

EVALUATION OFFICE

Dr Seppo Saari, Doc., Senior Adviser in Evaluation, was responsible for the entire evaluation, its planning and implementation and acted as an Editor-in-chief of the reports.

Dr Eeva Sievi, Doc., Adviser, was responsible for the registration and evaluation material compilations for the panellists. She worked in the evaluation office from August 2010 to July 2011.

MSocSc Paula Ranne, Planning Officer, was responsible for organising the panel meetings and all the other practical issues like agreements and fees and editing a part the RC-specific reports. She worked in the evaluation office from March 2011 to January 2012.

Mr Antti Moilanen, Project Secretary, was responsible for editing the reports. He worked in the evaluation office from January 2012 to April 2012.

TUHAT OFFICE

Provision of the publication and other scientific activity data

Mrs Aija Kaltera, Project Manager of TUHAT-RIS served the project ex officio providing the evaluation project with the updated information from TUHAT-RIS. The TUHAT office assisted in mapping the publications with CWTS/University of Leiden.

MA Liisa Ekebon, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation. She also assisted the UH/Library analyses.

BA Liisa Jäppinen, Assisting Officer, served in TUHAT-RIS updating the publications for the evaluation.

HELSINKI UNIVERSITY LIBRARY

Provision of the publication analyses

Dr Maria Forsman, Chief Information Specialist in the Helsinki University Library, managed with her 10 colleagues the bibliometric analyses in humanities, social sciences and in other fields of sciences where CWTS analyses were not applicable.

Acronyms and abbreviations applied in the report

External competitive funding

AF - Academy of Finland
TEKES - Finnish Funding Agency for Technology and Innovation
EU - European Union
ERC - European Research Council
International and national foundations
FP7/6 etc. /Framework Programmes/Funding of European Commission

Evaluation marks

Outstanding (5)
Excellent (4)
Very Good (3)
Good (2)
Sufficient (1)

Abbreviations of Bibliometric Indicators

P - Number of publications
TCS - Total number of citations
MCS - Number of citations per publication, excluding self-citations
PNC - Percentage of uncited publications
MNCS - Field-normalized number of citations per publication
MNJS - Field-normalized average journal impact
THCP10 - Field-normalized proportion highly cited publications (top 10%)
INT_COV - Internal coverage, the average amount of references covered by the WoS
WoS - Thomson Reuters Web of Science Databases

Participation category

Category 1. The research of the participating community represents the international cutting edge in its field.

Category 2. The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.

Category 3. The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.

Category 4. The research of the participating community represents an innovative opening.

Category 5. The research of the participating community has a highly significant societal impact.

Research focus areas of the University of Helsinki

Focus area 1: The basic structure, materials and natural resources of the physical world

Focus area 2: The basic structure of life

Focus area 3: The changing environment - clean water

Focus area 4: The thinking and learning human being

Focus area 5: Welfare and safety

Focus area 6: Clinical research

Focus area 7: Precise reasoning

Focus area 8: Language and culture

Focus area 9: Social justice

Focus area 10: Globalisation and social change

1 Introduction to the Evaluation

1.1 RC-specific evaluation reports

The participants in the evaluation of research and doctoral training were Researcher Communities (hereafter referred to as the RC). The RC refers to the group of researchers who registered together in the evaluation of their research and doctoral training. Preconditions in forming RCs were stated in the Guidelines for the Participating Researcher Communities. The RCs defined themselves whether their compositions should be considered well-established or new.

It is essential to emphasise that the evaluation combines both meta-evaluation¹ and traditional research assessment exercise and its focus is both on the research outcomes and procedures associated with research and doctoral training. The approach to the evaluation is enhancement-led where self-evaluation constituted the main information. The answers to the evaluation questions formed together with the information of publications and other scientific activities an entity that was to be reviewed as a whole.

The present evaluation recognizes and justifies the diversity of research practices and publication traditions. Traditional Research Assessment Exercises do not necessarily value high quality research with low volumes or research distinct from mainstream research. It is challenging to expose the diversity of research to fair comparison. To understand the essence of different research practices and to do justice to their diversity was one of the main challenges of the present evaluation method. Understanding the divergent starting points of the RCs demanded sensitivity from the evaluators.

1.2 Aims and objectives in the evaluation

The aims of the evaluation are as follows:

- to improve the level of research and doctoral training at the University of Helsinki and to raise their international profile in accordance with the University's strategic policies. The improvement of doctoral training should be compared to the University's policy.²
- to enhance the research conducted at the University by taking into account the diversity, originality, multidisciplinary nature, success and field-specificity,
- to recognize the conditions and prerequisites under which excellent, original and high-impact research is carried out,
- to offer the academic community the opportunity to receive topical and versatile international peer feedback,
- to better recognize the University's research potential.
- to exploit the University's TUHAT research information system to enable transparency of publishing activities and in the production of reliable, comparable data.

1.3 Evaluation method

The evaluation can be considered as an enhancement-led evaluation. Instead of ranking, the main aim is to provide useful information for the enhancement of research and doctoral training of the participating RCs. The comparison should take into account each field of science and acknowledge their special character.

¹ The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics or comparable analyses.

² [Policies on doctoral degrees and other postgraduate degrees at the University of Helsinki.](#)

The comparison produced information about the present status and factors that have lead to success. Also challenges in the operations and outcomes were recognized.

The evaluation approach has been designed to recognize better the significance and specific nature of researcher communities and research areas in the multidisciplinary top-level university. Furthermore, one of the aims of the evaluation is to bring to light those evaluation aspects that differ from the prevalent ones. Thus the views of various fields of research can be described and research arising from various starting points understood better. The doctoral training is integrated into the evaluation as a natural component related to research. Operational processes of doctoral training are being examined in the evaluation.

Five stages of the evaluation method were:

1. Registration – Stage 1
2. Self-evaluation – Stage 2
3. TUHAT³ compilations on publications and other scientific activities⁴
4. External evaluation
5. Public reporting

1.4 Implementation of the external evaluation

Five Evaluation Panels

Five evaluation panels consisted of independent, renowned and highly respected experts. The main domains of the panels are:

1. biological, agricultural and veterinary sciences
2. medicine, biomedicine and health sciences
3. natural sciences
4. humanities
5. social sciences

The University invited 10 renowned scientists to act as chairs or vice-chairs of the five panels based on the suggestions of faculties and independent institutes. Besides leading the work of the panel, an additional role of the chairs was to discuss with other panel chairs in order to adopt a broadly similar approach. The panel chairs and vice-chairs had a pre-meeting on 27 May 2011 in Amsterdam.

The panel compositions were nominated by the Rector of the University 27 April 2011. The participating RCs suggested the panel members. The total number of panel members was 50. The reason for a smaller number of panellists as compared to the previous evaluations was the character of the evaluation as a meta-evaluation. The panellists did not read research reports or abstracts but instead, they evaluated answers to the evaluation questions, tables and compilations of publications, other scientific activities, bibliometrics and comparable analyses.

The panel meetings were held in Helsinki:

- On 11–13 September 2011: (1) biological, agricultural and veterinary sciences, (2) medicine, biomedicine and health sciences and (3) natural sciences.
- On 18–20 September 2011: (4) humanities and (5) social sciences.

³ TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

⁴ Supervision of thesis, prizes and awards, editorial work and peer reviews, participation in committees, boards and networks and public appearances.

1.5 Evaluation material

The main material in the evaluation was the RCs' self-evaluations that were qualitative in character and allowed the RCs to choose what was important to mention or emphasise and what was left unmentioned.

The present evaluation is exceptional at least in the Finnish context because it is based on both the evaluation documentation (self-evaluation questions, publications and other scientific activities) and the bibliometric reports. All documents were delivered to the panellists for examination.

Traditional bibliometrics can be reasonably done mainly in medicine, biosciences and natural sciences when using the Web of Science database, for example. Bibliometrics, provided by CWTS/The Centre for Science and Technology Studies, University of Leiden, cover only the publications that include WoS identification in the TUHAT-RIS.

Traditional bibliometrics are seldom relevant in humanities and social sciences because the international comparable databases do not store every type of high quality research publications, such as books and monographs and scientific journals in other languages than English. The Helsinki University Library has done analysis to the RCs, if their publications were not well represented in the Web of Science databases (RCs should have at least 50 publications and internal coverage of publications more than 40%) – it meant 58 RCs. The bibliometric material for the evaluation panels was available in June 2011. The RC-specific bibliometric reports are attached at the end of each report.

The panels were provided with the evaluation material and all other necessary background information, such as the basic information about the University of Helsinki and the Finnish higher education system.

Evaluation material

1. Registration documents of the RCs for the background information
2. Self evaluation material – answers to the evaluation questions
3. Publications and other scientific activities based on the TUHAT RIS:
 - 3.1. statistics of publications
 - 3.2. list of publications
 - 3.3. statistics of other scientific activities
 - 3.4. list of other scientific activities
4. Bibliometrics and comparable analyses:
 - 4.1. Analyses of publications based on the verification of TUHAT-RIS publications with the Web of Science publications (CWTS/University of Leiden)
 - 4.2. Publication statistics analysed by the Helsinki University Library - mainly for humanities and social sciences
5. University level survey on doctoral training (August 2011)
6. University level analysis on publications 2005–2010 (August 2011) provided by CWTS/University of Leiden

Background material

University of Helsinki

- [Basic information about the University of the Helsinki](#)
- [The structure of doctoral training at the University of Helsinki](#)
- Previous evaluations of research at the University of Helsinki – links to the reports: [1998](#) and [2005](#)

The Finnish Universities/Research Institutes

- [Finnish University system](#)
- [Evaluation of the Finnish National Innovation System](#)
- [The State and Quality of Scientific Research in Finland. Publication of the Academy of Finland 9/09.](#)

The evaluation panels were provided also with other relevant material on request before the meetings in Helsinki.

1.6 Evaluation questions and material

The participating RCs answered the following evaluation questions which are presented according to the evaluation form. In addition, TUHAT RIS was used to provide the **additional material** as explained. For giving the feedback to the RCs, the panellists received the evaluation feedback form constructed in line with the evaluation questions:

1. Focus and quality of the RC's research

- Description of
 - the RC's research focus.
 - the quality of the RC's research (incl. key research questions and results)
 - the scientific significance of the RC's research in the research field(s)
- Identification of the ways to strengthen the focus and improve the quality of the RC's research

The additional material: TUHAT compilation of the RC's publications, analysis of the RC's publications data (provided by University of Leiden and the Helsinki University Library)

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

2. Practises and quality of doctoral training

- Organising of the doctoral training in the RC. Description of the RC's principles for:
 - recruitment and selection of doctoral candidates
 - supervision of doctoral candidates
 - collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes
 - good practises and quality assurance in doctoral training
 - assuring of good career perspectives for the doctoral candidates/fresh doctorates
- Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

The additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

3. The societal impact of research and doctoral training

- Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).
- Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.

The additional material: TUHAT compilation of the RC's other scientific activities.

A written feedback from the aspects of: societal impact, national and international collaboration, innovativeness

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

4. International and national (incl. intersectoral) research collaboration and researcher mobility

- Description of
 - the RC's research collaborations and joint doctoral training activities
 - how the RC has promoted researcher mobility
- Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

A written feedback from the aspects of: scientific quality, national and international collaboration

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

5. Operational conditions

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).
- Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.

A written feedback from the aspects of: processes and good practices related to leadership and management

- Strengths
- Areas of development
- Other remarks
- Recommendations

6. Leadership and management in the researcher community

- Description of
 - the execution and processes of leadership in the RC
 - how the management-related responsibilities and roles are distributed in the RC
 - how the leadership- and management-related processes support
 - high quality research
 - collaboration between principal investigators and other researchers in the RC
 - the RC's research focus
 - strengthening of the RC's know-how
- Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes

7. External competitive funding of the RC

- The RCs were asked to provide information of such external competitive funding, where:
 - the funding decisions have been made during 1.1.2005-31.12.2010, and
 - the administrator of the funding is/has been the University of Helsinki
- On the e-form the RCs were asked to provide:
 - 1) The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation , EU, ERC, foundations, other national funding organisations, other international funding organisations), and
 - 2) The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005-31.12.2010.

Competitive funding reported in the text is also to be considered when evaluating this point.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, innovativeness, future significance

- Strengths
- Areas of development
- Other remarks
- Recommendations

8. The RC's strategic action plan for 2011-2013

- RC's description of their future perspectives in relation to research and doctoral training.

A written feedback from the aspects of: scientific quality, scientific significance, societal impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

- Strengths
- Areas of development

- Other remarks
- Recommendations

9. Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category

A written feedback evaluating the RC's fitness to the chosen participation category

- Strengths
- Areas of development
- Other remarks
- Recommendations

Numeric evaluation: OUTSTANDING (5), EXCELLENT (4), VERY GOOD (3), GOOD (2), SUFFICIENT (1)

10. Short description of how the RC members contributed the compilation of the stage 2 material

Comments on the compilation of evaluation material

11. How the UH's focus areas are presented in the RC's research?

Comments if applicable

12. RC-specific main recommendations based on the previous questions 1-11

13. RC-specific conclusions

1.7 Evaluation criteria

The panellists were expected to give evaluative and analytical feedback to each evaluation question according to their aspects in order to describe and justify the quality of the submitted material. In addition, the evaluation feedback was asked to be pointed out the level of the performance according to the following classifications:

- outstanding (5)
- excellent (4)
- very good (3)
- good (2)
- sufficient (1)

Evaluation according to the criteria was to be made with thorough consideration of the entire evaluation material of the RC in question. Finally, in questions 1-4 and 9, the panellists were expected to classify their written feedback into one of the provided levels (the levels included respective descriptions, 'criteria'). Some panels used decimals in marks. The descriptive level was interpreted according to the integers and not rounding up the decimals by the editors.

Description of criteria levels

Question 1 – FOCUS AND QUALITY OF THE RC'S RESEARCH

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Outstandingly strong research, also from international perspective. Attracts great international interest with a wide impact, including publications in leading journals and/or monographs published by leading international publishing houses. The research has world leading qualities. The research focus, key research questions scientific significance, societal impact and innovativeness are of outstanding quality.

In cases where the research is of a national character and, in the judgement of the evaluators, should remain so, the concepts of "international attention" or "international impact" etc. in the grading criteria above may be replaced by "international comparability".

Operations and procedures are of outstanding quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality.

Excellent quality of procedures and results (4)

Research of excellent quality. Typically published with great impact, also internationally. Without doubt, the research has a leading position in its field in Finland.

Operations and procedures are of excellent quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality.

Very good quality of procedures and results (3)

The research is of such very good quality that it attracts wide national and international attention.

Operations and procedures are of very good quality, transparent and shared in the community. The improvement of research and other efforts are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Good research attracting mainly national attention but possessing international potential, extraordinarily high relevance may motivate good research.

Operations and procedures are of good quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

In some cases the research is insufficient and reports do not gain wide circulation or do not have national or international attention. Research activities should be revised.

Operations and procedures are of sufficient quality, shared occasionally in the community. The improvement of research and other efforts are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 2 – DOCTORAL TRAINING

Question 3 – SOCIETAL IMPACT

Question 4 – COLLABORATION

Classification: Criteria (level of procedures and results)

Outstanding quality of procedures and results (5)

Procedures are of outstanding quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are in alignment with the documentation. The ambition to develop the community together is of outstanding quality. The procedures and results are regularly evaluated and the feedback has an effect on the planning.

Excellent quality of procedures and results (4)

Procedures are of excellent quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of excellent quality. The procedures and outcomes are evaluated and the feedback has an effect on the planning.

Very good quality of procedures and results (3)

Procedures are of very good quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and

management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of very good quality.

Good quality of procedures and results (2)

Procedures are of good quality, shared occasionally in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are documented and operations and practices are to large extent in alignment with the documentation. The ambition to develop the community together is of good quality.

Sufficient quality of procedures and results (1)

Procedures are of sufficient quality, transparent and shared in the community. The practices and quality of doctoral training/societal impact/international and national collaboration/leadership and management are occasionally documented and operations and practices are to some extent in alignment with the documentation. The ambition to develop the community together is of sufficient quality.

Question 9 – CATEGORY

Participation category – fitness for the category chosen

The choice and justification for the chosen category below should be reflected in the RC's responses to the evaluation questions 1–8.

1. *The research of the participating community represents the international cutting edge in its field.*
2. *The research of the participating community is of high quality, but the community in its present composition has yet to achieve strong international recognition or a clear break-through.*
3. *The research of the participating community is distinct from mainstream research, and the special features of the research tradition in the field must be considered in the evaluation.* The research is of high quality and has great significance and impact in its field. However, the generally used research evaluation methods do not necessarily shed sufficient light on the merits of the research.
4. *The research of the participating community represents an innovative opening.* A new opening can be an innovative combination of research fields, or it can be proven to have a special social, national or international demand or other significance. Even if the researcher community in its present composition has yet to obtain proof of international success, its members can produce convincing evidence of the high level of their previous research.
5. *The research of the participating community has a highly significant societal impact.* The participating researcher community is able to justify the high social significance of its research. The research may relate to national legislation, media visibility or participation in social debate, or other activities promoting social development and human welfare. In addition to having societal impact, the research must be of a high standard.

An example of outstanding fitness for category choice (5)⁵

The RC's representation and argumentation for the chosen category were convincing. The RC recognized its real capacity and apparent outcomes in a wider context to the research communities. The specific character of the RC was well-recognized and well stated in the responses. The RC fitted optimally for the category.

- Outstanding (5)
- Excellent (4)
- Very good (3)
- Good (2)
- Sufficient (1)

The above-mentioned definition of outstanding was only an example in order to assist the panellists in the positioning of the classification. There was no exact definition for the category fitness.

⁵ The panels discussed the category fitness and made the final conclusions of the interpretation of it.

1.8 Timetable of the evaluation

The main timetable of the evaluation:

- | | |
|--|-----------------------|
| 1. Registration | November 2010 |
| 2. Submission of self-evaluation materials | January–February 2011 |
| 3. External peer review | May–September 2011 |
| 4. Published reports | March–April 2012 |
| - University level public report | |
| - RC specific reports | |

The entire evaluation was implemented during the university's strategy period 2010–2012. The preliminary results were available for the planning of the following strategy period in late autumn 2011. The evaluation reports will be published in March/April 2012. More detailed time schedule is published in the University report.

1.9 Evaluation feedback – consensus of the entire panel

The panellists evaluated all the RC-specific material before the meetings in Helsinki and mailed the draft reports to the evaluation office. The latest interim versions were on-line available to all the panellists on the Wiki-sites. In September 2011, in Helsinki the panels discussed the material, revised the first draft reports and decided the final numeric evaluation. After the meetings in Helsinki, the panels continued working and finalised the reports before the end of November 2011. The final RC-specific reports are the consensus of the entire panel.

The evaluation reports were written by the panels independently. During the editing process, the evaluation office requested some clarifications from the panels when necessary. The tone and style in the reports were not harmonized in the editing process. All the reports follow the original texts written by the panels as far as it was possible.

The original evaluation material of the RCs, provided for the panellists is attached at the end of the report. It is essential to notice that the exported lists of publications and other scientific activities depend how the data was stored in the TUHAT-RIS by the RCs.

2 Evaluation feedback

2.1 Focus and quality of the RC's research

- *Description of*
 - *the RC's research focus*
 - *the quality of the RC's research (incl. key research questions and results)*
 - *the scientific significance of the RC's research in the research field(s)*
 - *Identification of the ways to strengthen the focus and improve the quality of the RC's research*
- ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness*

The Laboratory of Inorganic Chemistry (LIC) forms the Research Community and belongs to the Helsinki University focus area "The basic structure, materials and natural resources of the physical world". LIC has connections to another university focus area "The changing environment – clean water". The LIC includes 3 professors, 1 visiting professor, 4 lecturers, 1 senior researcher, 1 university teacher, 10 post docs, 26 PhD students, 5 MSc students, 4 technicians. The competitive funding is distributed as follows: AF 3.7 M€, TEKES 1.2 M€, EU 1.8 M€, and funding by companies (national and international) 2.6 M€. The scientific output has been about 500 refereed articles during 2005-2010. The field-normalized number of citation per publication is 14% above average.

The research includes basically two topics: i) Chemical deposition of thin films, particularly Atomic Layer Deposition (ALD) and ii) Catalytic activation of small molecules with metalorganic compounds (green chemistry). LIC is world-leading in ALD and has been selected for the second round in the Centre of excellence program of AF. Within the field of catalysis the group has been nominated as a Centre of Excellence in 2001.

The research program joins both basic and applied research in an elegant way. Many of the research projects are initiated in close co-operation with industry and require quite often extensive basic research components for success. The quality of the research is judged to be very high. The research leaders are frequently invited as key-note speakers and plenary speakers at the most important conferences in the area. LIC has many international co-operations and is an attractive partner in international research projects. PhDs from LIC are often offered post doc positions abroad, which is another indicator that both research directions and quality of the research are at the highest level.

The significance of the research is extraordinary high as indicated by the publication profile, external funding and participation in excellence programs. The collaboration with industry is very impressive. The two research directions with ALD and catalysis, respectively, represent two very important fields for society. There is a steadily increased demand of extremely thin films of both "old" and new materials (information technology, sensors, optics, wear resistance, etc.) and the ALD technique has the characteristics to meet these demands. Opening of new reaction pathways by catalysis for energy savings and production of various fuels is in the heart of "green chemistry". Catalysts for oxidation of alcohols in water solutions and for utilization of CO₂ for production of chemicals have been developed. Another example is development of catalytic methods to degrade lignocelluloses materials as well as metal free hydrogenation of imines and enamines. Both the ALD and the catalysis research have also mechanistic approaches, which become a natural bridge between the two research directions. Computer simulations and introduction of additional spectroscopic techniques might be useful to further strengthen the mechanistic part. With the reduced dimensions of the thin films, the interfaces between different layers as well as film/substrate become more and more important, which means that the interfacial characterization also becomes more important. There might be a need to initiate a discussion (if not already initiated) on the long-term strategy and demand for characterization of interfaces at the atomic level.

Numeric evaluation: 5 (Outstanding)

2.2 Practises and quality of doctoral training

- *Organising of the doctoral training in the RC. Description of the RC's principles for:*
 - *recruitment and selection of doctoral candidates*
 - *supervision of doctoral candidates*
 - *collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes*
 - *good practises and quality assurance in doctoral training*
 - *assuring of good career perspectives for the doctoral candidates/fresh doctorates*
- *Identification of the RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.*
- *Additional material: TUHAT compilation of the RC's other scientific activities/supervision of doctoral dissertations*

ASPECTS: Processes and good practices related to leadership and management

The recruitment procedure of the doctoral candidates differed depending on the funding: University funding – announcement and recruitment committee, graduate school – announcement among five universities and selection by steering group, Marie Curie – announcement and selection by steering group, project funding – selection basically by PI. The recruitment procedures are judged to be appropriate.

Important criteria for doctoral training are fulfilled at LIC: Exposure to excellent research, critical mass of the research environment and access to state-of-the-art infrastructure. LIC is also involved in the national graduate school of inorganic materials chemistry as well as a Marie Curie network.

There is an excellent balance in the supervision capacity. There are about 8 senior scientists and 10 post docs on 26 PhD students, which means that supervisors are always available.

The Panel was pleased to note the close connection between LIC and industry/institutes. The PhD students will through such a connection get wider insights in both research procedures and areas at industry as well as may be receiving life long new contacts and employment positions. This collaboration is also a very good sign of the activities that natural sciences today have with companies and how industry needs results originating from basic research to be competitive in global markets.

LIC is involved in an impressive number of national and international networks, which means that the PhD students are exposed to many research environments. The spending of some months of the PhD training at foreign universities was very much appreciated.

The quality assurance in the doctoral training is the publishing in international reviewed journals, the PhD examination procedure, and finally the continued career as a post doctoral researcher at university or in industry. A good indication of the quality of the PhDs produced is how attractive they are for post doc positions within the country and abroad. Universities like Harvard and Stanford, IBM laboratories, and several European universities frequently ask for post docs from LIC, indicating that the quality of PhDs produced is at the top-level.

The strengths of the doctoral training within LIC is the research itself, the international networks, the graduate school and participation in Marie Curie network, the size of the research environment, the supervision capacity and the close connection to industry and job market. The Panel could not see in the evaluation documents if there is any annual revision of the study plans for the PhD students. Even if the supervisor and the student meet on a nearly daily basis a planned deeper discussion of the progress for the candidate is always appreciate.

Numeric evaluation: 5 (Outstanding)

2.3 The societal impact of research and doctoral training

- *Description on how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).*
- *Identification of the ways to strengthen the societal impact of the RC's research and doctoral training.*

- *Additional material: TUHAT compilation of the RC's other scientific activities.*
- ASPECTS: Societal impact, national and international collaboration, innovativeness*

The Panel was very impressed by the societal impact of LIC. The research in itself as well as the production of highly skilled PhDs meets the needs of the future society. ALD is now a key technology in the semiconductor industry and the technology is expanding rapidly into other areas like nanotechnology, energy-related materials, optical communication, catalysts, passivation layers. There are actually several companies in Finland fabricating products based on nanotechnology.

“Green chemistry” is the other main research area of LIC. The focus of the research in this area is development of catalytic processes and studies of biological raw materials for fuels and high added value chemicals. This research area is very timely and will have an impact on the future society via new innovations in bioeconomy, innovations that are based on research results originating from basic research.

The research in LIC produces also results suitable for patents. The close co-operation with companies may result in patent strategies to the benefit of both parties. Patents may also open for creation of new companies.

The Panel noticed that there has not been much time for disseminating research results and information to society. This might be an area to be strengthened in the future.

Numeric evaluation: 4 (Excellent)

2.4 International and national (incl. intersectoral) research collaboration and researcher mobility

- *Description of*
 - *the RC's research collaborations and joint doctoral training activities*
 - *how the RC has promoted researcher mobility*
- *Identification of the RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.*

ASPECTS: Scientific quality, national and international collaboration

LIC is involved in many collaborative activities. Internationally the EU funded networks and projects have been very important and LIC participates now in a Marie Curie training network (ENHANCE). An application on researcher training with exchange of graduate students between University of Colorado and UH has been sent to NSF. Other exchange programs are the DAAD-Academy of Finland programs for exchange with Munich Technical University and University of Stuttgart, respectively. In addition LIC has been involved in many COST projects. The above-mentioned activities illustrate both joint doctoral training activities as well as promotion of researcher mobility.

Nationally LIC participates in many collaborations. LIC is very active in the national graduate school on Inorganic Materials Chemistry. There are also many AF and TEKES funded collaborative projects between LIC and both VTT and the Aalto University. There exist quite a lot of collaborations between groups inside UH and LIC is also networked to basically all Finnish universities, having engineering or science faculties. LIC has also an intense collaboration with companies and one company, ASM Microchemistry, has its R&D laboratory located at the Department.

LIC is involved in an impressive number of collaborations at all levels, enhancing both research quality and mobility. There seems to be a healthy balance between national and international collaborations. There might be a tendency to be involved in too many collaborations and thus losing both focus and effectiveness. However, the plans with the NSF project were well received.

The challenges include keeping at least the present research level, focus of the research activities, and increasing the number of motivated PhD students in the mobility programs. The actions planned for further development include proactivity at different levels: Identification of new research projects and participation in the early planning of programs and projects.

Numeric evaluation: 4 (Excellent)

2.5 Operational conditions

- *Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).*
- *Identification of the RC's strengths and challenges related to operational conditions, and the actions planned for their development.*

ASPECTS: Processes and good practices related to leadership and management

LIC has access to the state-of-the-art infrastructure including also the laboratory facilities and must be regarded as a top-facility. The Panel was impressed by the complete set of instrumentation available for LIC.

LIC is heavily involved in teaching and takes care of all the teaching in general chemistry for all chemistry and non-chemistry students both in Kumpula and Viikki campuses. In addition LIC takes also care of all the teaching in inorganic chemistry at all levels (BSc, MSc, and PhD) with advanced courses in both materials chemistry and green chemistry. The teaching load is judged to be very high and basically all personnel within LIC are involved in the teaching with the graduate students mostly in the laboratory teaching. In the longer time perspective there may be a need of actions to change the teaching load of the individuals.

LIC has been or is also deeply involved in several boards (university board, faculty scientific board, department) and committees (infrastructure, education, alumni).

The Panel was impressed by both the infrastructure and all the activities within the teaching. The work at the managing and strategic planning levels is also recognized.

Challenges for the future are the infrastructure (keeping at least the present level) and recruitment of top scientist, preferably also internationally. The planned actions include a high scientific level for attraction of top scientists and strategic planning of the long-term needs of equipment and infrastructures with writing of proposals.

2.6 Leadership and management in the researcher community

- *Description of*
 - *the execution and processes of leadership in the RC*
 - *how the management-related responsibilities and roles are distributed in the RC*
 - *how the leadership- and management-related processes support*
 - *high quality research*
 - *collaboration between principal investigators and other researchers in the RC*
 - *the RC's research focus*
 - *strengthening of the RC's know-how*
- *Identification of the RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes*

ASPECTS: Processes and good practices related to leadership and management

The leadership and management philosophy seem to be well thought within LIC. There are about 10 different countries represented in LIC. With the differences in educational backgrounds and cultures together with the complexity in the research and operation of the laboratory, significant and successful efforts have been made in both the leadership and the management.

There is a clear vision on both the leadership and the management of LIC all the way from the head of the lab to the fresh doctors. There is a steadily on-going discussion at various levels on priorities of projects, research directions and use of equipment. An important part of these discussions is the focus of the research. Concerning projects, the PI is responsible both for leadership and management. For non-experienced researchers getting their first research funding they are educated how to lead and manage projects. It seems as if a natural mentorship has been developed in the lab in this context.

The strength of LIC in terms of leadership and management is that there is an excellent balance between the number of PIs, post docs and PhD students, creating also a natural working structure. The vision for LIC is also clear with continuously on-going discussions on future directions. The informal mentorship for young scientists in leadership and management seems to work well.

The challenge of LIC is to try to reduce the number short-term projects in favor of more long-term projects. Another challenge is the education of young doctors to PIs and finding routes for increased responsibilities in leadership and management.

2.7 External competitive funding of the RC

- *The RCs were asked to provide information of such external competitive funding, where:*
 - *the funding decisions have been made during 1.1.2005–31.12.2010, and*
 - *the administrator of the funding is/has been the University of Helsinki*
- *On the e-form the RCs were asked to provide:*
 - 1) *The relevant funding source(s) from a given list (Academy of Finland/Research Council, TEKES/The Finnish Funding Agency for Technology and Innovation , EU, ERC, foundations, other national funding organisations, other international funding organizations), and*
 - 2) *The total sum of funding which the organisation in question had decided to allocate to the RCs members during 1.1.2005–31.12.2010.*

Competitive funding reported in the text is also to be considered when evaluating this point.

ASPECTS: Scientific quality, scientific significance, societal impact, innovativeness and future significance

The external competitive funding for 2005-2010 is summarized below:

- AF: 3.7 M€
- TEKES: 1.2 M€
- EU: 1.8 M€
- ERC: 0
- International and national foundations: 0
- Other international funding: 0.4 M€
- Other national funding: 2.2M€

There is a healthy balance between the funding from different sources. Other funding” is predominated by companies. However, it was indicated by PI in the evaluation report that there are too many short-term funded company projects. The funding by AF, TEKES and EU shows the high quality of the research and the scientific significance. The funding by TEKES, EU and the companies indicate both a high societal impact and high innovativeness. The research areas developed by LIC are anticipated to expand in the future depending on the development of the science itself and creations of new opportunities as well as the future needs of society. With that in mind, a positive development in a direction of more stable funding situation can be foreseen. In the short-term perspective the efforts to get funding for a centre of excellence is much appreciated.

2.8 The RC’s strategic action plan for 2011–2013

- *RC’s description of their future perspectives in relation to research and doctoral training.*

ASPECTS: Scientific quality, scientific significance, societal Impact, processes and good practices related to leadership and management, national and international collaboration, innovativeness, future significance

The strategic action plan for 2011–2013 is relevant and appropriate. The aim of the laboratory itself, which is judged to be realistic, is to keep the number one position among the Finnish inorganic chemistry laboratory. The second aim is to keep the world-leading position within the ALD area. This is a very tough aim since the ALD research activities are growing worldwide. The proposed Centre of excellence, including

the Accelerator lab and VTT microelectronics and nanosystems groups, is the way to go on. Probably there are also reasons to include other thin film groups in such a Centre. The 3rd aim is to strengthen know-how and position in green chemistry (catalysis), which was welcomed by the Panel. The catalysis and the ALD research are from a mechanistic point of view mutually supporting each other.

The Panel agrees that the international collaborations should be increased and the initiatives taken in this direction are positive. Expansion of activities towards the EU programs should also help in the internationalization.

Recruitment of top-scientists and top-students is the key issue for groups which would like to be in the lead. There are a lot of factors making a laboratory attractive. Research directions, facilities, long-term planning, stable research funding, etc. The Panel believes that the long-term funding is extremely important for LIC.

Materials is a priority area within the Faculty of Science at UH. Thin films are used in most materials-oriented research. Actions for movement to new application areas, e.g., health and energy, in collaboration with other groups would be natural.

Many applications have reached such a development stage that more fundamental research is needed. The Panel was pleased to note that more emphasis will be put on basic research in both catalysis and ALD.

Concerning the doctoral training the actions towards participation in international networking and national graduate schools were appreciated.

2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8)

The RC's fitness to the chosen participation category.

Category 1. The research of the participating community represents the international cutting edge in its field.

The RC fits the criteria for the category 1 in an excellent way. Cutting edge research is carried out in research areas of utmost importance for society (thin film technology and catalysis). LIC is carrying out world-class research in ALD. The blend of basic and applied research work is excellent with a healthy balance between funding agencies with different missions (AF, TEKES, and EU). There is also an impressive research funding from companies which may cause problems due to the short duration of the funding. The application of a Centre of Excellence is strongly supported by the Panel.

The strategic action plan for 2011-2013 is challenging and very interesting. It includes not only LIC locally but also wider perspectives (UH, national and international). For further positive development of the research, a better stability in funding and a wider university co-operation to open for new but natural application areas is probably required. The latter may also result in bigger and more long-term projects.

The doctoral training within the RC is excellent. The candidates are exposed to top-level research in a big enough research environment with state-of-the-art infrastructure. With all the international co-operations and participations in international conferences the candidates can get a wider view of their own research as well as for networking. The involvement of the RC in the national graduate school and in a Marie Curie program is very positive. Supervision capacity and structure were in balance and both professors and post docs were active supervisors.

The management structure of the RC was clear. The leadership philosophy was well thought and the ambition to mentor post doc to PIs was well received. More efforts put in such mentorships would certainly be valuable for post docs.

Numeric evaluation: 5 (Outstanding)

2.10 Short description of how the RC members contributed the compilation of the stage 2 material

The whole LIC community was involved in the compilation of the stage 2 material. The evaluation procedure was presented for all personnel at LIC and in meetings with the topical research groups. Information and data were collected for the writing procedure and a draft was produced by the RC leader. The draft was then distributed to all PIs in LIC for comments and corrections. After some alterations the compilation was finished. The working procedure was an illustration of the management structure at LIC.

2.11 How the UH's focus areas are presented in the RC's research

Focus area 1: the basic structure, materials and natural resources of the physical world

LIC belongs to the Helsinki University focus area "The basic structure, materials and natural resources of the physical world" and has also a connection to another university focus area "The changing environment – clean water". No special attention was paid to how the university focus areas were presented in the evaluation documents from the RC.

2.12 RC-specific main recommendations

Recruitment of top-scientists and top-students is the key issue for groups which would like to be in the lead. There are a lot of factors making a laboratory attractive. Research directions, facilities, long-term planning, stable research funding, etc. The Panel believes that the long-term funding is extremely important for LIC. The Panel was pleased to notice that an application of a Centre of excellence was processed. The Panel recommends further efforts in this direction.

The Panel recommends to reduce the number of short-term projects to the favor of more long-term projects.

The Panel recommends an increased participation in international collaborations, e.g. the EU programs, for increased mobility, international recruitment and widening of the funding basis.

A challenge for the future is the funding of the infrastructure. The Panel recommends that initiatives to a long-term strategic infrastructural planning across disciplinary borders should be taken.

With the reduced dimensions of the thin films, the interfaces between different layers as well as film/substrate become more and more important, which means that the interfacial characterization also becomes more important. There might be a need to initiate a discussion (if not already initiated) on the long-term strategy and demand for characterization of interfaces at the atomic level.

Further strengthening of the mechanistic studies by for instance increased activities in spectroscopy and computer simulations is recommended.

Materials is a priority area within the Faculty of Science at UH. Thin films are used in most materials-oriented research. Actions for movement to new application areas, e.g., health and energy, in collaboration with other groups would be natural.

The catalysis research has obvious connections to another RC, HUBI, working with development of new and advanced lignocellulosic biomass products. A closer interaction with HUBI is recommended.

LIC is involved in one national graduate school. It would be beneficial to particularly the PhD students to widen the engagement to also other national graduate schools related to chemistry.

The work on proposing a Centre of excellence, including the Accelerator lab and VTT microelectronics and nanosystems groups is recommended to be intensified.

Further strengthening of the research towards green chemistry is recommended.

2.13 RC-specific conclusions

The RC fits the criteria for the category 1 in an excellent way. Cutting edge research is carried out in research areas of utmost importance for society (thin film technology and catalysis). LIC is carrying out world-class research in ALD. The blend of basic and applied research work is excellent with a healthy balance between funding agencies with different missions (AF, TEKES, and EU). There is also an impressive research funding from companies. The application of a Centre of Excellence is strongly supported by the Panel.

The quality of the research is judged to be very high as indicated by the impressive publication record with citations far above average in the field. The research leaders are frequently invited as key-note and plenary speakers at the important conferences in the area. LIC has a lot of international co-operations and is an attractive partner in international research projects. PhDs from LIC are often offered post doc positions abroad, which is another indicator that both research directions and quality of the research are at the highest level.

The significance of the research is extraordinary high as indicated by the publication profile, external funding and participation in excellence programs. The collaboration with industry is very impressive. The two research directions with ALD and catalysis, respectively represent two very important fields for society. For the catalysis there is a natural link to the HUBI RC.

The doctoral training within the RC is excellent. The candidates are exposed to top-level research in a big enough research environment with state-of-the-art infrastructure. With many international co-operations and participations in international conferences, the candidates can get a wider view of their own research as well as for networking. The involvement of the RC in the national graduate school and in a Marie Curie program is very positive for the whole research environment and the long-term development. However, involvement in other national graduate schools in chemistry would be very beneficial for the PhD students. Supervision capacity and structure were in balance and both professors and post docs were active supervisors.

The Panel was very impressed by the societal impact of LIC. The research in itself and the production of highly skilled PhDs meet the needs of the future society. The research areas thin film technology and catalysis are very timely and have an impact on the future society.

LIC is involved in quite a few collaborative activities. Internationally the EU funded networks and projects have been very important and LIC participates now in a Marie Curie training network (ENHANCE). Other exchange programs are the DAAD-Academy of Finland programs for exchange with Munich Technical University and University of Stuttgart, respectively. In addition LIC has been involved in many COST projects. Nationally LIC participates in many collaborations. LIC is very active in the national graduate school on Inorganic Materials Chemistry. There are also many AF and TEKES funded collaborative projects between LIC and both VTT and the Aalto University.

LIC is heavily involved in teaching and takes care of all the teaching in general chemistry for all chemistry and non-chemistry students both in Kumpula and Viikki campuses. In addition LIC takes also care of all the teaching in inorganic chemistry at all levels (BSc, MSc, and PhD) with advanced courses in both materials chemistry and green chemistry. The teaching load is judged to be very high.

The leadership and management philosophy seem to be well thought within LIC. The vision for LIC is clear with continuous on-going discussions on future directions. There is a good balance between the number of PIs, post docs and PhD students. The informal mentorship for young scientists in leadership and management seems to work well.

The strategic action plan for 2011-2013 is challenging and very interesting. It includes not only LIC locally but also wider perspectives (UH, national and international). For further positive development of the research a better stability in funding and a wider university co-operation to open for new but natural application areas is probably required. The latter may also result in bigger and more long-term projects.

2.14 Preliminary findings in the Panel-specific feedback

The LIC RC includes about 55 people and has during 2005 to 2010 published about 500 articles in international scientific journals. Both the research and the doctoral training is at the highest international level. The societal impact and national and international collaborations are excellent.

Selected recommendations for the LIC are as follows:

- Reduction in the number of short-term projects to the favor of more long-term projects.
- Increased participation in international collaborations, e.g. the EU programs, for increased mobility, international recruitment and widening of the funding basis.
- Initiatives to a long-term strategic infrastructural planning across disciplinary borders should be taken.
- Further strengthening of the mechanistic studies by for instance increased activities in spectroscopy and computer simulations.
- A closer interaction with the RC HUBI in catalysis.
- It would be beneficial to particularly the PhD students to widen the engagement to also other national graduate schools related to chemistry.
- The work on proposing a Centre of excellence, including the Accelerator lab and VTT microelectronics and nanosystems groups should be intensified.
- Further strengthening of the research towards green chemistry is recommended.

2.15 Preliminary findings in the University-level evaluation

LIC carries out research and doctoral training at the highest international level. Activities are well focused with an excellent blend of basic and applied research. The research includes both thin film technology and catalysis – two areas of utmost importance for the future society. Fabrication of thin films is the cornerstone in microelectronics, solar cells, sensors, and many other areas. Catalysis is of highest relevance for development of new chemical processes as well as for energy savings. The external funding is impressive and leadership philosophy is well developed. The LIC RC has natural connections to the RCs MATENA (nanotechnology) and HUBI (catalysis). With the ever increasing costs of infrastructures and the research opportunities associated with access to state-of-art infrastructure, strategic and long-term plans should be developed for investments in infrastructures at the university level. This might also include other RCs.

3 Appendices

- A. Original evaluation material
 - a. Registration material – Stage 1
 - b. Answers to evaluation questions – Stage 2
 - c. List of publications
 - d. List of other scientific activities
- B. Bibliometric analyses
 - a. Analysis provided by CWTS/University of Leiden
 - b. Analysis provided by Helsinki University Library (66 RCs)



International evaluation of research and doctoral training
at the University of Helsinki 2005-2010

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW

NAME OF THE RESEARCHER COMMUNITY:

Laboratory of Inorganic Chemistry (LIC)

LEADER OF THE RESEARCHER COMMUNITY:

Professor Markku Leskelä, Department of Chemistry

RC-SPECIFIC MATERIAL FOR THE PEER REVIEW:

- Material submitted by the RC at stages 1 and 2 of the evaluation
 - STAGE 1 material: RC's registration form (incl. list of RC participants in an excel table)
 - STAGE 2 material: RC's answers to evaluation questions
- TUHAT compilations of the RC members' publications 1.1.2005-31.12.2010
- TUHAT compilations of the RC members' other scientific activities 1.1.2005-31.12.2010
- Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010 (analysis carried out by CWTS, Leiden University)

NB! Since Web of Science(WoS)-based bibliometrics does not provide representative results for most RCs representing humanities, social sciences and computer sciences, the publications of these RCs will be analyzed by the UH Library (results available by the end of June, 2011)



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

1 RESPONSIBLE PERSON

Name: Leskelä, Markku

E-mail:

Phone: 191 50195

Affiliation: Department of Chemistry

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2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Laboratory of Inorganic Chemistry

Acronym for the participating RC (max. 10 characters): LIC

Description of the operational basis in 2005-2010 (eg. research collaboration, joint doctoral training activities) on which the RC was formed (MAX. 2200 characters with spaces): LIC is one of the seven laboratories in the Department of Chemistry. The Laboratory is large enough: 3 professors, 1 visiting professor, 4 lecturers, 1 senior researcher, 1 university teacher, 10 post docs, 26 PhD student, 5 MSc students, 4 technical staff, 55 together, to fulfill the requirements of critical mass. The education, research and doctoral training are on a solid basis and the Laboratory has worked in the present structure already 15 years. The laboratory contains only a few research groups which have their own targets but have same scientific basis and thereby nicely complete each other.

3 SCIENTIFIC FIELDS OF THE RC

Main scientific field of the RC's research: natural sciences

RC's scientific subfield 1: Chemistry, Inorganic and Nuclear

RC's scientific subfield 2: Materials Science, Coatings and Films

RC's scientific subfield 3: Nanoscience and Nanotechnology

RC's scientific subfield 4: Chemistry, Multidisciplinary

Other, if not in the list:

4 RC'S PARTICIPATION CATEGORY

Participation category: 1. Research of the participating community represents the international cutting edge in its field

Justification for the selected participation category (MAX. 2200 characters with spaces): The main research topics in LIC are: chemical deposition of thin films, in particular with atomic layer deposition (ALD) and catalytic activation of small molecules with metalorganic compounds (green chemistry). In ALD LIC is the world leading laboratory in developing new processes. The work is very well recognized and both



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leaders of the ALD group (prof. Leskelä and prof. Ritala) are ISI highly cited scientists in materials science. LIC has been selected for the second round in the Center of Excellence program of Academy of Finland (2012-2017). The title of the proposal is Finnish Center of excellence of Atomic Layer Deposition. LIC has received also domestic recognition: the catalyst group was nominated in 2001 as a Center of Excellence by the Academy of Finland in the Bio- and Nanopolymer Research Group, professor Leskelä was Academy professor in 2004-2009, the other catalyst group leader prof. Timo Repo acted as Academy fellow 2004-2008, as did Dr. Kaupo Kukli 2008-2009. LIC has had a few Academy post doc positions (Marianna Kemell 2008-2009, Jaakko Niinistö 2009-2011). The research in LIC is made in deep collaboration with world leading universities, research institutes and companies.

5 DESCRIPTION OF THE RC'S RESEARCH AND DOCTORAL TRAINING

Public description of the RC's research and doctoral training (MAX. 2200 characters with spaces): LIC has selected two strategic research areas: (i) materials chemistry – especially thin films, and (ii) green chemistry – especially organometallic chemistry and catalysis. In thin film studies ALD – the Finnish origin chemical gas phase deposition technique is in main focus. In catalysis the strategic selection is made in favor of homogeneous catalysis over heterogeneous one. The research focus is mainly basic research in nature but both areas have strong industrial potentials. Close long-term collaboration with industry has been one strategic decision.

The scientific objectives of the thin film research are to understand and thereby better control the surface chemistry of the growth processes as well as fundamental physical properties of novel nanomaterials, and, based on this knowledge, develop new precursors and processes for materials of an interest in the applied research. The goal of the applied research is to deposit films for different applications and characterize their composition, structural, and functional properties. The ALD research has resulted in several new processes for materials of a high interest in semiconductor and optoelectronic industries.

A central research theme in the Catalyst group is the development of sustainable catalytic processes. Novel in situ catalysts for the oxidation of alcohols in water solutions using molecular oxygen as oxidant have been developed. The group is also studying catalytic processes to utilize CO₂ as a starting material for the production of chemicals. Recently very efficient catalytic methods to degrade lignocelluloses materials and metal-free hydrogenation of imines and enamines have been developed. Both can be considered as scientific breakthroughs.

Doctoral training is based on national graduate school of Inorganic Materials Chemistry, Marie Curie training network and in house organized lectures and seminars. Most of the PhD students are funded by external money requiring project type of working. This is beneficial for the training because the students learn reporting, get to know other research groups and importantly are often in contact with companies and thereby learn the industry of their field.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): Both the quality and quantity of the research of LIC is high. The Laboratory produces annually 60-80 publications in highly-ranked international journals. Two professors are ISI highly cited scientists which has an impact on the position of University of Helsinki in different rankings.



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LIC is densely networked inside University: strong collaboration inside Department of Chemistry, long-time partnering with Department of Physics and member of Helsinki Functional Imaging Center (HFIC). LIC is also networked with all Finnish universities having science or engineering faculties. The collaboration with Finnish research institutes and companies is living. LIC has or has recently had sponsored research agreements with several foreign companies from which ASM Microchemistry (ASMM) is the most important one. ASMM has had since 2004 its R&D laboratory in our Department and the reason for the location is a need for deep collaboration with LIC.

LIC has worked hard and been successful in getting external funding for the research. During the period 2005-2010 12 projects funded by Academy of Finland, 9 projects funded by TEKES, 6 projects funded by industry, 6 projects funded by EU, 1 project funded by ESA and 1 by Nordic MINT have been completed or are in progress. More than 2/3 of the Laboratory personnel are constantly funded by external sources.

The societal impact of the research is high and it appears by many ways. The strong collaboration with industry supports their R&D work and possibilities to grow and offer jobs in future. Patents are literal proves from this collaboration and societal impacts.

Education of young people for the society is the most important task of University. Our approach to educate people in modern materials and green processes answers to the needs of the society and industry. Recently, Ministry of Education made a survey of the need of doctors in 2020. Chemistry, materials and chemical engineering are expected to be fields where more doctors are needed. LIC answers to that societal need.

Keywords: thin films, atomic layer deposition, green chemistry, catalysis, nanochemistry, materials chemistry, organometallic chemistry, electronic materials

6 QUALITY OF RC'S RESEARCH AND DOCTORAL TRAINING

Justified estimate of the quality of the RC's research and doctoral training at national and international level during 2005-2010 (MAX. 2200 characters with spaces): The quality of the research and doctoral training can be justified with three criteria: publications, research funding and need of doctors and their placing in the job market.

The average impact factors of journals of our areas (based on ISI classification and 5-years average numbers) are: Materials science: coatings and films 1.285 (16 journals), Chemistry, inorganic 1.99 (33 journals, 4 review journals excluded). The average impact factor of papers published by LIC in 2005-2009 has varied between 2.5 and 3 (390 publications) within the years. The numbers indicate that the quality of the publications is well above the average level of their fields.

LIC has been very successful in receiving research funding from Academy of Finland and EU where the competition is hard.



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In our areas the education level needed in R&D is high and industry prefers doctors over masters. The number of doctors educated by LIC is considerable and their demand on the market indicates the relevance and quality of the theses. ALD is an increasing research area world wide and the need of well educated doctors is obvious. LIC is permanently asked for post docs for example by Harvard and Stanford universities, several European universities, different IBM research laboratories, and other companies.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): In chemistry the scientific productivity is mainly evaluated by the quality and quantity of original peer reviewed papers. Conference presentations and proceedings books are significantly less important. Patents reflect the applicability of the research results but the ideas in patents are published after some delay.

In publication strategy the main focus is in articles in highly-ranked international journals. The selection of the journals depends on the topic and nature of the report. Categories are: papers of general interest, papers of interest in own field (inorganic chemistry, thin films), papers focusing on more limited topic (certain property of a material, special characterization technique). In selection of journals both the topic (the reading audience) and the impact factors are taken in to account. The best possible international journals are used. Conference proceedings books are used only when required by the conference organizers. Review articles are written occasionally and as publication medium the journals are preferred.

The research in LIC is basic in nature but all topics have high industrial potential. Patentability of all new discoveries is first considered and after protecting the rights the manuscripts are sent for publishing. Annually 3-5 innovation announcements are made and 1-3 patent applications filed.

LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:			Laboratory of Inorganic Chemistry (LIC) personnel 2005-2010		
RC-LEADER			M. Leskelä		
CATEGORY			1		
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
1	Ahmad	Jahir Uddin		doctoral candidate	Department of Chemistry
2	Aaltonen	Titta		doctoral candidate	Department of Chemistry
3	Aitola	Erkki		doctoral candidate	Department of Chemistry
4	Alèn	Petra		doctoral candidate	Department of Chemistry
5	Al-Hunaiti	Afnan		doctoral candidate	Department of Chemistry
6	Al-Qaisi	Feda		doctoral candidate	Department of Chemistry
7	Axenov	Kirill		doctoral candidate	Department of Chemistry
8	Barry	Sean		professor	Department of Chemistry
9	Blanquart	Timothe		doctoral candidate	Department of Chemistry
10	Castro	Pascal		doctoral candidate	Department of Chemistry
11	Chernichenko	Kostiantyn		post doctoral researcher	Department of Chemistry
12	Elo	Pertti		doctoral candidate	Department of Chemistry
13	Feodorow	Santeri		doctoral candidate	Department of Chemistry
14	Figjell	Pawell		post doctoral researcher	Department of Chemistry
15	Färm	Elina		doctoral candidate	Department of Chemistry
16	Grafov	Andriy	X	professor	Department of Chemistry
17	Grafova	Iryna		senior researcher	Department of Chemistry
18	Guo	Hongfan		post doctoral researcher	Department of Chemistry
19	Hatanpää	Timo		doctoral candidate	Department of Chemistry
20	Heikkilä	Mikko		doctoral candidate	Department of Chemistry
21	Hyvönen	Helena		doctoral candidate	Department of Chemistry
22	Hämäläinen	Jani		doctoral candidate	Department of Chemistry
23	Härkönen	Emma		doctoral candidate	Department of Chemistry
24	Ihanus	Jarkko		doctoral candidate	Department of Chemistry
25	Kalmi	Mikko		doctoral candidate	Department of Chemistry
26	Kansikas	Jarno		Amanuensis	Department of Chemistry
27	Kariniemi	Maarit		doctoral candidate	Department of Chemistry
28	Kemell	Marianna	X	post doctoral researcher/university lecturer	Department of Chemistry
29	Kervinen	Kaisa		doctoral candidate	Department of Chemistry
30	Kivekäs	Raikko		senior researcher	Department of Chemistry
31	Klinga	Martti		senior researcher	Department of Chemistry
32	Knapas	Kjell		doctoral candidate	Department of Chemistry
33	Kozlov	Vasilij		doctoral candidate	Department of Chemistry
34	Kukli	Kaupo		post doctoral researcher	Department of Chemistry
35	Lahtinen	Petro		post doctoral researcher	Department of Chemistry
36	Lankinen	Mikko		doctoral candidate	Department of Chemistry
37	Lappalainen	Kristian		doctoral candidate	Department of Chemistry
38	Leskelä	Markku	X	professor	Department of Chemistry
39	Lindqvist	Markus		doctoral candidate	Department of Chemistry
40	Lindroos	Seppo	X	university lecturer	Department of Chemistry
41	Miikkulainen	Ville		post doctoral researcher	Department of Chemistry
42	Mutikainen	Ilpo		senior researcher	Department of Chemistry
43	Mäntymäki	Mia		doctoral candidate	Department of Chemistry
44	Nieger	Martin	X	senior researcher	Department of Chemistry
45	Niinistö	Jaakko		post doctoral researcher	Department of Chemistry
46	Niskanen	Antti		doctoral candidate	Department of Chemistry
47	Pilvi	Tero		doctoral candidate	Department of Chemistry
48	Polamo	Mika		university lecturer	Department of Chemistry
49	Pore	Viljami		doctoral candidate	Department of Chemistry
50	Puranen	Arto		doctoral candidate	Department of Chemistry
51	Puukilainen	Esa		post doctoral researcher	Department of Chemistry
52	Pärssinen	Antti		doctoral candidate	Department of Chemistry
53	Rautiainen	Sari		doctoral candidate	Department of Chemistry
54	Repo	Timo	X	Senior researcher/Professor	Department of Chemistry
55	Ritala	Mikko	X	Professor	Department of Chemistry
56	Ryan	Paul		post doctoral researcher	Department of Chemistry
57	Räisänen	Minna		doctoral candidate/post doc	Department of Chemistry
58	Saarinen	Heikki		professor, dean	Department of Chemistry
59	Salmi	Leo		doctoral candidate	Department of Chemistry
60	Santala	Eero		doctoral candidate	Department of Chemistry
61	Sarangal	Anjali		post doctoral researcher	Department of Chemistry
62	Sarnet	Tiina		doctoral candidate	Department of Chemistry
63	Sibaouh	Ahlam		doctoral candidate	Department of Chemistry
64	Sumerin	Victor		doctoral candidate	Department of Chemistry
65	Sundberg	Markku	X	university lecturer	Department of Chemistry
66	Szilagyí	Imre		post doctoral researcher	Department of Chemistry
67	Talja	Markku		doctoral candidate	Department of Chemistry

68	Tomczak	Yoann		doctoral candidate	Department of Chemistry
69	Tupala	Jere		doctoral candidate	Department of Chemistry
70	Turpeinen	Urho		senior researcher	Department of Chemistry
71	Valo	Jaana		post doctoral researcher	Department of Chemistry
72	Vehkamäki	Marko		doctoral candidate/post doc	Department of Chemistry
73	Vuorinen	Sirpa		doctoral candidate	Department of Chemistry
74	Yliheikkilä	Katariina		doctoral candidate	Department of Chemistry



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RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Leskelä, Markku

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Laboratory of Inorganic Chemistry, LIC

The RC's research represents the following key focus area of UH: 1. Maailman perusrakenne, materiaalit ja luonnonvarat – The basic structure, materials and natural resources of the physical world

Comments for selecting/not selecting the key focus area:

1 FOCUS AND QUALITY OF RC'S RESEARCH (MAX. 8800 CHARACTERS WITH SPACES)

- **Description of the RC's research focus, the quality of the RC's research (incl. key research questions and results) and the scientific significance of the RC's research for the research field(s).**

1.1 RC research focus

Laboratory of Inorganic Chemistry (LIC) has selected two strategic research areas: (i) materials chemistry – especially thin films, and (ii) green chemistry – especially organometallic chemistry and catalysis. In thin film studies ALD – the Finnish origin chemical gas phase deposition technique is in main focus. In catalysis the strategic selection is made in favor of homogeneous catalysis over heterogeneous one. The research focus is mainly basic research in nature but both areas have strong industrial application potentials. Close long-term collaboration with industry has been one strategic decision.

The scientific objectives of the thin film research are to understand and thereby better control the surface chemistry of the growth processes as well as fundamental chemical and physical properties of novel nanomaterials, and, based on this knowledge, develop new precursors and processes for materials of an interest in the applied research. The goal of the applied research is to deposit films for different applications and characterize their composition, structural, and functional properties. The ALD research has resulted in several new processes for materials of a high interest in semiconductor and optoelectronic industries.

A central research theme in the Catalyst group is the development of sustainable catalytic processes. Novel in situ catalysts for the oxidation of alcohols in water solutions using molecular oxygen as oxidant have been developed. The group is also studying catalytic processes to utilize CO₂ as a starting material for the production of chemicals. Recently very efficient catalytic methods to degrade lignocellulose materials and metal-free hydrogenation of imines and enamines have been developed. Both can be considered as scientific breakthroughs.

1.2 Quality of the research

The quality of the research can be justified with two criteria: publications, and research funding. The average impact factors of journals of our areas (based on ISI classification and 5-years average numbers) are: Materials science: coatings and films 1.285 (16 journals), Chemistry, inorganic 1.99 (33 journals, 4 review journals excluded). The average impact factor of papers published by LIC in 2005-2009 has varied between 2.5 and 3 (390 publications) within the years. The numbers indicate that the quality of the publications is well above the average level of their fields.



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The quality of the publications can be to certain extent estimate with the citations. The citations also tell about the importance and popularity of the research field and also the visibility of the researchers. In ALD research Leskelä (h-index 50) and Ritala (h-index 44) are world leaders both in amount of publications (ISI topic Atomic Layer Deposition or Atomic Layer Epitaxy) and citations. Both are highly cited scientists in the field of materials science. In green chemistry the papers are mainly published in the best journals of the field and for example the hydrogen activation papers have attracted 30-40 citations annually.

LIC has been very successful in receiving research funding from Academy of Finland and EU where the competition is hard. In the centre of excellence program of Academy of Finland catalyst group of LIC was 2002-2007 involved in Bio- and nanopolymers research group. In the present centre of excellence competition LIC is in the second round. The title of the proposal is Finnish Centre of excellence in Atomic Layer Deposition. In addition funding from TEKES and industry has been substantial and very important.

Academy of Finland organized recently the evaluation of chemistry research in Finland. The evaluation was made not on departmental but laboratory base. In the report the international evaluation committee concludes about LIC:

"The impressive performance of this unit and the effective way in which the various research areas support each other leave little to be desired. This outstanding group should be strongly supported. A decrease in the demands of bureaucracy would enable the unit to work more efficiently." (Publications of the Academy of Finland, 1/11, p. 55).

1.3 Scientific significance of the research

The research carried out in LIC is basic in nature but motivation comes from applications. The research areas: new thin film materials for microelectronics, optics and energy applications as well as catalysis and green chemistry are very interesting, challenging and scientifically significant. The topics to be studied are very complicated and basic scientific problems have to be solved before applications can be imagined. There is no border between basic and applied science.

The scientific significance of the research done is shown by publications in the best journals of the areas. The external research funding, success in center of excellence program of Academy of Finland and evaluation of chemistry research in Finland are other proofs from the high scientific significance.

• **Ways to strengthen the focus and improve the quality of the RC's research.**

The quality of research could be improved by increased international collaboration with top institutions, and recruitment of top scientists from abroad also for permanent positions. Connections exist with the international partners but resources for collaboration is the limiting factor. Solutions are looked from European research programs and Center of Excellence funding. Several plans for new international collaborations have been made in connection to the Center of Excellence application.

2 PRACTISES AND QUALITY OF DOCTORAL TRAINING (MAX. 8800 CHARACTERS WITH SPACES)

- How is doctoral training organised in the RC? Description of the RC's principles for recruitment and selection of doctoral candidates, supervision of doctoral candidates, collaboration with faculties, departments/institutes, and potential graduate schools/doctoral programmes, good practises and quality assurance in doctoral training, and assuring good career perspectives for the doctoral candidates/fresh doctorates.

The recruitment of PhD students differs depending on the funding. Different categories are: university funding based PhD students (5 years), graduate school funding (4 years), Marie Curie network funding (3



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE UNIVERSITY OF HELSINKI

RC-SPECIFIC STAGE 2 MATERIAL

years), and project funding (1 to 4 years). In the case of university and graduate school positions recruitment is based on open calls in newspapers and internet. In our graduate school of Inorganic Materials Chemistry the open positions are called specially inside the five participating universities. In Marie Curie network the positions are called open in EU web pages and information is circulated widely in conferences etc. In cases of the shorter term project funding the recruitment is more based on the information on available students from channels mentioned above.

Selections are made differently in each case. Applications for University positions are evaluated in a recruitment committee and decided by the Department head. In the graduate school and Marie Curie network the selections are made by the steering groups. The recruitment for short term projects is more based on the PI. International recruitment is problematic since it is difficult to know the people and their backgrounds only based on e-mail information. So far the international students have been recruited based on the information and recommendations given by persons we know well.

Supervision is in general based on unofficial continuous daily basis discussions between students, post docs and professors. If structures are considered for supervision LIC has a pyramidal structure from PhD students to project leaders and further on to professors. In practical daily problems the PhD students have a post doc/project leader in charge of supervision but professors are always available ready to participate in supervision.

The research problems are discussed in weekly seminars. The first seminar hour is focusing thin films and materials, and the second hour green chemistry and catalysis. Both contain two presentations: one from experimental research and one from recent literature. Every student has to present two times a year own results and two times tell recent development in his/her field in literature. At the end of the seminar the topics are discussed and general situation and problems in the laboratory informed and discussed. In addition, there are thematic subgroup meetings where specific topics are discussed. In formal projects (Academy, Tekes, EU) which usually are consortium based there are separate research meetings for exchanging results.

LIC is participating in doctoral training in a national graduate school of Inorganic Materials Chemistry and a European Marie Curie training network. These schools provide summer schools, workshops and research visits to the students. Many doctoral courses and seminars are also organized on Faculty and Department level. Close location of Aalto University enables the mutual utilization of normal graduate courses.

Most of the PhD students are funded by external money requiring project type of working. This is beneficial for the training because the students learn reporting, get to know other research groups and importantly are often in contact with companies and thereby learn the industry of their field. European projects are very useful because there the students learn the reporting and collaboration in international conditions. The project type working is a very good practice in PhD studies.

The quality of the doctoral training can be justified with two criteria: quality of publications, and need and success of doctors in the job market. Large part of the research and publications are made by PhD students and the papers are parts of their PhD thesis. The quality of publications was already discussed in the first section. In materials chemistry and green chemistry the education level needed in industrial R&D is high and in recruitment industry prefers doctors over masters. The number of doctors educated by LIC is considerable and their demand on the market indicates the relevance and quality of the education and theses. ALD is an increasing research area world wide and the need of well educated doctors is obvious. LIC is frequently asked for post docs for example by Harvard and Stanford



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universities, several European universities, different IBM research laboratories, and other companies in Finland and abroad.

- RC's strengths and challenges related to the practises and quality of doctoral training, and the actions planned for their development.

Strengths:

Good infrastructure enabling world-class experimental research

Good funding situation making LIC large enough to fulfill the critical mass

Relevant research topics giving good motivation for the students

Close collaboration and contacts with industry which means funding, information from research needs, and students getting familiar with industry

International visibility in research

Challenges:

The number of good students interested in making PhD thesis

Selection of good foreign students

Funding of PhD students with long enough periods

Action plan:

Keep the scientific quality and visibility high to attract good students

3 SOCIETAL IMPACT OF RESEARCH AND DOCTORAL TRAINING (MAX. 4400 CHARACTERS WITH SPACES)

- Description of how the RC interacts with and contributes to the society (collaboration with public, private and/or 3rd sector).

The societal impact of the research made in LIC is high and it appears by many ways.

Education of young people for the society is the most important task of University. Our approach to educate people in modern materials and green processes answers to the needs of the society and industry. Recently, Ministry of Education made a survey of the need of doctors in 2020. Chemistry, materials and chemical engineering are expected to be fields where more doctors are needed. LIC answers exactly to that societal need. Also at the moment the graduates can easily find jobs indicating the need of our chemists in the society.

Societal impact reveals in the strong collaboration with industry. The collaboration supports their R&D work and possibilities to grow and offer jobs in future. Patents made by LIC researchers are literal proves from this collaboration and societal impacts

The topics which are studied in LIC have high societal relevance. In ALD research microelectronics and energy applications are the most actual ones. The energy research is aimed for environmental benign and green energy, necessary for the future. The microelectronics research focuses on smaller, smarter, ubiquitous systems necessary in the future society. The societal impact of these topics is obvious.

More specifically the societal impact of the ALD research is high both globally and in Finland. ALD has developed to a key technology in silicon based microelectronics and employed by all major companies.



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However, the development of new chemistry and processes is made only by a half dozen groups world wide. To stay in the road map in microelectronics set by ITRS requires the development of processes for new thin film materials. The significance of ALD is growing perhaps even faster in areas other than microelectronics, i.e. in nanotechnology, optics, energy materials, different coatings and passivation layers, and catalysts. These give further motivations for basic ALD process development. In Finland ALD is a very important technology. For three companies, ASM Microchemistry Oy, Beneq Oy and Picosun Oy, ALD is the main business area, and for the display company Planar Systems Oy it is the key manufacturing technology. Volatec Oy is a small precursor supplier for ALD and CVD. Basic academic research is very useful and important for these companies. The constant supply of highly trained graduates of different degrees is also of an importance for these companies. In Finnish nanotechnology research programs ALD was identified as a key technology.

Green chemistry is an important aspect to be taken in account in all chemistry research. The 12 principles of green chemistry should guide all chemistry research and industrial production to minimize all environmental harms and save energy and resources. Green chemistry in LIC is focusing on development of catalytic processes and studies of biological raw materials for fuels and high added value chemicals. Catalysis aims to atomic economy, more efficient processes and mild and environmentally friendly process conditions. The societal impact is huge when processes developed according to the green chemistry principles are introduced in industry. Examples of the green chemistry topics in LIC are: non-metal containing hydrogenation c

- Ways to strengthen the societal impact of the RC's research and doctoral training.

LIC could be still more visible in Finnish society. Due to heavy research and teaching load there has not been too much time for writing articles for the public, take part in discussions.

4 INTERNATIONAL AND NATIONAL (INCL. INTERSECTORAL) RESEARCH COLLABORATION AND RESEARCHER MOBILITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's research collaborations and joint doctoral training activities and how the RC has promoted researcher mobility.

LIC is densely networked inside University: strong collaboration inside Department of Chemistry, long-time partnering with Department of Physics and member of Helsinki Functional Imaging Center (HFIC). LIC is also networked with all Finnish universities having science or engineering faculties. The collaboration with Finnish research institutes and companies is active. LIC has or has recently had sponsored research agreements with several foreign companies from which ASM Microchemistry (ASMM) is the most important one. ASMM has had since 2004 its R&D laboratory in our Department and the reason for the location is a need for deep collaboration with LIC. EU projects form an important international collaboration. At the moment three research projects are participated.

LIC is an active partner in both domestic and international researcher training. The graduate students in LIC are members of the national graduate school on Inorganic Materials Chemistry. The graduate school offers many courses and summer schools and supports visits to abroad. Good relations and close location to Otaniemi campus of Aalto University has enabled close teaching collaboration with Aalto. The students take courses from Aalto and vice versa. The research collaboration with Aalto University and VTT in many Academy of Finland and Tekes projects further tightens the common research training.

International collaboration forms an important part of the researcher training and this has been done via EU funded projects and networks and via collaboration with foreign universities and companies. It is common for LIC PhD students to spend some months in foreign universities while doing the thesis. LIC



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participates in a Marie-Curie training network (ENHANCE - New materials: Innovative concepts and their fabrication, integration and characterization) with 7 partners and 6 associate partners. An application has been sent to NSF for Integrative Graduate Education and Research Traineeship (IGERT) program with University of Colorado. This program will allow mutual visits of graduate students of the two universities. In addition LIC has DAAD-Academy of Finland exchange programs with Munich Technical University (15 years) and University of Stuttgart (2 years). Close collaboration with Munich Technical University appears also in the visiting professor position of Timo Repo. LIC has during the years constantly participated in COST projects. At the moment we are participating in one project on multiferroic materials.

- RC's strengths and challenges related to research collaboration and researcher mobility, and the actions planned for their development.

Strengths:

A lot of collaboration via domestic and international projects

Close collaboration with industry and top universities

Special mobility projects (Marie Curie, DAAD, IGERT, COST)

Challenges:

Keeping project amount and funding at high level

Keeping position as world class research group and wanted partner for projects

Increase the number of students in mobility programs

Actions planned:

Active participation in research program planning

Active contacts to research groups for looking new research projects

Activity in application and planning of new mobility projects, international schools etc.

5 OPERATIONAL CONDITIONS (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the operational conditions in the RC's research environment (e.g. research infrastructure, balance between research and teaching duties).

LIC is one of the 7 laboratories in Department of Chemistry. The Laboratory has 3 professors, 5 lecturers, 1 senior researcher, 11 post docs, 26 PhD student, 5 MSc students, 4 technical staff, 55 together. The laboratory contains only a few research groups which have their own targets but have same scientific basis and thereby nicely complete each other.

The infrastructure is excellent for the research topics of the Laboratory. Schlenk lines and glove boxes allow the synthesis and handling of metalorganic compounds aimed for catalysis and thin film precursors. Structures of metal complexes can be verified by X-ray diffraction, NMR, IR, and MS techniques. Results of catalytic reactions can be verified with different chromatographic methods (GC-MS, HPLC, GPC). Volatility of ALD precursors is studied by TGA techniques.

Thin films are made by different techniques in LIC: from gas-phase by ALD and evaporation, from solution by electrodeposition, SILAR (Successive Ionic Layer Adsorption and Reaction) and sol-gel



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technique. At present there are 9 ALD reactors in LIC. One of reactors is equipped with a unique combination of a quadrupole mass spectrometer (QMS) and quartz crystal microbalance (QCM) for in situ reaction mechanism studies. For SILAR, there is one homemade versatile reactor. For electrodeposition and other electrochemical processing there are two set-ups controlled by potentiostats with cyclic voltammetry capabilities. Spin and dip-coaters are available for sol-gel thin film deposition. An electron beam evaporator completes the set of film deposition techniques. An electrospinning system has been made for nanofiber preparation.

Teaching:

The Laboratory of Inorganic Chemistry takes care of the teaching of general chemistry for all chemistry and non-chemistry students both in Kumpula and Viikki campuses. Since the teaching involves laboratory works the load is heavy. The Laboratory takes care of teaching of inorganic chemistry at all levels (BSc, MSc and PhD). The advanced courses range from materials chemistry to green chemistry and modeling, the total number of courses being more than 20. All 3 professors have lecture courses in every teaching period, senior lecturers have both lectures and laboratory courses to teach around the year. Post docs and PhD students participate in laboratory teaching. The number of PhD students is 25 causing a lot of supervising work for the senior scientists.

Administration:

The personnel takes part in the University administration at all levels. Saarinen was the dean of the Faculty in 1998-2007. Leskelä was a member of scientific board and research fund committee of the University (2004-6), a member in the scientific board of the Faculty and the infrastructure working group (2007-2009). Currently he is a member of University board. Ritala has been and is a member of the board of Faculty of Science and the Department of Chemistry (2007-). He is also the vice-chairman of the Department and represents chemistry in the scientific board of the Faculty and the infrastructure working group. Repo was the vice-chair of the Department (2007-2009). Now he is a member in the committee of studies and in the committee of alumni of the Faculty. He is also a vice-member of the board of the Department.

- RC's strengths and challenges related to operational conditions, and the actions planned for their development.

Strengths:

Infrastructure in the Laboratory and Department

Infrastructure (facilities in other departments, library, IT-facilities) of Kumpula campus, which is the largest science campus in Finland

Close collaboration with industry

Challenges:

Keeping the infrastructure at good level

To be able to hire best people

Actions planned:

Active participation in domestic infrastructure (HFIC, Micronova, Nanotechnology Center of Finland)

Proposals for Academy and University concerning infrastructure

Keeping of scientific level as high as possible to be an attractive group for best students



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6 LEADERSHIP AND MANAGEMENT IN THE RESEARCHER COMMUNITY (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the execution and processes of leadership in the RC, how the management-related responsibilities and roles are distributed in the RC and how the leadership- and management-related processes support high quality research, collaboration between principal investigators and other researchers in the RC, the RC's research focus and strengthening of the RC's know-how.

In leadership the main idea is to strengthen the inner motivation of the students in the studies and research. The nature of the leadership can be considered as motivation and value leadership. The learning of values (high scientific level, ethics, equality, culture of hard working etc) is very important, in particular in LIC where we have multinational and -cultural (people from about 10 different countries) personnel.

The management is mainly carried out by the professors. The head of the laboratory is responsible on the resources given by the Department. Each professor has their own project funding. In projects the principal (responsible) investigator is responsible for the management and leadership. The younger doctors are encouraged to apply research money and once they receive it they helped and educated in leading and managing their projects.

The creation of new projects and plans for funding applications are first made in common with professors and senior researchers. That planning also covers the first steps in managing (planning, organizing). If a project is started which means funding has been received, the final actions in managing (directing and controlling) are then made by the principal investigator in charge.

Collaboration with different projects and PIs must be close since in experimental research the equipment are common and in disposal of every researcher. On the other hand, the equipment selection determines in large extent what kind of research can be done and what type of research projects can be accepted. There must be synergy between the projects and the skills of PIs, otherwise there is no value of the critical mass. In management actions all sides of the research are planned: the topics of the projects, the equipment needed and persons and skills needed.

The research topics, vision and mission of Laboratory are discussed daily in informal meetings and more formal in group and Laboratory meetings. The judging of areas where to go and where not to go is constant as is the thinking what know-how we need. In know-how the question is all the time should we get the know-how in-house or are collaboration actions enough.

- RC's strengths and challenges related to leadership and management, and the actions planned for developing the processes.

Strengths:

Number of senior researchers is reasonably high

Good collaboration between PIs

Management has so far been successful and the plans and vision made have been fulfilled.

Challenges:

High number of short term projects requires a lot of management efforts

Education of young doctors to PIs



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Getting projects for young doctors

Action plans:

Try to get longer lasting projects

Giving more leadership and management responsibilities to young doctors

7 EXTERNAL COMPETITIVE FUNDING OF THE RC

- Listing of the RCs external competitive funding, where:
 - the funding decisions have been made during 1.1.2005-31.12.2010, and
 - the administrator of the funding is/has been the University of Helsinki

- Academy of Finland (AF) - total amount of funding (in euros) AF has decided to allocate to the RC members during 1.1.2005-31.12.2010: Leskelä 2236000, Ritala 280000, Repo 610000, Nieger 466000, Kemell 129000, Niini

- Finnish Funding Agency for Technology and Innovation (TEKES) - total amount of funding (in euros) TEKES has decided to allocate to the RC members during 1.1.2005-31.12.2010: Leskelä 1 109 000, Repo 124 000

- European Union (EU) - total amount of funding (in euros) EU has decided to allocate to the RC members during 1.1.2005-31.12.2010: Leskelä 833 000, Ritala 732 000, Repo 275 000

- European Research Council (ERC) - total amount of funding (in euros) ERC has decided to allocate to the RC members during 1.1.2005-31.12.2010:

- International and national foundations – names of international and national foundations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the foundations:
 - total amount of funding (in euros) from the above-mentioned foundations:

- Other international funding - names of other international funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations: Several companies: Qimonda, OminiPV, Air products, BSI
 - total amount of funding (in euros) from the above-mentioned funding organizations: 417 000

- Other national funding (incl. EVO funding and Ministry of Education and Culture funded doctoral programme positions) - names of other national funding organizations which have decided to allocate funding to the RC members during 1.1.2005-31.12.2010, and the amount of their funding (in euros).
 - names of the funding organizations: Several companies: ASM Microchemistry, Kemira, Neste Oil, Metorex, Picosun, Beneq
 - total amount of funding (in euros) from the above-mentioned funding organizations: 2 175 000



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8 RC'S STRATEGIC ACTION PLAN FOR 2011–2013 (MAX. 4400 CHARACTERS WITH SPACES)

- Description of the RC's future perspectives in respect to research and doctoral training.

The aim of the Laboratory is to keep its position as the number one Finnish inorganic chemistry laboratory. Also the aim is to keep worldwide leading position in ALD chemistry and strengthen the know-how and position in green (catalyst) chemistry. There is a need to increase international collaboration and increase the number of foreign students and staff members. Especially foreign senior scientists are needed and all possible ways (University funded position, FiDiPro- and FiDi fellow-systems, EU funding) to help in this issue are looked for.

Materials research is a multidisciplinary area which is strongly present in Kumpula campus, in Viikki and Meilahti campuses at UH and Aalto University. The strengthening of materials research in whole Helsinki metropolis area is needed. The collaboration between different disciplines may bring breakthroughs and biomaterials form a good example from these potential areas. Materials research is also a priority area of Faculty of Science and LIC wants to be one of the key players in the Faculty. A centre of excellence proposal for Academy of Finland is in progress and the second round interview was February 9, 2011. The proposal is made together with the Accelerator Laboratory at Physics Department and VTT Microelectronics and nanosystems group under the title: Finnish Centre of excellence in Atomic Layer Deposition.

Research of the laboratory in the two strategic areas of materials chemistry and green chemistry has been evolutionary in the past two decades and will surely be that also in the future. The laboratory will maintain and deepen its fundamental strengths in the chosen core topics and apply those in new areas. The choice of the application areas will unavoidably be affected by the directions of public funding and interests of industry. Without doubt, clean energy solutions as well as other topics related to sustainable development will gain increasing role. Medical materials and other solutions improving human well-being will likely capture increasing attention.

Federation of Finnish Chemical Industries commented (Febr. 7, 2011) the evaluation of chemistry research made by Academy of Finland and emphasized that basic research should be supported and in catalysis in particular. Catalyst research is in our focus but we will strengthen its role in the strategy.

In doctoral training common domestic graduate school and international networking are continued and strengthened. The role of international students as well as post docs will be increased. The doctoral studies need longer term funding so that full time studies can be guaranteed for the students to be sure that the topic does not need be changed while the funding source changes.

9 SHORT DESCRIPTION OF HOW THE RC MEMBERS HAVE CONTRIBUTED TO THE COMPILATION OF THE STAGE 2 MATERIALS (MAX. 1100 CHARACTERS WITH SPACES).

The procedure of the evaluation has been presented in the meeting of the personnel of LIC as well as in meetings of the topical research groups. Each member was asked to give all the data information needed in the writing process.

The draft version of the text was made by the RC leader. The text was distributed to all PIs in the RC to make comments and additions. With discussions and iteration process the final form of the text was completed.



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1 Analysis of publications

- Associated person is one of Jahir Uddin Ahmad , Erkki Tapio Aitola , Petra Johanna Alen, Afnan Al-Hunaiti , afnan.al-hunaiti@helsinki.fi, Fedaa Al-Qaisi , Kirill Axenov, Timothee Blanquart , Pascal Castro, Kostiantyn Chernichenko , Pertti Elo , Santeri Feodorow , Elina Färm , Andriy Grafov , Iryna Grafova , Hongfan Guo , Timo Tapio Hatanpää , Mikko Heikkilä , Helena Kristiina Hyvönen , Jani Hämäläinen , Emma Härkönen , Jarkko Ihanus , Jarno Kansikas , Maarit Kariniemi , Marianna Leena Kemell , Kaisa Pauliina Kervinen, Raikko T I Kivekäs, Martti Klinga, Kjell Johan Patrik Knapas , Vasilij Kozlov , Kaupo Kukli , Petro Lahtinen, Mikko Lankinen , , Kristian Päiviö Lappalainen, Markku Leskelä , Markus Lindqvist , Seppo Lindroos , Ville Miikkulainen , Ilpo Mutikainen , Miia Mäntymäki , Martin Nieger , Jaakko Niinistö , Antti Niskanen, Tero Pivi , Mika Tapio Polamo , Viljami Pore , Arto Juhani Puranen , Esa Puukilainen , Antti Tapani Pärssinen , Sari Rautiainen , Timo Repo , Mikko Ritala , Paul William Ryan, Minna Räisänen , Heikki Saarinen , Leo Salmi , Eero Santala , Tiina Sarnet , Victor Sumerin , Markku Sundberg , Imre Miklos Szilagyi , Markku Talja , Yoann Tomezak , Jere Tupala , Urho Turpeinen, Jaana Valo , Marko Vehkamäki , Sirpa Elina Vuorinen , Katarina Yliheikkilä

Publication type	Publication Year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	64	64	93	77	85	71	454
A2 Review in scientific journal	1	2	1	1	3		8
A3 Contribution to book/other compilations (refereed)		1	1	3	1		6
A4 Article in conference publication (refereed)	7	3	7	4	11	4	36
B3 Unrefereed article in conference proceedings	1		1	2			4
C2 Edited book, compilation, conference proceeding or special issue of journal				1			1
D1 Article in professional journal			1				1
D2 Article in professional hand or guide book or in a professional data system, or text book material					1		1
D5 Text book or professional handbook or guidebook or dictionary	1	2	1	2		1	7
H1 Patents			1		6	4	11



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2 Listing of publications

A1 Refereed journal article

2005

- Aaltonen, T, Ritala, M, Leskelä, M **2005**, 'ALD of rhodium thin films from Rh(acac)(3) and oxygen', **Electrochemical and Solid-State Letters**, vol 8, no. 8, pp. C99-C101.
- Aitola, E, Surakka, M, Repo, T, Linnolahti, M, Lappalainen, K, Kervinen, K, Klinga, M, Pakkanen, T, Leskelä, M, Aitola, E **2005**, 'Polymerization of ethene with zirconocene catalysts: an experimental and quantum chemical study of the influence of para-substituent in benzyl in bis(eta(5)(1-benzyl)indenyl) zirconium dichlorides', **Journal of Organometallic Chemistry**, vol 690, no. 3, pp. 773-783.
- Alén, P, Ritala, M, Arstila, K, Keinonen, J, Leskelä, M **2005**, 'Atomic layer deposition of molybdenum nitride thin films for Cu metallizations', **Journal of the Electrochemical Society**, vol 152, no. 2, pp. G361-G366.
- Alén, P, Ritala, M, Arstila, K, Keinonen, J, Leskelä, M **2005**, 'The growth and diffusion barrier properties of atomic layer deposition NbN_x thin films', **Thin Solid Films**, vol 491, no. 1-2, pp. 235-241.
- Arca, M, Azimi, G, Demartin, F, Devillanova, FA, Escriche, L, Garau, A, Isaia, F, Kivekäs, R, Lippolis, V, Muns, V, Perra, A, Shamsipur, M, Sportelli, L, Yari, A **2005**, 'Complexes of Cu-II with mixed-donor phenanthroline-containing macrocycles: analysis of their structural, redox and spectral properties in the context of Type-1 blue copper proteins biomimetic models', **Inorganica Chimica Acta**, vol 358, no. 7, pp. 2403-2412.
- Axenov, KV, Klinga, M, Leskelä, M, Repo, T, Leskelä, M **2005**, 'Bis(amido)cyclodiphosph(III)azane Hafnium Complexes and Their Activation by Tris(perfluorophenyl)borane', **Organometallics**, vol 24, no. 6, pp. 1336-1343.
- Casellas, H, Gamez, P, Reedijk, J, Mutikainen, I, Turpeinen, U, Masciocchi, N, Galli, S, Sironi, A **2005**, 'Moisture-triggered 1,3,5-triazine-based cull molecular switch: A combined X-ray single-crystal and powder diffraction study', **Inorganic Chemistry**, vol 44, no. 22, pp. 7918-7924.
- Castro, PM, Lahtinen, P, Axenov, K, Viidanoja, J, Kotiaho, T, Leskelä, M, Repo, T **2005**, 'Activation of 2,6-Bis(imino)pyridine Iron(II) Chloride Complexes by Methylaluminoxane: An Electrospray Ionization Tandem Mass Spectrometry Investigation', **Organometallics**, vol 24, no. 15, pp. 3664-3670.
- Castro, PM, Lankinen, MP, Leskela, M, Repo, T **2005**, 'Polymerisation of acrylates catalysed by methylaluminoxane activated ditertiary phosphine complexes of iron and cobalt dichlorides', **Macromolecular Chemistry and Physics**, vol 206, no. 11, pp. 1090-1097.
- Colacio, E, Deboudi, A, Kivekäs, R, Rodriguez, A **2005**, 'Multidimensional cyanide-bridged heterometallic Fe-II-Cu-I and homometallic Cu-I coordination polymers from solvothermal reactions involving either K₃[Fe(CN)₆] or KCN as the source of cyanide anions', **European Journal of Inorganic Chemistry**, vol 2005, no. 14, pp. 2860-2868.
- Driessen, WL, Rehorst, D, Reedijk, J, Mutikainen, I, Turpeinen, U **2005**, 'Copper(II) compounds of some rigid dinucleating bis-amine-bis-imidazole ligands', **Inorganica Chimica Acta**, vol 358, no. 7, pp. 2167-2173.
- Dueñas, S, Castán, H, Garcia, H, Barbolla, J, Kukli, K, Aarik, J, Ritala, M, Leskelä, M **2005**, 'Electrical characterization of hafnium oxide and hafnium-rich silicate films grown by atomic layer deposition', **Microelectronics Reliability**, vol 45, no. 5-6, pp. 949-952.
- Dueñas, S, Castán, H, Garcia, H, Barbolla, J, Kukli, K, Ritala, M, Leskelä, M **2005**, 'Comparative study on electrical properties of atomic layer deposited high-permittivity materials on silicon substrates', **Thin Solid Films**, vol 474, no. 1-2, pp. 222-229.
- Frey, S, Kemell, M, Carstensen, J, Langa, S, Föll, H **2005**, 'Fast pore etching', **Physica Status Solidi. A, Applied Research**, vol 202, no. 8, pp. 1369-1373.
- Gamez, P, van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'Crystal packing driven by metal-ligand interactions, hydrogen bonds, pi-pi stacking and anion-pi stacking', **Inorganica Chimica Acta**, vol 358, no. 6, pp. 1975-1980.
- Gamez, P, Albada, GAV, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'Crystal packing driven by metal|ligand interactions, hydrogen bonds, [pi]-[pi] stacking and anion-[pi] stacking', **Inorganica Chimica Acta**, vol 358, no. 6, pp. 1975-1980.
- Harjuoja, J, Hatanpää, T, Vehkamäki, M, Väyrynen, S, Putkonen, M, Niinistö, L, Ritala, M, Leskelä, M, Rauhala, E **2005**, 'New approach to the ALD of Bismuth silicates: Bi(CH₃SiMe) acting as a precursor for both Bismuth and silicon', **Chemical Vapor Deposition**, vol 11, no. 8-9, pp. 362-367.
- Hyvönen, H, Orama, M, Alen, P, Saarinen, H, Aksela, R, Paren, A **2005**, 'Complexation of N-tris([1,2-dicarboxyethoxy)ethyl]amine with Ca(II), Mn(II) and Zn(II) in aqueous solution', **Journal of Coordination Chemistry**, vol 58, no. 13, pp. 1115-1125.
- Ihanen, J, Lankinen, MP, Kemell, M, Ritala, M, Leskelä, M **2005**, 'Aging of electroluminescent ZnS:Mn Thin Films Deposited by Atomic Layer Deposition Processes', **Journal of Applied Physics**, vol 98, no. 11, pp. 113526.
- Jones, AC, Aspinall, HC, Chalker, RR, Potter, RJ, Kukli, K, Rahtu, A, Ritala, M, Leskela, M **2005**, 'Recent developments in the MOCVD and ALD of rare earth oxides and silicates', **Materials Science and Engineering B: Advanced Functional Solid-state Materials**, vol 118, no. 1-3, pp. 97-104.



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- Kannappan, R, Tanase, S, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'Square-planar copper(II) halide complexes of tridentate ligands with [pi-pi] stacking interactions and alternating short and long Cu ... Cu distances', **Inorganica Chimica Acta**, vol 358, no. 2, pp. 383-388.
- Kemell, M, Pore, V, Ritala, M, Leskelä, M, Linden, M **2005**, 'Atomic layer deposition in nanometer-level replication of cellulosic substances and preparation of photocatalytic TiO₂/cellulose composites', **Journal of the American Chemical Society**, vol 127, pp. 14178-14179.
- Kervinen, K, Korpi, H, Mesu, JG, Soulimani, F, Repo, T, Rieger, B, Leskela, M, Weckhuysen, BM **2005**, 'Mechanistic insights into the oxidation of veratryl alcohol with Co(salen) and oxygen in aqueous media: An in-situ spectroscopic study', **European Journal of Inorganic Chemistry**, no. 13, pp. 2591-2599.
- Kettunen, M, Vedder, C, Brintzinger, H, Mutikainen, I, Leskelä, M, Repo, T **2005**, 'Alternative Coordination Modes in Palladium(II)-Diimino-Bispyridine Complexes with an Axially Chiral Biphenyl Backbone', **European Journal of Inorganic Chemistry**, no. 6, pp. 1081-1089.
- Korpi, H, Polamo, M, Leskelä, M, Repo, T **2005**, 'Bis(pyridine-2-carboxaldehyde oxime)copper(II) sulphate as catalyst precursor in the oxidation of veratryl alcohol by dioxygen', **Inorganic Chemistry Communications**, vol 8, no. 12, pp. 1181-1184.
- Kukli, K, Aaltonen, T, Aarik, J, Lu, J, Ritala, M, Ferrari, S, Härsta, A, Leskelä, M **2005**, 'Atomic layer deposition and characterization of HfO₂ films on noble metal film substrates', **Journal of the Electrochemical Society**, vol 152, no. 7, pp. F75-F82.
- Kukli, K, Aarik, J, Uustare, T, Lu, J, Ritala, M, Aidla, A, Pung, L, Härsta, A, Leskelä, M, Kikas, A, Sammelselg, V **2005**, 'Engineering structure and properties of hafnium oxide films by atomic layer deposition temperature', **Thin Solid Films**, vol 479, no. 1-2, pp. 1-11.
- Kukli, K, Ritala, M, Pilvi, T, Aaltonen, T, Aarik, J, Lautala, M, Leskelä, M **2005**, 'Atomic layer deposition rate, phase composition and performance of HfO₂ films on noble metal and alkoxyated silicon substrates', **Materials Science and Engineering B: Advanced Functional Solid-state Materials**, vol 118, no. 1-3, pp. 112-116.
- Kukli, K, Pilvi, T, Ritala, M, Sajavaara, T, Lu, J, Leskelä, M **2005**, 'Atomic layer deposition of hafnium dioxide thin films from hafnium tetrakis(dimethylamide) and water', **Thin Solid Films**, vol 491, pp. 328-338.
- Lahtinen, P, Lankinen, E, Leskelä, M, Repo, T **2005**, 'Insight into copper oxidation catalysts: kinetic, catalytic active species and their deactivation', **Applied Catalysis A: General**, vol 295, no. 2, pp. 177-184.
- Lappalainen, K, Yliheikkilä, K, Abu-Surrah, AS, Polamo, M, Leskela, M, Repo, T **2005**, 'Iron(II)- and cobalt(II) complexes with tridentate bis(mino)pyridine nitrogen ligands bearing chiral bulky aliphatic and aromatic substituents: Crystal structure of [CoCl₂[2,6-bis[R-(+)-(bornylimino)methyl]pyridine]]', **Zeitschrift für anorganische und allgemeine Chemie**, vol 631, pp. 763-768.
- Laromaine, A, Teixidor, F, Kivekäs, R, Sillanpää, R, Benakki, R, Gruner, B, Vinas, C **2005**, 'Synthesis, reactivity and structural studies of carboranyl thioethers and disulfides', **Dalton Transactions**, vol 2005, no. 10, pp. 1785-1795.
- Matero, R, Rahtu, A, Ritala, M **2005**, 'In situ reaction mechanism studies on the atomic layer deposition of Al₂O₃ from (CH₃)₂AlCl and water', **Langmuir**, vol 21, pp. 3498-3502.
- Niinistö, J, Putkonen, M, Niinistö, L, Stoll, SL, Kukli, K, Sajavaara, T, Ritala, M, Leskelä, M **2005**, 'Controlled growth of HfO₂ thin films by atomic layer deposition from cyclopentadienyl-type precursor and water', **Journal of Materials Chemistry**, vol 15, no. 23, pp. 2271-2275.
- Niinistö, J, Rahtu, A, Putkonen, M, Ritala, M, Leskelä, M, Niinistö, L **2005**, 'In situ quadrupole mass spectrometry study of atomic-layer deposition of ZrO₂ using Cp₂Zr(CH₃)₂ and water', **Langmuir**, vol 21, no. 16, pp. 7321-7325.
- Niinistö, J, Petrova, N, Putkonen, M, Niinistö, L, Arstila, K, Sajavaara, T **2005**, 'Gadolinium oxide thin films by atomic layer deposition', **Journal of Crystal Growth**, vol 285, no. 1-2, pp. 191-200.
- Niskanen, A, Rahtu, A, Ritala, M, Leskelä, M, Sajavaara, T, Arstila, K **2005**, 'Radical-Enhanced Atomic Layer Deposition of Metallic Copper Thin Films', **Journal of the Electrochemical Society**, vol 152, no. 1, pp. G25-G28.
- Niskanen, A, Arstila, K, Ritala, M, Leskela, M **2005**, 'Low-temperature deposition of aluminum oxide by radical enhanced atomic layer deposition', **Journal of the Electrochemical Society**, vol 152, no. 7, pp. F90-F93.
- Nissinen, T, Leskela, M, Gasik, M, Lamminen, J **2005**, 'Decomposition of mixed Mn and Co nitrates supported on carbon', **Thermochemica Acta**, vol 427, pp. 155-161.
- Nunez, R, Tutasaus, O, Teixidor, F, Vinas, C, Sillanpää, R, Kivekäs, R **2005**, 'Highly stable neutral and positively charged dicarbollide sandwich complexes', **Chemistry: A European Journal**, vol 11, no. 19, pp. 5637-5647.
- Nunez, R, Gonzalez, A, Vinas, C, Teixidor, F, Sillanpää, R, Kivekäs, R **2005**, 'Approaches to the preparation of carborane-containing carbosilane compounds', **Organic Letters**, vol 7, no. 2, pp. 231-233.
- Nunez, R, Gonzalez-Campo, A, Vinas, C, Teixidor, F, Sillanpää, R, Kivekäs, R **2005**, 'Boron-functionalized carbosilanes: Insertion of carborane clusters into peripheral silicon atoms of carbosilane compounds', **Organometallics**, vol 24, no. 26, pp. 6351-6357.
- Pankratova, OY, Stepanova, JS, Zvinchuk, RA, Suvorov, AV, Hatanpää, T, Kozlov, V, Leskelä, M **2005**, 'Thermal behaviour of titanium seleno-telluride Ti(5)Ch(8) in Ar and N-2 atmospheres', **Thermochemica Acta**, vol 428, no. 1-2, pp. 91-94.



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- Pankratova, OY, Zvinchuk, RA, Suvorov, AV, Hatanpää, T, Kozlov, VI, Leskelä, M **2005**, 'Thermal decomposition of Ti(Se, Te) in argon and nitrogen atmospheres', **Russian Journal of General Chemistry**, vol 75, no. 7, pp. 1005-1009.
- Polamo, M, Tajja, M, Piironen, AJ **2005**, 'Crystal structure of 2-[2,6-di(methylethyl)phenylamino]pyridine, C₁₇H₂₂N₂', **Zeitschrift für Kristallographie - New Crystal Structures**, vol 220, no. 1, pp. 41-42.
- Polamo, M, Tajja, M **2005**, 'Crystal structure of trichloro(phenyl-2-pyridylamido)phenylimidotungsten(VI), WCl₃(C₆H₅N)(C₁₁H₉N₂)', **Zeitschrift für Kristallographie - New Crystal Structures**, vol 220, no. 1, pp. 43-44.
- Ponec, R, Yuzhakov, G, Sundberg, MR **2005**, 'Chemical structures from the analysis of domain-averaged Fermi holes. Nature of the Mn-Mn bond in bis(pentacarbonylmanganese)', **Journal of Computational Chemistry**, vol 26, no. 5, pp. 447-454.
- Päiväsääri, J, Niinistö, J, Arstila, K, Kukli, K, Putkonen, M, Niinistö, L **2005**, 'High growth rate of erbium oxide thin films in atomic layer deposition from (CpMe)Er and water precursors', **Chemical Vapor Deposition**, vol 11, no. 10, pp. 415-419.
- Pärssinen, A, Luhtanen, T, Klinga, M, Pakkanen, T, Leskelä, M, Repo, T **2005**, 'Bis(salicylaldiminato)titanium complexes containing bulky imine substituents: synthesis, characterization and ethene polymerization studies', **European Journal of Inorganic Chemistry**, no. 11, pp. 2100-2109.
- Rodriguez, A, Kivekäs, R, Colacio, E **2005**, 'Unique self-assembled 2D metal-tetrazolate networks: crystal structure and magnetic properties of [M(pmtz)(2)] (M = Co(II) and Fe(II); Hpmtz = 5-(pyrimidyl)tetrazole)', **Chemical Communications**, vol 41, pp. 5228-5230.
- Salonen, M, Saarinen, H, Orama, M **2005**, 'Formation of cobalt(II) complexes with five pyridine oximes in aqueous solution', **Journal of Coordination Chemistry**, vol 58, no. 4, pp. 317-326.
- Silver, S, Puranen, A, Sjöholm, R, Repo, T, Leino, R **2005**, 'Chiral indenenes and group-4 metallocene dichlorides containing alpha- and beta-pinenyl-derived ligand substituents: Synthesis and catalytic applications in polymerization and carboalumination reactions', **European Journal of Inorganic Chemistry**, pp. 1514-1529.
- Song, Y, Massera, C, Quesada, M, Manotti Lanfredi, AM, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'A one-dimensional copper (II) coordination polymer [Cu₃(ampym)₂([mu]1,1-N₃)₄([mu]1,3-N₃)₂(dmf)₂]_n (ampym = 2-aminopyrimidine) containing both end-on and end-to-end azido bridges', **Inorganica Chimica Acta**, vol 358, no. 4, pp. 1171-1178.
- Song, Y, Gamez, P, Roubeau, O, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'Structure and magnetism of two new linear trinuclear copper(II) clusters obtained from the tetradentate N₂O₂ ligand bis(2-hydroxybenzyl)-1,3-diaminopropane', **Inorganica Chimica Acta**, vol 358, no. 1, pp. 109-115.
- Song, YF, van Albada, GA, Quesada, M, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'A new linear trinuclear Cu(II) complex [Cu₃L₂(MeCN)₂](2)-2(MeCN)₂ with semi-coordinated iodides formed through ligand sharing (H₂L=1,7-bis(2-hydroxyphenyl)-2,6-diaza-4-hydroxyl-heptane)', **Inorganic Chemistry Communications**, vol 8, no. 11, pp. 975-978.
- Sundberg, MR, Paavola, S, Vinas, C, Teixidor, F, Uggla, R, Kivekäs, R **2005**, 'Plasticity of the five-membered chelate ring in [PdCl₂(1,2-(PR₂)(2)-,12-C₂B₁₀H₁₀)] complexes (R = H or Pr-i)', **Inorganica Chimica Acta**, vol 358, no. 6, pp. 2107-2111.
- Tajja, M, Klinga, M, Polamo, M, Aitola, E, Leskelä, M **2005**, 'Synthesis, structure and polymerization behavior of tri- and dichloroaminopyridinato complexes of titanium', **Inorganica Chimica Acta**, vol 358, no. 4, pp. 1061-1067.
- Tajja, M, Polamo, M **2005**, 'Crystal structure of 2-(2-chlorophenylamino)pyridine, C₁₁H₉CIN₂', **Zeitschrift für Kristallographie - New Crystal Structures**, vol 220, no. 1, pp. 39-40.
- Teixidor, F, Barbera, G, Vaca, A, Kivekäs, R, Sillanpää, R, Oliva, J, Vinas, C **2005**, 'Are methyl groups electron-donating or electron-withdrawing in boron clusters? Permethylation of o-carborane', **Journal of the American Chemical Society**, vol 127, no. 29, pp. 10158-10159.
- Vinas, C, Llop, J, Teixidor, F, Kivekäs, R, Sillanpää, R **2005**, 'Restricted rotation in unbridged sandwich complexes: Rotational behavior of closo-[Co(eta(5)-NC₄H₄)(C₂B₉H₁₁)] derivatives', **Chemistry: A European Journal**, vol 11, no. 6, pp. 1933-1941.
- Wolborski, M, Bakowski, M, Pore, V, Ritala, M, Leskelä, M, Schöner, A, Hallen, A **2005**, 'Characterization of aluminum and titanium oxides deposited on 4H SiC by atomic layer deposition technique', **Materials Science Forum**, vol 483-485, pp. 701-704.
- Youngme, S, van Albada, GA, Chaichit, N, Gunnaasoot, P, Kongsaeeree, P, Mutikainen, I, Roubeau, O, Reedijk, J, Turpeinen, U **2005**, 'Corrigendum to: Synthesis, spectroscopic characterization, X-ray crystal structure and magnetic properties of oxalato-bridged copper(II) dinuclear complexes with di-2-pyridylamine (vol 353, pg 119, 2003)', **Inorganica Chimica Acta**, vol 358, no. 9, pp. 2838.
- Youngme, S, Phuengphai, P, Pakawatchai, C, Albada, GAV, Tanase, S, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'A copper(II) chain compound with hydrogenphosphate bridges organized in a double-chain structure. Synthesis, structure and magnetic properties of [Cu(1,10-phenanthroline)([mu]-HPO₄)(H₂O)₂]_n', **Inorganic Chemistry Communications**, vol 8, no. 4, pp. 335-338.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2005**, 'Tris(5,5'-dimethyl-2,2'-bipyridyl-kappa N-2,N')iron(II) bis(perchlorate) 5,5'-dimethyl-2,2'-bipyridyl solvate', **Acta Crystallographica. Section E: Structure Reports Online**, vol 61, pp. M1411-M1412.

2006

- Aitola, E, Puranen, A, Setälä, H, Lipponen, S, Leskelä, M, Repo, T **2006**, 'Copolymerization of vinylcyclohexane with ethene and propene using zirconocene catalysts', **Journal of Polymer Science. Part A, Polymer Chemistry**, vol 44, no. 22, pp. 6569-6574.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

Alen, P, Vehkamäki, M, Ritala, M, Leskelä, M **2006**, 'Diffusion Barrier Properties of Atomic Layer Deposited Ultrathin Ta₂O₅ and TiO₂ Films', **Journal of the Electrochemical Society**, vol 153, no. 4, pp. G304-G308.

Axenov, KV, Kipeläinen, I, Klinga, M, Leskelä, M, Repo, T **2006**, 'Titanium and zirconium benzyl complexes bearing bulky bis(amido)cyclophosph(III)azanes: synthesis, structure, activation, and ethene polymerization studies', **Organometallics**, vol 25, no. 2, pp. 463-471.

Axenov, KV, Leskelä, M, Repo, T **2006**, 'Bis(imino)cyclophosph(V)azane complexes of late transition metals: Efficient catalyst precursors for ethene and propene oligomerization and dimerization', **Journal of Catalysis**, vol 238, pp. 196-205.

Benisvy, L, Mutikainen, I, Quesada, M, Turpeinen, U, Gamez, P, Reedijk, J **2006**, 'The self-assembly between C-2-symmetric (methanol)(6) or S-6-symmetric (ethanol)(6) cyclohexamers and paddle-wheel dinuclear copper units leads to unique 1D polymer chains', **Journal of the Chemical Society. Chemical communications**, no. 35, pp. 3723-3725.

Dezelah, CL, Niinistö, J, Arstila, K, Niinistö, L, Winter, CH **2006**, 'Atomic layer deposition of Ga₂O₃ films from a dialkylamido-based precursor', **Chemistry of Materials**, vol 18, no. 2, pp. 471-475.

Duenas, S, Castan, H, Garcia, H, de Castro, A, Bailon, L, Kukli, K, Aidla, A, Aarik, J, Mändar, H, Uustare, T, Lu, J, Hårsta, A **2006**, 'Influence of single and double deposition temperatures on the interface quality of atomic layer deposited Al₂O₃ dielectric thin films on silicon', **Journal of Applied Physics**, vol 99, no. 5, pp. 054902.

Duenas, S, Castan, H, Garcia, H, Bailon, L, Kukli, K, Ritala, M, Leskelä, M, Rooth, M, Wilhelmsson, O, Håsta, A **2006**, 'Experimental investigation of the electrical properties of atomic layer deposition hafnium-rich silicate films on n-type silicon', **Journal of Applied Physics**, vol 100, no. 9, pp. art. 094107.

Escrache, L, Casabo, J, Muns, V, Kivekäs, R, Sillanpää, R **2006**, 'New phosphathiamacrocycles containing polypyridine units', **Polyhedron**, vol 25, no. 3, pp. 801-808.

Färm, E, Kemell, M, Ritala, M, Leskelä, M **2006**, 'Self-assembled octadecyltrimethoxysilane monolayers enabling selective-area atomic layer deposition of iridium', **Chemical Vapor Deposition**, vol 12, no. 7, pp. 415-417.

Ge, S, Andell, OS, Penninkangas, A, Maaranen, J, Telen, T, Mutikainen, I **2006**, 'The first synthesised examples of di-siloxy-substituted cyclopentadienyl zirconocenes, their synthesis, structure and activity in ethylene polymerisation', **Journal of Organometallic Chemistry**, vol 691, no. 1-2, pp. 122-130.

Harju, K, Kylänlahti, I, Paananen, T, Polamo, M, Nielsen, J, Yli-Kauhaluoma, J **2006**, 'Solid-phase synthesis of pyrazolopyridines from polymer-bound alkyne and azomethine imines', **Journal of Combinatorial Chemistry**, vol 8, no. 3, pp. 344-349.

Hyvönen, H, Orama, M, Arvela, R, Henriksson, K, Saarinen, H, Aksela, R, Paren, A, Jäkärä, J, Renvall, I **2006**, 'Studies of three new environmentally friendly chelating ligands', **Appita Journal**, vol 59, no. 2, pp. 142-149.

Izzo, L, Puranen, AJ, Repo, T, Oliva, L **2006**, 'Comparison of the C-1-symmetric diastereoisomers of a zirconocene-based catalyst in ethylene polymerization: A benzyl substituent as a regulator in branch formation', **Journal of Polymer Science. Part A, Polymer Chemistry**, vol 44, pp. 3551-3555.

Jefimovs, K, Laukkanen, J, Vallius, T, Pilvi, T, Ritala, M, Meilahti, T, Kaipainen, M, Bavdaz, M, Leskelä, M, Turunen, J **2006**, 'Free-standing inductive grid filter for infrared radiation rejection', **Microelectronic Engineering**, vol 83, pp. 1339-1342.

Jogi, I, Kukli, K, Aarik, J, Aidla, A, Lu, J **2006**, 'Precursor-dependent structural and electrical characteristics of atomic layer deposited films: Case study on titanium oxide', **Materials Science in Semiconductor Processing**, vol 9, no. 6, pp. 1084-1089.

Josell, D, Bonevich, JE, Moffat, TP, Aaltonen, T, Ritala, M, Leskelä, M **2006**, 'Iridium barriers for direct copper electrodeposition in damascene processing', **Electrochemical and Solid-State Letters**, vol 9, no. 2, pp. C48-C50.

Järn, M, Areva, S, Pore, V, Peltonen, J, Linden, M **2006**, 'Topography and surface energy dependent calcium phosphate formation on sol-gel derived TiO coatings', **Langmuir**, vol 22, no. 19, pp. 8209-8213.

Kallio, T, Alajoki, S, Pore, V, Ritala, M, Laine, J, Leskelä, M, Stenius, P **2006**, 'Antifouling properties of TiO₂: Photocatalytic decomposition and adhesion of fatty and rosin acids, sterols and lipophilic wood extractives', **Colloids and Surfaces A: Physicochemical and Engineering Aspects**, vol 291, no. 1-3, pp. 162-176.

Kannappan, R, Tanase, S, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'Low-spin iron(III) Schiff-base complexes with symmetric hexadentate ligands: Synthesis, crystal structure, spectroscopic and magnetic properties', **Polyhedron**, vol 25, no. 7, pp. 1646-1654.

Kemell, M, Pore, V, Ritala, M, Leskelä, M **2006**, 'Ir/Oxide/Cellulose composites for catalytic purposes prepared by atomic layer deposition', **Chemical Vapor Deposition**, vol 12, no. 7, pp. 419-422.

Kemell, M, Färm, E, Leskelä, M, Ritala, M **2006**, 'Transparent superhydrophobic surfaces by self-assembly of hydrophobic monolayers on nanostructured surfaces', **Physica Status Solidi. A, Applied Research**, vol 203, no. 6, pp. 1453-1458.

Keskinen, H, Mäkelä, JM, Aromaa, M, Keskinen, J, Areva, S, Teixeira, CV, Rosenholm, JB, Pore, V, Ritala, M, Leskelä, M, Raulio, M, Salkinoja-Salonen, M, Levänen, E, Mäntylä, T **2006**, 'Titania and titania-silver nanoparticle deposits made by Liquid Flame Spray and their functionality as photocatalyst for organic- and biofilm removal', **Catalysis Letters**, vol 111, no. 3-4, pp. 127-132.

Korpi, H, Sippola, V, Filpponen, I, Sipilä, J, Krause, O, Leskelä, M, Repo, T **2006**, 'Copper-2,2'-bipyridines: catalytic performance and structures in aqueous alkaline solutions', **Applied Catalysis A: General**, vol 302, no. 2, pp. 250-256.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Kukli, K, Ritala, M, Sajavaara, T, Hänninen, T, Leskelä, M 2006, 'Atomic layer deposition of calcium oxide and calcium hafnium oxide films using calcium cyclopentadienyl precursor', **Thin Solid Films**, vol 500, pp. 322-329.
- Kukli, K, Ritala, M, Pore, V, Leskelä, M, Sajavaara, T, Hegde, R, Gilmer, DC, Tobin, PJ, Jones, AC, Aspinall, HC 2006, 'Atomic layer deposition and properties of lanthanum oxide and lanthanum-aluminum oxide films', **Chemical Vapor Deposition**, vol 12, pp. 158-164.
- Kurten, T, Sundberg, MR, Vehkamäki, H, Nopel, M, Blomqvist, J, Kulmala, M 2006, 'Ab initio and density functional theory reinvestigation of gas-phase sulfuric acid monohydrate and ammonium hydrogen sulfate', **Journal of Physical Chemistry A**, vol 110, pp. 7178-7188.
- Laromaine, A, Teixidor, F, Kivekäs, R, Sillanpää, R, Arca, M, Lippolis, V, Crespo, E, Vinas, C 2006, 'Synthesis, reactivity and structural studies of selenide bridged carboranyl compounds', **Dalton Transactions**, vol 2006, no. 44, pp. 5240-5247.
- Lee, DS, Park, SJ, Park, SD, Park, YW, Kemell, M, Ritala, M, Svensson, J, Jonson, M, Campbell, EEB 2006, 'Quantum dot manipulation in a single-walled carbon nanotube using nanotube gate', **Applied Physics Letters**, vol 89, pp. art no 233107.
- Leskelä, M, Kukli, K, Ritala, M 2006, 'Rare-earth oxide thin films for gate dielectrics in microelectronics', **Journal of Alloys and Compounds**, vol 418, pp. 27-34.
- Maaranen, J, Andell, OS, Vanne, T, Mutikainen, I 2006, 'Dimethyl-, diphenyl- and cyclohexamethylene silylchloride derivatives of guanidine, their synthesis and structure. Formation of pentacoordinated silicon compounds and an unexpected diionic disila-diguandinium dichloride', **Journal of Organometallic Chemistry**, vol 691, no. 1-2, pp. 240-246.
- Matero, R, Rahtu, A, Haukka, S, Tuominen, M, Vehkamäki, M, Hatanpää, T, Ritala, M, Leskelä, M 2006, 'Scale-up of the barium titanate atomic layer deposition process onto 200 MM wafer', **ECS transactions**, vol 1, no. 10, pp. 137-141.
- Moffat, TP, Walker, M, Chen, PJ, Bonevich, JE, Egelhoff, WF, Richter, L, Witt, C, Aaltonen, T, Ritala, M, Leskelä, M, Josell, D 2006, 'Electrodeposition of Cu on Ru barrier layers for damascene processing', **Journal of the Electrochemical Society**, vol 153, no. 1, pp. C37-C50.
- Myllymäki, P, Nieminen, M, Niinistö, J, Putkonen, M, Kukli, K, Niinistö, L 2006, 'High-permittivity YScO₃ thin films by atomic layer deposition using two precursor approaches', **Journal of Materials Chemistry**, vol 16, no. 6, pp. 563-569.
- Niinistö, J, Putkonen, M, Niinistö, L, Arstila, K, Sajavaara, T, Lu, J, Kukli, K, Ritala, M, Leskelä, M 2006, 'HfO₂ films grown by ALD using cyclopentadienyl-type precursors and H₂O or O₃ as oxygen source', **Journal of the Electrochemical Society**, vol 153, no. 3, pp. F39-F45.
- Nunez, R, Gonzalez-Campo, A, Laromaine, A, Teixidor, F, Sillanpää, R, Kivekäs, R, Vinas, C 2006, 'Synthesis of small carboranylsilane dendrons as scaffolds for multiple functionalizations', **Organic Letters**, vol 8, no. 20, pp. 4549-4552.
- Nunez, R, Farras, P, Teixidor, F, Vinas, C, Sillanpää, R, Kivekäs, R 2006, 'A discrete P center dot center dot center dot I-I center dot center dot center dot P assembly: The large influence of weak interactions on the P-31 NMR spectra of phosphane-diiodine complexes', **Angewandte Chemie (International Edition)**, vol 45, no. 8, pp. 1270-1272.
- Picazo, O, Alkorta, I, Elguero, J, Sundberg, MR 2006, 'Chiral discrimination in binuclear square planar metal complexes of group 10', **Inorganic Chemistry Communications**, vol 9, no. 7, pp. 712-715.
- Planas, JG, Masalles, C, Sillanpää, R, Kivekäs, R, Teixidor, F, Vinas, C 2006, 'Synthesis and solid state structure for a series of poly(1-pyrrolylmethyl)-benzene derivatives. Control of the interplaying pi-pi and C-H center dot center dot center dot pi interactions?', **CrystEngComm**, vol 8, no. 1, pp. 75-83.
- Planas, JG, Mohamed, GG, Sillanpää, R, Kivekäs, R, Teixidor, F, Vinas, C 2006, 'Interplay of hydrogen bonding and pi-pi interactions in the molecular complex of 2,6-lutidine N-oxide and water', **Journal of Molecular Structure**, vol 787, no. 1-3, pp. 121-126.
- Pore, V, Heikkilä, M, Ritala, M, Leskelä, M, Areva, S 2006, 'Atomic layer deposition of TiO₂-xNx thin films for photocatalytic applications', **Journal of Photochemistry and Photobiology, A: Chemistry**, vol 177, no. 1, pp. 68-75.
- Pärssinen, A, Elo, P, Klinga, M, Leskelä, M, Repo, T 2006, 'Synthesis of titanium complexes bearing two mono anionic malonic acid ester based ligands and their use as catalyst precursors in ethene polymerization', **Inorganic Chemistry Communications**, vol 9, no. 8, pp. 859-861.
- Raulio, M, Pore, V, Areva, S, Ritala, M, Leskelä, M, Lindén, M, Rosenholm, JB, Lounatmaa, K, Salkinoja-Salonen, M 2006, 'Destruction of Deinococcus Geothermalis Biofilm by Photocatalytic ALD and Sol-Gel TiO₂ Surfaces', **Journal of Industrial Microbiology and Biotechnology**, vol 33, no. 4, pp. 261-268.
- Ritala, M, Kemell, M, Lautala, M, Niskanen, A, Leskelä, M, Lindfors, S 2006, 'Rapid coating of through-porous substrates by atomic layer deposition', **Chemical Vapor Deposition**, vol 12, no. 11, pp. 655-658.
- Rodriguez-Dieguez, A, Kivekäs, R, Sillanpää, R, Cano, J, Lloret, F, McKee, V, Stoeckli-Evans, H, Colacio, E 2006, 'Structural and magnetic diversity in cyano-bridged bi- and trimetallic complexes assembled from cyanometalates and [M(rac-CTH)](n+) building blocks (CTH = d, l-5,5,7,12,12,14-hexamethyl-1,4,8,11-tetraazacyclotetradecane)', **Inorganic Chemistry**, vol 45, no. 26, pp. 10537-10551.
- Seraidaris, T, Puranen, A, Karesoja, M, Löfgren, B, Repo, T, Leskelä, M, Seppälä, J 2006, 'High-molar-mass polypropene with tunable elastic properties by hafnocene/borate catalysts', **Journal of Polymer Science. Part A, Polymer Chemistry**, vol 44, pp. 4743-4751.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Solehmainen, K, Aalto, T, Dekker, J, Kapulainen, M, Harjanne, M, Kukli, K, Heimala, P, Kolari, K, Leskelä, M **2006**, 'Dry-etched silicon-on-insulator waveguides with low propagation and fiber-coupling losses', **Journal of Lightwave Technology**, vol 23, no. 11, pp. 3875-3880.
- Sundberg, MR, Ponec, R **2006**, 'The nature of M-O bond in MO₄ compounds (M = Os, Ru; X = F, Cl, Br, I)', **Inorganica Chimica Acta**, vol 359, no. 3, pp. 899-906.
- Talja, M, Polamo, M **2006**, 'Configurational isomerism in crystalline bis(amidopyridine)trichloro complexes of tantalum(V)', **Polyhedron**, vol 25, no. 15, pp. 3039-3044.
- Tamayo, A, Casabo, J, Escriche, L, Lodeiro, C, Covelo, B, Brondino, CD, Kivekäs, R, Sillanpää, R **2006**, 'Color tuning of a nickel complex with a novel N₂S₂ pyridine-containing macrocyclic ligand', **Inorganic Chemistry**, vol 45, no. 3, pp. 1140-1149.
- Tanase, S, Gallego, PM, Bouwman, E, Long, GJ, Rebbouh, L, Grandjean, F, de Gelder, R, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'Versatility in the binding of 2-pyrazinecarboxylate with iron. Synthesis, structure and magnetic properties of iron(II) and iron(III) complexes', **Journal of the Chemical Society. Dalton Transactions**, no. 13, pp. 1675-1684.
- Teixidor, F, Barbera, G, Vinas, C, Sillanpää, R, Kivekäs, R **2006**, 'Synthesis of boron-iodinated o-carborane derivatives. Water stability of the periodinated monoprotic salt', **Inorganic Chemistry**, vol 45, no. 9, pp. 3496-3498.
- Vaca, A, Teixidor, F, Kivekäs, R, Sillanpää, R, Vinas, C **2006**, 'A solvent-free regioselective iodination route of ortho-carboranes', **Dalton Transactions**, vol 2006, no. 41, pp. 4884-4885.
- Vehkamäki, M, Hatanpää, T, Kemell, M, Ritala, M, Leskelä, M **2006**, 'Atomic layer deposition of ferroelectric bismuth titanate Bi₄Ti₃O₁₂ thin films', **Chemistry of Materials**, vol 18, pp. 3883-3888.
- Vidal, I, Melchor, S, Alkorta, I, Elguero, J, Sundberg, MR, Dobado, JA **2006**, 'On the existence of alpha-agostic bonds: Bonding analyses of titanium alkyl complexes', **Organometallics**, vol 25, pp. 5638-5647.
- Wolborski, M, Bakowski, M, Ortiz, A, Pore, V, Schöner, A, Ritala, M, Leskelä, M, Hallen, A **2006**, 'Characterisation of the Al₂O₃ films deposited by ultrasonic spray pyrolysis and atomic layer deposition methods for passivation of 4H-SiC devices', **Microelectronics Reliability**, vol 46, pp. 743-755.
- Yli-Kauhaluoma, J, Salakari, A, Mutikainen, I **2006**, 'Spiro-[cyclopropane-1,1'-1H-inden]-2-(3'-H)-one', **Acta Crystallographica. Section E: Structure Reports Online**, vol 62, no. 6, pp. O2415-O2416.
- Yliheikkilä, K, Lappalainen, K, Castro, PM, Ibrahim, K, Abu-Surrah, A, Leskelä, M, Repo, T **2006**, 'Polymerization of acrylate monomers with MAO activated iron(II) and cobalt(II) complexes bearing tri- and tetradentate nitrogen ligands', **European Polymer Journal**, vol 42, pp. 92-100.
- Youngme, S, Phatchimkun, J, Chaichit, N, Pakawatchai, C, Mutikainen, I, Turpeinen, U **2006**, 'Coordination geometry in bis(di-2-pyridylamine)copper(II) complexes. Crystal structures and spectroscopic properties of [Cu(L)(2)(NCS)(2)][Cu(L)(2)(NCS)]X, X=BF₄⁻, I⁻', **Journal of Coordination Chemistry**, vol 59, no. 16, pp. 1813-1824.
- van Albada, GA, Tanase, S, Mohamadou, A, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'Synthesis, structure and magnetism of two new polymeric double dicyanamido-bridged Mn(II) compounds', **Polyhedron**, vol 25, no. 11, pp. 2236-2240.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'Intermolecular Watson-Crick-like ligand pairing in two Cu(II) compounds with the ligand bis(pyrimidin-2-yl)amine forming 2D chain-type compounds', **Inorganic Chemistry Communications**, vol 9, no. 11, pp. 1067-1070.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'Crystal structure, magnetism and spectroscopy of two strongly antiferromagnetically coupled dinuclear Cu(II) paddlewheel-like compounds with 4-azabenzimidazole as a ligand', **Polyhedron**, vol 25, no. 17, pp. 3278-3284.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'A new copper(II) coordination compound with 2,2'-bipyridine-N-oxide as a ligand: Crystal structure, synthesis and spectroscopy', **Journal of Chemical Crystallography**, vol 36, no. 4, pp. 259-262.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2006**, 'Two different isomers of tetrahedrally distorted square-planar Cu(II) triflate compounds with 2-guanidinobenzimidazole; synthesis, X-ray and spectroscopic characterisation', **Journal of Molecular Structure**, vol 789, no. 1-3, pp. 182-186.

2007

- Axenov, KV, Klinga, M, Lehtonen, O, Koskela, HT, Leskela, M, Repo, T **2007**, 'Hafnium bis(phenoxyimino) dibenzyl complexes and their activation toward olefin polymerization', **Organometallics**, vol 26, no. 6, pp. 1444-1460.
- Benisvy, L, Kannappan, R, Song, Y, Milikisyants, S, Huber, M, Mutikainen, I, Turpeinen, U, Gamez, P, Bernasconi, L, Baerends, EJ, Hartl, F, Reedijk, J **2007**, 'A square-planar nickel(II) monoradical complex with a bis(salicylidene)-diamine ligand', **European Journal of Inorganic Chemistry**, vol 2007, no. 5, pp. 637-642.
- Biener, J, Baumann, TF, Wang, Y, Nelson, EJ, Kucheyev, SO, Hamza, AV, Kemell, M, Ritala, M, Leskelä, M **2007**, 'Ruthenium/aerogel nanocomposites via atomic layer deposition', **Nanotechnology**, vol 18, no. 5, pp. art. 055303.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Bisel, P, Walter, L, Nieger, M, Hummel, W, Muller, M **2007**, 'Stereochemical clarification of the enzyme-catalysed reduction of 2-acetylchromen-4-one', **Tetrahedron: Asymmetry**, vol 18, pp. 1142-1144.
- Bode, M, Nieger, M, Streubel, R **2007**, 'Synthesis of the first 1,3,4 lambda(3)-dioxaphospholane complexes', **Organometallics**, vol 26, pp. 245-246.
- Burck, S, Gudat, D, Nieger, M **2007**, 'Metal-assisted, reversible phosphinyl phosphination of the carbon-nitrogen triple bond in a nitrite', **Angewandte Chemie (International Edition)**, vol 46, pp. 2919-2922.
- Burck, S, Gudat, D, Näntinen, K, Nieger, M, Niemeyer, M, Schmid, D **2007**, '2-Chloro-1,3,2-diazaphospholenes - a crystal structural study', **European Journal of Inorganic Chemistry**, no. 32, pp. 5112 - 5119.
- Burck, S, Gudat, D, Nieger, M, Tirree, J **2007**, 'Structures, dynamic behaviour, and reactivity of P-cyclopentadienyl-substituted 1,3,2-diazaphospholenes', **Dalton Transactions**, no. 19, pp. 1891-1897.
- Chikkali, SH, Gudat, D, Lissner, F, Nieger, M, Schleid, T **2007**, 'Boron templated catechol phosphines as bidentate ligands in silver complexes', **Dalton Transactions**, no. 35, pp. 3906-3913.
- Costa, JS, Lappalainen, K, de Ruiter, G, Quesada, M, Tang, J, Mutikainen, I, Turpeinen, U, Grunert, CM, Güttlich, P, Lazar, HZ, Letard, J, Gamez, P, Reedijk, J **2007**, 'Remarkable steric effects and influence of monodentate axial ligands L on the spin-crossover properties of trans-[Fe-II(N-4 ligand)L] complexes', **Inorganic Chemistry**, vol 46, no. 10, pp. 4079-4089.
- Dezelah, CL, El-Kadri, OM, Kukli, K, Arstila, K, Baird, RJ, Lu, J, Niinistö, L, Winter, CH **2007**, 'A low valent metalorganic precursor for the growth of tungsten nitride thin films by atomic layer deposition', **Journal of Materials Chemistry**, vol 17, no. 11, pp. 1109-1116.
- Drochner, D, Hüttel, W, Bode, SE, Müller, M, Karl, U, Nieger, M, Steglich, W **2007**, 'Dimeric Orsellinic Acid Derivatives: Valuable Intermediates for Natural Product Synthesis', **European Journal of Organic Chemistry**, vol 2007, no. 11, pp. 1749-1758.
- Duenas, S, Castan, H, Garcia, H, Bailon, L, Kukli, K, Hatanpää, T, Ritala, M, Leskelä, M **2007**, 'Experimental observations of temperature-dependent flat band voltage transients on high-k dielectrics', **Microelectronics Reliability**, vol 47, pp. 653-656.
- Dueñas, S, Castán, H, Garcia, H, Gómez, A, Bailón, L, Kukli, K, Hatanpää, T, Lu, J, Ritala, M, Leskelä, M **2007**, 'Electrical properties of atomic-layer-deposition thin gadolinium oxide high-k gate dielectrics', **Journal of the Electrochemical Society**, vol 154, no. 10, pp. G207-G214.
- Elsinghorst, PW, Nieger, M, Gutschow, M **2007**, '6,9-Dichloro-1,2,3,4-tetrahydroacridine', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. 1818-1820.
- Figiel, PJ, Leskelä, M, Repo, T **2007**, 'TEMPO-copper(II) diimine-catalysed oxidation of benzylic alcohols in aqueous media', **Advanced Synthesis & Catalysis**, vol 349, no. 7, pp. 1173-1179.
- Friedrich, A, Jainta, M, Nieger, M, Bräse, S **2007**, 'One-pot synthesis of symmetrical and unsymmetrical diketopiperazines from unprotected amino acids', **Synlett**, no. 13, pp. 2127-2129.
- Gonzalez-Campo, A, Vinas, C, Teixidor, F, Nunez, R, Sillanpää, R, Kivekäs, R **2007**, 'Modular construction of neutral and anionic carboranyl-containing carbosilane-based dendrimers', **Macromolecules**, vol 40, pp. 5644-5652.
- Hatanpää, T, Ritala, M, Leskelä, M **2007**, 'Crystal structures and thermal properties of Ba(1,2,4-t-Bu3C5H2)(2) and Sr(1,2,4-t-Bu3C5H2)(2): precursors for atomic layer deposition', **Journal of Organometallic Chemistry**, vol 692, no. 23, pp. 5256-5262.
- Helten, H, Neumann, C, Espinosa, A, Jones, PG, Nieger, M, Streubel, R **2007**, 'Evidence for ligand-centered reactivity of a 17e radical kationic 2H-azaphosphirene complex', **European Journal of Inorganic Chemistry**, no. 29, pp. 4669-4678.
- Hyvönen, H, Aksela, R **2007**, 'The complexation of novel amino acid derivatives with La(III) ion in aqueous solution', **Journal of Coordination Chemistry**, vol 60, no. 8, pp. 901-910.
- Jefimovs, K, Vila-Comamala, J, Pilvi, T, Raabe, J, Ritala, M, David, C **2007**, 'Zone-doubling technique to produce ultrahigh-resolution x-ray optics', **Physical Review Letters**, vol 99, no. 26, pp. art no 264801.
- Jogi, I, Kukli, K, Kemell, M, Ritala, M, Leskelä, M **2007**, 'Electrical characterization of Al[sub x]Ti[sub y]O[sub z] mixtures and AlO-TiO-AlO nanolaminates', **Journal of Applied Physics**, vol 102, no. 11, pp. art. 114114.
- Kemell, M, Pore, V, Tupala, J, Ritala, M, Leskelä, M **2007**, 'Atomic Layer Deposition of Nanostructured TiO2 Photocatalysts via Template Approach', **Chemistry of Materials**, vol 19, no. 7, pp. 1816-1820.
- Kemell, M, Ritala, M, Leskelä, M, Ossei-Wusu, E, Carstensen, J, Föll, H **2007**, 'Si/Al2O3/ZnO : Al capacitor arrays formed in electrochemically etched porous Si by atomic layer deposition', **Microelectronic Engineering**, vol 84, no. 2, pp. 313-318.
- Korpi, H, Figiel, PJ, Lankinen, E, Ryan, P, Leskelä, M, Repo, T **2007**, 'On in situ prepared Cu-Phenanthroline complexes in aqueous alkaline solutions and their use in the catalytic oxidation of veratryl alcohol', **European Journal of Inorganic Chemistry**, no. 17, pp. 2465-2471.
- Kossev, I, Reckien, W, Kirchner, B, Felder, T, Nieger, M, Schalley, CA, Vögtle, F, Sokolowski, M **2007**, 'Highly ordered 2D hydrogen-bonded structures of a tetralactam macrocycle on the Au(111) surface', **Advanced Functional Materials**, vol 17, pp. 513-519.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Krick, A, Kehraus, S, Gerhauer, C, Klimo, K, Nieger, M, Maier, A, Fiebig, H, Atodiressei, I, Raabe, G, Fleischhauer, J, Koenig, GM 2007, 'Potential cancer chemopreventive in vitro activities of monomeric xanthone derivatives from the marine algiculous fungus *Monodictys putredinis*', **Journal of Natural Products**, vol 70, pp. 353-360.
- Kukli, K, Niinistö, J, Tamm, A, Lu, J, Ritala, M, Leskelä, M, Putkonen, M, Niinistö, L, Song, F, Williams, P, Heys, PN 2007, 'Atomic Layer Deposition of ZrO₂ and HfO₂ on Deep Trenched and Planar Silicon', **Microelectronic Engineering**, vol 84, no. 9-10, pp. 2010-2013.
- Kukli, K, Hatanpää, T, Ritala, M, Leskelä, M 2007, 'Atomic layer deposition of gadolinium oxide films', **Chemical Vapor Deposition**, vol 13, no. 10, pp. 546-552.
- Kukli, K, Ritala, M, Leskelä, M, Sundqvist, J, Oberbeck, L, Heitmann, J, Schröder, U, Aarik, J, Aidla, A 2007, 'Influence of TiO₂ incorporation in HfO₂ and Al₂O₃ based capacitor dielectrics', **Thin Solid Films**, vol 515, no. 16, pp. 6447-6451.
- Kurten, T, Torpo, L, Sundberg, MR, Kerminen, V, Vehkamäki, H, Kulmala, M 2007, 'Estimating the NH₃:H₂SO₄ ratio of nucleating clusters in atmospheric conditions using quantum chemical methods', **Atmospheric Chemistry and Physics**, vol 7, no. 10, pp. 2765-2773.
- Kurten, T, Torpo, L, Ding, C, Vehkamäki, H, Sundberg, MR, Laasonen, K, Kulmala, M 2007, 'A density functional study on water-sulfuric acid-ammonia clusters and implications for atmospheric cluster formation', **Journal of Geophysical Research**, vol 112, pp. D04210.
- Lahcini, M, Räisänen, MT, Castro, PM, Klinga, M, Leskelä, M 2007, 'Tetrakis(phenylethynyl)tin(IV)', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, no. 11, pp. M2762.
- Lahtinen, P, Ahmad, JU, Lankinen, E, Pihko, P, Leskelä, M, Repo, T 2007, 'Organocatalyzed oxidation of alcohols to aldehydes with molecular oxygen', **Journal of Molecular Catalysis A: Chemical**, vol 275, no. 1-2, pp. 228-232.
- Lilienkamp, A, Heikkinen, S, Mutikainen, I, Wähälä, K 2007, 'Synthesis of isomeric enamine derivatives of fused cycloalkeno thieno[2,3-d]pyrimidin-4(3H)-ones: Stereoelectronic effect on the regioselectivity', **Synthesis (Stuttgart)**, vol 2007, no. 17, pp. 2699-2705.
- Lu, Z, Gamez, P, Mutikainen, I, Turpeinen, U, Reedijk, J 2007, 'Supramolecular assemblies generated from both lone-pair...pi and C-H...pi binding interactions', **Crystal Growth & Design**, vol 7, no. 9, pp. 1669-1671.
- Luostarinen, M, Nissinen, M, Nieger, M, Shivanyuk, A, Rissanen, K 2007, 'Regioselective acylation of aminoresorcinarenes', **Tetrahedron**, vol 63, pp. 1254-1263.
- Maheswari, PU, Lappalainen, K, Sfrögola, M, Barends, S, Gamez, P, Turpeinen, U, Mutikainen, I, van Wezel, GP, Reedijk, J 2007, 'Structure and DNA cleavage properties of two copper(II) complexes of the pyridine-pyrazole-containing ligands mbpzbpy and Hmpzbpya', **Journal of the Chemical Society. Dalton Transactions**, vol 2007, no. 33, pp. 3676-3683.
- Malkowsky, IM, Nieger, M, Kataeva, O, Waldvogel, SR 2007, 'Synthesis and properties of optically pure phenols derived from (+)-dehydroabietylamine', **Synthesis (Stuttgart)**, no. 5, pp. 773-778.
- Mutikainen, I, Kiriazis, A, Leikoski, T, Yli-Kauhaluoma, J 2007, '2-Ethyl-1,3-dioxo-2,3,3a,4,7,7a-hexahydro-1H-isoindole-4-carboxylic acid', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, no. 7, pp. O3240.
- Niinistö, J, Putkonen, M, Niinistö, L, Song, F, Williams, P, Heys, PN, Odedra, R 2007, 'Atomic layer deposition of HfO₂ thin films exploiting novel cyclopentadienyl precursors at high temperatures', **Chemistry of Materials**, vol 19, no. 13, pp. 3319-3324.
- Niskanen, A, Arstila, K, Leskelä, M, Ritala, M 2007, 'Radical enhanced atomic layer deposition of titanium dioxide', **Chemical Vapor Deposition**, vol 13, no. 4, pp. 152-157.
- Niskanen, A, Kreissig, U, Leskelä, M, Ritala, M 2007, 'Radical enhanced atomic layer deposition of tantalum oxide', **Chemistry of Materials**, vol 19, no. 9, pp. 2316-2320.
- Niskanen, A, Hatanpää, T, Arstila, K, Leskelä, M, Ritala, M 2007, 'Radical-enhanced atomic layer deposition of silver thin films using phosphine-adsorbed silver carboxylates', **Chemical Vapor Deposition**, vol 13, no. 8, pp. 408-413.
- Overländer, C, Tirrèe, JJ, Nieger, M, Niecke, E, Moser, C, Spirk, S, Pietschnig, R 2007, 'Preparation and molecular structure of 2,6-dimesitylphenyldichlorophosphane', **Applied Organometallic Chemistry**, vol 21, no. 1, pp. 46-48.
- Picazo, O, Alkorta, I, Elguero, J, Sundberg, MR, Valo, J 2007, 'Bonding properties related with Chiral discrimination in dinuclear metal complexes of group 10', **European Journal of Inorganic Chemistry**, vol 2007, pp. 324-332.
- Pietsch, M, Nieger, M, Gutschow, M 2007, 'N-Benzyltetrahydropyridone-anellated thiphenes derivatives: new anticholinesterases', **Acta Crystallographica. Section C: Crystal Structure Communications**, vol 63, pp. 147-151.
- Pilvi, T, Arstila, K, Leskelä, M, Ritala, M 2007, 'Novel ALD Process for Depositing CaF₂ Thin Films', **Chemistry of Materials**, vol 19, no. 14, pp. 3387-3392.
- Pilvi, T, Hatanpää, T, Puukilainen, E, Arstila, K, Bischoff, M, Kaiser, U, Kaiser, N, Leskelä, M, Ritala, M 2007, 'Study of a novel ALD process for depositing MgF₂ thin films', **Journal of Materials Chemistry**, vol 17, pp. 5077-5083.
- Polamo, M, Laine, TV 2007, 'Crystal structure of dichlorobis[2-(diphenylphosphino)pyridine]nickel(II) NiCl₂[(CH)(CHN)P]₂', **Zeitschrift für Kristallographie**, vol 222, pp. 13-14.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Pore, V, Ritala, M, Leskelä, M, Areva, S, Järn, M, Järnström, J 2007, 'H₂S Modified Atomic Layer Deposition Process for Photocatalytic TiO₂ Thin Films', **Journal of Materials Chemistry**, vol 17, pp. 1361-1371.
- Pore, V, Ritala, M, Leskelä, M 2007, 'Atomic layer deposition of titanium disulfide thin films', **Chemical Vapor Deposition**, vol 13, no. 4, pp. 163-168.
- Pärssinen, A, Luhtanen, T, Klinga, M, Pakkanen, T, Leskelä, M, Repo, T 2007, 'Alkylphenyl-substituted Bis(salicylaldiminato) titanium catalysts in ethene polymerization', **Organometallics**, vol 26, no. 15, pp. 3690-3698.
- Raisänen, MT, Elo, P, Kettunen, M, Klinga, M, Leskela, M, Repo, T 2007, 'Practical method for 2-hydroxyphenylketimine synthesis', **Synthetic Communications**, vol 37, no. 11, pp. 1765-1777.
- Ras, RHA, Kemell, M, Wit, JD, Ritala, M, Brinke, GT, Leskelä, M, Ikkala, O 2007, 'Hollow inorganic nanospheres and nanotubes with tunable wall thicknesses by atomic layer deposition on self-assembled polymeric templates', **Advanced Materials**, vol 19, pp. 102-106.
- Raula, J, Kuivaneen, A, Lähde, A, Jiang, H, Antopolsky, M, Kansikas, J, Kauppinen, EI 2007, 'Synthesis of L-leucine nanoparticles via physical vapor deposition at varying saturation conditions', **Journal of Aerosol Science**, vol 38, no. 12, pp. 1172-1184.
- Rodríguez-Dieguez, A, Cano, J, Kivekäs, R, Debdoubi, A, Colacio, E 2007, 'Self-assembled cationic heterochiral honeycomb-layered metal complexes with the in situ generated pyrimidine-2-carboxylato bisdidentate ligand. Hydrothermal synthesis, crystal structures, magnetic properties, and theoretical study of [M-2(mu-pymca)(3)]OH center dot H₂O (M = Fe-II, Co-II)', **Inorganic Chemistry**, vol 46, no. 7, pp. 2503-2510.
- Rodríguez-Dieguez, A, Kivekäs, R, Sakiyama, H, Debdoubi, A, Colacio, E 2007, 'A novel 3D cyano-bridged mixed-valence Co-II/Co-III canted antiferromagnet constructed from defective cubanes. Synthesis, X-ray structure and magnetic properties', **Dalton Transactions**, vol 2007, no. 21, pp. 2145-2149.
- Räisänen, MT, Klinga, M, Leskelä, M, Repo, T 2007, '(2S)-Methyl 1-[(2R)-3-(benzylsulfanyl)-2-(tert-butoxycarbonylamino)propanoyl]pyrrolidine-2-carboxylate', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. o2095-o2096.
- Räisänen, MT, Klinga, M, Leskelä, M, Repo, T 2007, '(Methyl (S)-3-(imidazol-4-yl)-2-[6-[(S)-2-(imidazol-4-yl)-1-(methoxycarbonyl)ethylaminocarbonyl]pyridine-2-carboxylamino]propionato)copper(II) methanol sesquisolvate', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. M3021.
- Räisänen, MT, Leskelä, M, Repo, T 2007, '5-Dodecyloxy-2-(phenethyliminomethyl)phenol', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. o1816-o1817.
- Räisänen, MT, Kemell, M, Leskelä, M, Repo, T 2007, 'Oxidation of elemental gold in alcohol solutions', **Inorganic Chemistry**, vol 46, no. 8, pp. 3251-3256.
- Räisänen, MT, Mögele, F, Feodorow, S, Rieger, B, Ziener, U, Leskelä, M, Repo, T 2007, 'Alkyl chain length defines 2D architecture of salophen complexes on liquid-graphite interface', **European Journal of Inorganic Chemistry**, no. 25, pp. 4028-4034.
- Räisänen, MT, Runeberg, N, Klinga, M, Nieger, M, Bolte, M, Pyykkö, P, Leskelä, M, Repo, T 2007, 'Coordination of pyridinethiols in gold(I) complexes', **Inorganic Chemistry**, vol 46, no. 23, pp. 9954-9960.
- Räisänen, MT, Klinga, M, Leskelä, M, Repo, T 2007, '2-Carboxyquinolinium chloride monohydrate', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. o1926-o1927.
- Shaimeev, S, Gritsenko, V, Kukli, K, Wong, H, Lee, E, Kim, C 2007, 'Single band electronic conduction in hafnium oxide prepared by atomic layer deposition', **Microelectronics Reliability**, vol 47, no. 1, pp. 36-40.
- Song, Y, van Albada, GA, Tang, J, Mutikainen, I, Turpeinen, U, Massera, C, Roubeau, O, Costa, JS, Gamez, P, Reedijk, J 2007, 'Controlled copper-mediated chlorination of phenol rings under mild conditions', **Inorganic Chemistry**, vol 46, no. 12, pp. 4944-4950.
- Sood, A, Räisänen, MT, Ahlgren, M, Leskelä, M, Repo, T 2007, '2,6-Diisopropyl-N-[(Z)-quinolin-2-ylmethylidene]aniline', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, no. 10, pp. o4083.
- Sundberg, MR, Sanchez-Gonzalez, A 2007, 'Hydrogen storage in ammonia trborane: Properties and behavior of the chemical bonds', **Inorganic Chemistry Communications**, vol 10, no. 10, pp. 1229-1232.
- Sundberg, MR, Ugglä, R, Vinas, C, Teixidor, F, Paavola, S, Kivekäs, R 2007, 'Nature of intramolecular interactions in hypercoordinate C-substituted 1,2-dicarba-closo-dodecaboranes with short P...P distance', **Inorganic Chemistry Communications**, vol 10, pp. 713-716.
- Taccardi, N, Paolillo, R, Gallo, V, Mastrorilli, P, Nobile, CF, Raisanen, M, Repo, T 2007, 'On the mechanism of palladium-catalyzed cross-coupling of diazonium salts with aryltrifluoroborates: A combined ESI-MS/NMR study', **European Journal of Inorganic Chemistry**, vol 13, pp. 4645-4652.
- Tamayo, A, Pedras, B, Lodeiro, C, Escriche, L, Casabo, J, Capelo, JL, Covelo, B, Kivekäs, R, Sillanpää, R 2007, 'Exploring the interaction of Mercury(II) by N2S2 and NS3 anthracene-containing macrocyclic ligands: Photophysical, analytical, and structural studies', **Inorganic Chemistry**, vol 46, no. 19, pp. 7818-7826.
- Tang, J, Costa, JS, Aromi, G, Mutikainen, I, Turpeinen, U, Gamez, P, Reedijk, J 2007, 'Supramolecular click assembly of a fused double-stranded [Mn-3(II)] dihelicate', **European Journal of Inorganic Chemistry**, vol 2007, no. 26, pp. 4119-4122.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Teixidor, F, Barbera, G, Kivekäs, R, Sillanpää, R, Vinas, C **2007**, "Water-stable boron-iodinated dicarbollide dianions [7,8-nido-C₂H₂B₉I₉](2-) and [7,8-nido-C₂H₂B₉I₈H](2-)", **Dalton Transactions**, no. 17, pp. 1668-1670.
- Tiala, I, Suomela, S, Huuhtanen, J, Wakkinen, J, Hölttä-Vuori, M, Kainu, K, Ranta, S, Turpeinen, U, Haemaelaäinen, E, Jiao, H, Karvonen, S, Ikonen, E, Kere, J, Saarialho-Kere, U, Elomaa, O **2007**, 'The CCHCR1 (HCR) gene is relevant for skin steroidogenesis and downregulated in cultured psoriatic keratinocytes', **Journal of Molecular Medicine**, vol 85, no. 6, pp. 589-601.
- Torpo, L, Kurten, T, Vehkamäki, H, Laasonen, K, Sundberg, MR, Kulmala, M **2007**, 'Significance of ammonia in growth of atmospheric nanoclusters', **Journal of Physical Chemistry A**, vol 111, no. 42, pp. 10671-10674.
- Toräng, J, Vanderheiden, S, Nieger, M, Bräse, S **2007**, 'Synthesis of 3-alkylcoumarins from salicylaldehydes and β -unsaturated aldehydes utilizing nucleophilic carbenes: a new umpoled Domino reaction', **European Journal of Organic Chemistry**, no. 6, pp. 943-952.
- Tu, T, Assenmacher, W, Peterlik, H, Weisbarth, R, Nieger, M, Doetz, KH **2007**, 'An air-stable organometallic low-molecular-mass gelator: Synthesis, aggregation, and catalytic application of a palladium pincer complex', **Angewandte Chemie (International Edition)**, vol 46, pp. 6368-6371.
- Über, JS, Vogels, Y, van den Helder, D, Mutikainen, I, Turpeinen, U, Fu, WT, Roubeau, O, Gamez, P, Reedijk, J **2007**, 'Pyrazole-based ligands for the [copper-TEMPO]-mediated oxidation of benzyl alcohol to benzaldehyde and structures of the Cu coordination compounds', **European Journal of Inorganic Chemistry**, vol 2007, no. 26, pp. 4197-4206.
- Über, JS, Mutikainen, I, Turpeinen, U, Gamez, P, Reedijk, J **2007**, 'Formation of a silver(I) coordination compound, with a pyrazole-pyridine ligand, whose crystal lattice is composed of three different types of 1D chains', **Inorganic Chemistry Communications**, vol 10, no. 12, pp. 1478-1481.
- Vehkamäki, M, Hatanpää, T, Ritala, M, Leskelä, M, Väyrynen, S, Rauhala, E **2007**, 'Atomic layer deposition of BaTiO₃ thin films - effect of barium hydroxide formation', **Chemical Vapor Deposition**, vol 13, no. 5, pp. 239-246.
- Yliheikkilä, K, Axenov, K, Räisänen, MT, Klinga, M, Lankinen, MP, Kettunen, M, Leskelä, M, Repo, T **2007**, 'Manganese (II) complexes in ethene polymerization', **Organometallics**, vol 26, pp. 980-987.
- Youngme, S, Wannarit, N, Pakawatchai, C, Chaichit, N, Somsook, E, Turpeinen, U, Mutikainen, I **2007**, 'Structural diversities and spectroscopic properties of bis and tris(1,10-phenanthroline)copper(II) complexes', **Polyhedron**, vol 26, no. 7, pp. 1459-1468.
- Youngme, S, Phuengphai, P, Chaichit, N, Mutikainen, I, Turpeinen, U, Murphy, BM **2007**, 'Crystal structures and electronic properties of three fluxional [Cu(di-2-pyridylamine)(2)(OXO)]Y complexes', **Journal of Coordination Chemistry**, vol 60, no. 2, pp. 131-142.
- van Albada, GA, van der Horst, MG, Mutikainen, I, Turpeinen, U, Reedijk, J **2007**, 'An alternating chain consisting of dinuclear Cu(II) ions bridged by bonded end-on bis(mu-dicyanamido-kappa(N1,N5)) ligands and hydrogen-bonded pairs of bis(pyrimidin-2-yl)amines, with unusually long Cu center dot center dot center dot Cu distances of 7.20 and 9.99 angstrom: Synthesis, structure and magnetic properties of [Cu(dipm)(mu-dca)(H₂O)(ClO₄)](2)center dot 2EtOH', **Inorganic Chemistry Communications**, vol 10, no. 9, pp. 1014-1018.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2007**, 'An unusual Cu(II) polymeric compound with tridentate dehydrated and bidentate neutral ligand bis(pyrimidin-2-yl)amine (=Hdipm) and uncoordinated Hdipm in a complicated H-bonding system. Synthesis, characterization and X-ray structure of {[Cu(dipm)(Hdipm)](Hdipm)(CF₃SO₃)(C₂H₅OH)(H₂O)}(n)', **Journal of Molecular Structure**, vol 837, no. 1-3, pp. 43-47.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2007**, 'Distortion isomerism of Cu(II) chloride adducts with bis(2-benzimidazolyl)ethane. Synthesis, characterization, X-ray structures and spectroscopy of four different isomers', **Journal of Chemical Crystallography**, vol 37, no. 7, pp. 489-496.
- van Albada, GA, Dominicus, I, Mutikainen, I, Turpeinen, U, Reedijk, J **2007**, 'Synthesis, X-ray crystal structures, spectroscopic properties and magnetism of copper(II) compounds of formula trans-Cu(LL)(2)(anion)(2), with N-(pyridin-2-yl)acetamide and N-(pyrimidin-2-yl)acetamide as ligands: Unexpected absence of hydrogen bonding to the non-coordinating nitrogen atom of the ligand', **Polyhedron**, vol 26, no. 14, pp. 3731-3736.
- van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2007**, 'Crystal structure, spectroscopy and magnetism of a dinuclear strongly antiferromagnetically coupled N-oxido-bridged Cu(II) compound with 2,2'-bipyridine-1,1'-dioxide (bpdo) as a ligand; [Cu-2(bpdo)(2)Br-4]', **Polyhedron**, vol 26, no. 12, pp. 2728-2732.
- Özbolat, A, Khan, AA, Frantzius, GV, Nieger, M, Streubel, R **2007**, 'Dehydroiodination of iodo- and diiodomethane by a transient phosphidene complex', **Angewandte Chemie (International Edition)**, vol 46, pp. 2104-2107.
- Özbolat, A, Frantzius, GV, Marinas, P, Nieger, M, Streubel, R **2007**, 'Strong Evidence for a transient phosphinidenoid complex', **Angewandte Chemie (International Edition)**, vol 46, pp. 9327-9330.
- Özbolat, A, Frantzius, GV, Ionescu, E, Schneider, S, Nieger, M, Jones, PG, Streubel, R **2007**, 'Attempted synthesis of 1-Aza-3[lambda]phospha-1-allenide complexes: structure and reactions of an unusual phosphanide complex', **Organometallics**, vol 26, pp. 4021-4024.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

2008

- Abu-Surrah, AS, Kettunen, M, Leskelä, M, Al-Abed, Y **2008**, 'Platinum and palladium complexes bearing new (1R,2R)-(-)-1,2-Diaminocyclohexane (DACH)-based nitrogen ligands: evaluation of the complexes against L1210 leukemia', **Zeitschrift für anorganische und allgemeine Chemie**, vol 634, pp. 2655-2658.
- Aitola, E, Hakala, K, Byman-Fagerholm, H, Leskelä, M, Repo, T **2008**, 'High molar mass ethene/1-olefin copolymers synthesized with acenaphthyl substituted metallocene catalysts', **Journal of Polymer Science. Part A, Polymer Chemistry**, vol 46, pp. 373-382.
- Ay, S, Nieger, M, Bräse, S **2008**, 'Co-metal-free enantioselective conjugate addition reactions of zinc reagents', **Chemistry: A European Journal**, vol 14, pp. 11539-11556.
- Barbera, G, Vaca, A, Teixidor, F, Sillanpää, R, Kivekäs, R, Vinas, C **2008**, 'Designed synthesis of new ortho-carborane derivatives: from mono- to polysubstituted frameworks', **Inorganic Chemistry**, vol 47, no. 16, pp. 7309-7316.
- Benko, Z, Burk, S, Gudat, D, Nieger, M, Nyulaszi, L, Shore, N **2008**, 'Pyrido-annellated diazaphosphenes and phospholenium ions', **Dalton Transactions**, pp. 4937-4945.
- Bould, J, Laromaine, A, Bullen, NJ, Vinas, C, Thornton-Pett, M, Sillanpää, R, Kivekäs, R, Kennedy, JD, Teixidor, F **2008**, 'Borane reaction chemistry. Alkyne insertion reactions into boron-containing clusters. Products from the thermolysis of [6,9-(2-HC C-C5H4N)(2)-arachno-B10H12]', **Dalton Transactions**, no. 12, pp. 1552-1563.
- Burck, S, Gudat, D, Nieger, M, Vindus, D **2008**, 'Increasing the lability of polarised phosphorus-phosphorus bonds', **European Journal of Inorganic Chemistry**, pp. 704-707.
- Burk, S, Gudat, D, Nieger, M, Schalley, CA, Weiland, T **2008**, 'Phosphazene vs. diazaphospholene PN-bond cleavage in spirocyclic cyclophosphazenes', **Dalton Transactions**, no. 26, pp. 3478-3485.
- Castro, AG, Costa, JS, Pievo, R, Massera, C, Mutikainen, I, Turpeinen, U, Gamez, P, Reedijk, J **2008**, 'A New Sulfur-containing Schiff-Base Ligand and Binding to Copper(II) and Cobalt(II)', **Zeitschrift für anorganische und allgemeine Chemie**, vol 634, no. 14, pp. 2477-2482.
- Chikkali, S, Magens, S, Gudat, D, Nieger, M, Hartenbach, I, Schleid, T **2008**, 'A phosphanyl-substituted benzo-1,3,2-dioxaborol as ambiphilic bifunctional Lewis Donor-acceptor unit', **European Journal of Inorganic Chemistry**, vol 2008, pp. 2207-2213.
- De Pilli, T, Jouppila, K, Ikonen, J, Kansikas, J, Derossi, A, Severini, C **2008**, 'Study on formation of starch-lipid complexes during extrusion-cooking of almond flour', **Journal of Food Engineering**, vol 87, no. 4, pp. 495-504.
- Dezelah, CL, Niinistö, J, Kukli, K, Munnik, F, Lu, J, Ritala, M, Leskelä, M, Niinistö, L **2008**, 'The atomic layer deposition of HfO₂ and ZrO₂ using advanced metallocene precursors and H₂O as the oxygen source', **Chemical Vapor Deposition**, vol 14, no. 11-12, pp. 358-365.
- Dueñas, S, Castán, H, García, H, Bailón, L, Kukli, K, Lu, J, Ritala, M, Leskelä, M **2008**, 'Selection of post-growth treatment parameters for atomic layer deposition of structurally disordered TiO₂ thin films', **Journal of Non-Crystalline Solids**, vol 354, no. 2-9, pp. 404-408.
- Dueñas, S, Castán, H, García, H, Gómez, A, Bailón, L, Kukli, K, Aarik, J, Ritala, M, Leskelä, M **2008**, 'Comparative study of flatband voltage transients of high-k dielectric-based metal-insulator-semiconductor capacitors', **Journal of the Electrochemical Society**, vol 155, no. 11, pp. G241-G246.
- Farras, P, Teixidor, F, Kivekäs, R, Sillanpää, R, Vinas, C, Gruner, B, Cisarova, I **2008**, 'Metallacarboranes as Building Blocks for Polymeric Polyarmed Aryl-Ether Materials', **Inorganic Chemistry**, vol 47, no. 20, pp. 9497-9508.
- Färm, E, Kemell, M, Ritala, M, Leskelä, M **2008**, 'Selective-area atomic layer deposition with microcontact printed self-assembled octadecyltrichlorosilane monolayers as mask layers', **Thin Solid Films**, vol 517, no. 2, pp. 972-975.
- Färm, E, Kemell, M, Ritala, M, Leskelä, M **2008**, 'Selective-area atomic layer deposition using poly(methyl methacrylate) films as mask', **Journal of Physical Chemistry C**, vol 112, no. 40, pp. 15791-15795.
- Gansäuer, A, Winkler, I, Worgull, D, Franke, D, Lauterbach, T, Okkel, A, Nieger, M **2008**, 'Modular synthesis of functional titanocenes', **Organometallics**, vol 27, pp. 5699-5707.
- García, H, Duenas, S, Castan, H, Bailon, L, Kukli, K, Aarik, J, Ritala, M, Leskelä, M **2008**, 'Identification of spatial localization and energetic position of electrically active defects in amorphous high-k dielectrics for advanced devices', **Journal of Non-Crystalline Solids**, vol 354, pp. 393-398.
- Gonzalez-Campo, A, Juarez-Perez, EJ, Vinas, C, Boury, B, Sillanpää, R, Kivekäs, R, Nunez, R **2008**, 'Carboranyl Substituted Siloxanes and Octasilsesquioxanes: Synthesis, Characterization, and Reactivity', **Macromolecules**, vol 41, no. 22, pp. 8458-8466.
- Grafov, A, Vuorinen, S, Repo, T, Kemell, M, Nieger, M, Leskelä, M **2008**, 'New Sn(IV) and Ti(IV) bis(trimethylsilyl)amides in D,L-lactide polymerization, SEM characterization of polymers', **European Polymer Journal**, vol 44, pp. 3797-3805.
- Götz, RJ, Robertazzi, A, Mutikainen, I, Turpeinen, U, Gamez, P, Reedijk, J **2008**, 'Concurrent anion center dot center dot center dot pi interactions between a perchlorate ion and two pi-acidic aromatic rings, namely pentafluorophenol and 1,3,5-triazine', **Journal of the Chemical Society. Chemical communications**, vol 2008, no. 29, pp. 3384-3386.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Hyvönen, H, Lehtinen, P, Aksela, R **2008**, 'Complexation of N-bis[2-(1,2-dicarboxyethoxy)ethyl]aspartic acid with Cd(II), Hg(II) and Pb(II) ions in aqueous solution', **Journal of Coordination Chemistry**, vol 61, no. 6, pp. 984-996.
- Hyvönen, H, Aksela, R **2008**, 'Complexation of [S,S,S]- and [R,S,R]-isomers of n-bis[2-(1,2-dicarboxyethoxy)ethyl] aspartic acid with Mg(II), Ca(II), Mn(II), Fe(III), Cu(II) and Zn(II) ions in aqueous solution', **Journal of Coordination Chemistry**, vol 61, no. 16, pp. 2515-2527.
- Hämäläinen, J, Munnik, F, Ritala, M, Leskelä, M **2008**, 'Atomic layer deposition of platinum oxide and metallic platinum thin films from Pt(acac)₃ and ozone', **Chemistry of Materials**, vol 20, no. 21, pp. 6840-6846.
- Hämäläinen, J, Kemell, M, Munnik, F, Kreissig, U, Ritala, M, Leskelä, M **2008**, 'Atomic layer deposition of iridium oxide thin films from Ir(acac)₃ and ozone', **Chemistry of Materials**, vol 20, pp. 2903-2907.
- Jainta, M, Nieger, M, Bräse, S **2008**, 'Microwave-assisted stereoselective one-pot synthesis of symmetrical and unsymmetrical 2,5-diketopiperazines from unprotected amino acids', **European Journal of Organic Chemistry**, vol 2008, pp. 5418-5424.
- Jogi, I, Pärs, M, Aarik, J, Aidla, A, Laan, M, Sundqvist, J, Oberbeck, L, Heitmann, J, Kukli, K **2008**, 'Conformity and structure of titanium oxide films grown by atomic layer deposition on silicon substrates', **Thin Solid Films**, vol 516, no. 15, pp. 4855-4862.
- Juarez-Perez, EJ, Vinas, C, Gonzalez-Campo, A, Teixidor, F, Sillanpää, R, Kivekäs, R, Nunez, R **2008**, 'Controlled direct synthesis of C-Mono- and C-disubstituted derivatives of [3,3'-Co(1,2-C₂B₉H₁₁)(2)](-) with organosilane groups: Theoretical calculations compared with experimental results', **Chemistry: A European Journal**, vol 14, no. 16, pp. 4924-4938.
- Järn, M, Heikkilä, M, Linden, M **2008**, 'Bioinspired synthesis of superhydrophobic coatings', **Langmuir**, vol 24, pp. 10625-10628.
- Kaila, RK, Gutierrez, A, Sloor, R, Kemell, M, Leskelä, M, Krause, AOI **2008**, 'Zirconia-supported bimetallic RhPt catalysts: characterization and testing in autothermal reforming of simulated gasoline', **Applied Catalysis B: Environmental**, vol 84, pp. 223-232.
- Kawakami, H, Ilola, R, Straka, L, Papula, S, Romu, J, Hänninen, H, Mahlberg, R, Heikkilä, M **2008**, 'Photocatalytic activity of atomic layer deposited TiO₂ coatings on austenitic stainless steels and copper alloys', **Journal of the Electrochemical Society**, vol 155, no. 2, pp. C62-C68.
- Kemell, M, Färm, E, Ritala, M, Leskelä, M **2008**, 'Surface modification of thermoplastics by atomic deposition of Al₂O₃ and TiO₂ thin films', **European Polymer Journal**, vol 44, no. 11, pp. 3564-3570.
- Kemell, M, Ritala, M, Leskelä, M, Groenen, R, Lindfors, S **2008**, 'Coating of highly porous fiber matrices by atomic layer deposition', **Chemical Vapor Deposition**, vol 14, pp. 347-352.
- Knapas, K, Ritala, M **2008**, 'In situ reaction mechanism studies on atomic layer deposition of ZrO₂ from (CpMe)₂Zr(OMe)Me and water or ozone', **Chemistry of Materials**, vol 20, no. 17, pp. 5698-5705.
- Latronico, M, Polini, F, Gallo, V, Mastrolilli, P, Calmuschi-Cula, B, Englert, U, Re, N, Repo, T, Raisanen, M **2008**, 'Site Selectivity in the Protonation of a Phosphinito Bridged Pt-I-Pt-I Complex: a Combined NMR and Density-Functional Theory Mechanistic Study', **Inorganic Chemistry**, vol 47, pp. 9779-9796.
- Lu, Z, Costa, JS, Roubeau, O, Mutikainen, I, Turpeinen, U, Teat, SJ, Gamez, P, Reedijk, J **2008**, 'A copper complex bearing a TEMPO moiety as catalyst for the aerobic oxidation of primary alcohols', **Journal of the Chemical Society. Dalton Transactions**, no. 27, pp. 3567-3573.
- Marchetti, F, Pampaloni, G, Repo, T **2008**, 'The polymerization of tetrahydrofuran initiated by niobium(V) and tantalum(V) halides', **European Journal of Inorganic Chemistry**, vol 12, pp. 2107-2112.
- Muniz, K, Hövelmann, CH, Campos-Gomez, E, Barluenga, J, Gonzalez, JM, Streuff, J, Nieger, M **2008**, 'Intramolecular diamination of alkenes with palladium(II)/copper(II) bromide and IPyBF₄: the role of halogenated intermediates', **Chemistry, an Asian journal**, no. 3, pp. 776-788.
- Niinistö, J, Kukli, K, Tamm, A, Putkonen, M, Dezelah, CL, Ritala, M, Leskelä, M **2008**, 'Advanced cyclopentadienyl precursors for atomic layer deposition of ZrO₂ thin films', **Journal of Materials Chemistry**, vol 18, no. 28, pp. 3385-3390.
- Niinistö, J, Kukli, K, Kariniemi, M, Ritala, M, Leskelä, M, Blasco, N, Pinchart, A, Lachaud, C, Laaroussi, N, Wang, Z, Dussarrat, C **2008**, 'Novel mixed alkylamido-cyclopentadienyl precursors for ALD of ZrO₂ thin films', **Journal of Materials Chemistry**, vol 18, no. 43, pp. 5243-5247.
- Nunez, R, Teixidor, F, Kivekäs, R, Sillanpää, R, Vinas, C **2008**, 'Influence of the solvent and R groups on the structure of (carboranyl) R₂Pi₂ compounds in solution. Crystal structure of the first iodophosphonium salt incorporating the anion [7,8-nido-C₂B₉H₁₀]⁻', **Journal of the Chemical Society. Dalton Transactions**, vol 2008, no. 11, pp. 1471-1480.
- Ottersbach, PA, Bolek, D, Lepicova, E, Nieger, M, Gutschow, M **2008**, 'Darzens reaction of 2-bromo-4,6-dimethoxy-3(2H)-benzofuranone with aromatic aldehydes to form flavonoids', **Journal of Heterocyclic Chemistry**, vol 45, pp. 1149-1153.
- Pietsch, M, Häcker, H, Schnakenburg, G, Hoffbauer, W, Nieger, M, Gutschow, M **2008**, 'Structural characterization of two salts derived from tetrafluorophthalic acid and isopropylamine', **Journal of Molecular Structure**, vol 878, pp. 131-138.
- Pilvi, T, Ritala, M, Leskelä, M, Bischoff, M, Kaiser, U, Kaiser, N **2008**, 'Atomic layer deposition process with TiF₄ as a precursor for depositing metal fluoride thin films', **Applied Optics**, vol 47, no. 13, pp. C271-C274.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Pilvi, T, Puukilainen, E, Arstila, K, Leskelä, M, Ritala, M **2008**, 'Atomic layer deposition of LaF₃ thin films using La(thd)₃ and TiF₄ as precursors', **Chemical Vapor Deposition**, vol 14, no. 3-4, pp. 85-91.
- Pilvi, T, Puukilainen, E, Kreissig, U, Leskelä, M, Ritala, M **2008**, 'Atomic layer deposition of MgF₂ thin films using TaF₅ as a novel fluorine source', **Chemistry of Materials**, vol 20, no. 15, pp. 5023-5028.
- Ponec, R, Lendvay, G, Sundberg, MR **2008**, 'Structure and Bonding in Binuclear Metal Carbonyls from the Analysis of Domain Averaged Fermi Holes. 2. Fe(CO)₂ and Fe(CO)', **Journal of Physical Chemistry A**, vol 112, no. 40, pp. 9936-9945.
- Pore, V, Kivela, T, Ritala, M, Leskelä, M **2008**, 'Atomic layer deposition of photocatalytic TiO₂ thin films from TiF₄ and H₂O', **Dalton Transactions**, vol 45, pp. 6467-6474.
- Rang, A, Engeser, M, Maier, NM, Nieger, M, Lindner, W, Schalley, CA **2008**, 'Synthesis of Axially Chiral 4,4'-Bipyridines and Their Remarkably Selective Self-Assembly into Chiral Metallo-Supramolecular Squares', **Chemistry: A European Journal**, vol 14, no. 13, pp. 3855-3859.
- Rang, A, Nieger, M, Engeser, M, Lutzen, A, Schalley, CA **2008**, 'Self-assembling squares with amino acid-decorated bipyridines: heterochiral self-sorting of dynamically interconverting diastereomers', **Chemical Communications**, vol 2008, pp. 4789-4791.
- Raula, J, Thielmann, F, Kansikas, J, Hietala, S, Annala, M, Seppälä, J, Lähde, A, Kauppinen, EI **2008**, 'Investigations on the humidity-induced transformations of salbutamol sulphate particles coated with L-leucine', **Pharmaceutical Research**, vol 25, no. 10, pp. 2250 - 2261.
- Reingruber, R, Vanderheiden, S, Wagner, A, Nieger, M, Muller, T, Es-Sayed, M, Bräse, S **2008**, '1-aryl-3,3-diisopropyltriazenes: an easily accessible and particularly stable class of triazenes towards strong basic and Lewis acid conditions', **European Journal of Organic Chemistry**, vol 2008, pp. 3314-3327.
- Räsänen, MT, de Almeida, P, Meinander, K, Kemell, M, Mutikainen, I, Leskelä, M, Repo, T **2008**, 'Cobalt salen functionalised polycrystalline gold surfaces', **Thin Solid Films**, vol 516, no. 10, pp. 2948-2956.
- Salonen, M, Saarinen, H, Mutikainen, I **2008**, 'Equilibrium and structural studies of copper(II) and nickel(III) complexes with pyridine-2,6-diamidoxime in aqueous solution', **Journal of Coordination Chemistry**, vol 61, no. 9, pp. 1462-1474.
- Schmidt, A, Lindner, AS, Shilabin, AG, Nieger, M **2008**, 'New derivatives and ring systems of annulated pyrrolobenzo[1,4]diazepines', **Tetrahedron**, vol 64, pp. 2048-2056.
- Sumerin, V, Schulz, F, Atsumi, M, Wang, C, Nieger, M, Leskelä, M, Repo, T, Pyykkö, P, Rieger, B **2008**, 'Molecular tweezers for hydrogen: synthesis, characterization, and reactivity', **Journal of the American Chemical Society**, vol 130, no. 43, pp. 14117-14119.
- Sumerin, V, Schulz, F, Nieger, M, Leskelä, M, Repo, T, Rieger, B **2008**, 'Facile heterolytic H-2 activation by amines and B(C₆F₅)(3)', **Angewandte Chemie (International Edition)**, vol 47, pp. 6001-6003.
- Suni, NM, Haapala, M, Mäkinen, A, Sainiemi, L, Franssila, S, Färm, E, Puukilainen, E, Ritala, M, Kostainen, R **2008**, 'Selective surface patterning with an electric discharge in the fabrication of microfluidic structures', **Angewandte Chemie (International Edition)**, vol 47, no. 39, pp. 7442-7445.
- Talja, M, Polamo, M, Leskelä, M **2008**, 'Bis(alkylphenylaminopyridinato) titanium dichlorides as ethylene polymerization catalysts', **Journal of Molecular Catalysis A: Chemical**, vol 280, pp. 102-105.
- Talja, M, Luhtanen, T, Polamo, M, Klinga, M, Pakkanen, TA, Leskelä, M **2008**, 'Synthesis, characterization and ethylene polymerization activity of titanium aminopyridinato complexes', **Inorganica Chimica Acta**, vol 361, pp. 2195-2202.
- Tang, J, Costa, JS, Pevec, A, Kozlevcar, B, Massera, C, Roubeau, O, Mutikainen, I, Turpeinen, U, Gamez, P, Reedijk, J **2008**, 'Influence of coordinating and non-coordinating anions and of a methoxy substituent on the formation of copper-based coordination assemblies', **Crystal Growth & Design**, vol 8, no. 3, pp. 1005-1012.
- Teixidor, F, Laromaine, A, Kivekäs, R, Sillanpää, R, Vinas, C, Vespalec, R, Horakova, H **2008**, 'Synthesis, reactivity and complexation studies of N,S exo-heterodisubstituted o-carborane ligands. Carborane as a platform to produce the uncommon bidentate chelating (pyridine)N-C-C-C(S(H)) motif', **Dalton Transactions**, vol 2008, no. 3, pp. 345-354.
- Torres, J, Veiga, N, Gancheff, JS, Dominguez, S, Mederos, A, Sundberg, M, Sanchez, A, Castiglioni, J, Diaz, A, Kremer, C **2008**, 'Interaction of myo-inositol hexakisphosphate with alkali and alkaline earth metal ions: Spectroscopic, potentiometric and theoretical studies', **Journal of Molecular Structure**, vol 874, no. 1-3, pp. 77-88.
- Tyunina, M, Plekh, M, Levoska, J, Vehkamäki, M, Hatanpää, T, Ritala, M, Leskelä, M **2008**, 'Dielectric properties of atomic layer deposited thin-film barium strontium titanate', **Integrated Ferroelectrics**, vol 102, pp. 29-36.
- Viciano-Chumillas, M, Tanase, S, Mutikainen, I, Turpeinen, U, de Jongh, LJ, Reedijk, J **2008**, 'Mononuclear manganese(III) complexes as building blocks for the design of trinuclear manganese clusters: Study of the ligand influence on the magnetic properties of the [Mn-3(mu(3)-O)](7+) core', **Inorganic Chemistry**, vol 47, pp. 5919-5929.
- Zhang, X, Järn, M, Peltonen, J, Pore, V, Vuorinen, T, Levänen, E, Mäntylä, T **2008**, 'Analysis of roughness parameters to specify superhydrophobic antireflective boehmite films made by the sol-gel process', **European Ceramic Society. Journal**, vol 28, pp. 2177-2181.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Zhang, X, Honkanen, M, Jän, M, Peltonen, J, Pore, V, Levänen, E, Mäntylä, T **2008**, 'Thermal stability of the structural features in the superhydrophobic boehmite films on austenitic stainless steels', **Applied Surface Science**, vol 254, pp. 5129-5133.
- van Albada, GA, Tanase, S, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'A bis(chlorido)-bridged linear-chain Cu(II) compound with 7-azaindole as an axial ligand; synthesis, structure, hydrogen bonding and magnetism', **Inorganica Chimica Acta**, vol 361, no. 5, pp. 1463-1468.
- van Albada, GA, van der Horst, MG, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'Synthesis, crystal structure and spectroscopy of catena-poly-bis(azido-N1,N1)(2-Aminopyrimidine)Copper(II)', **Journal of Chemical Crystallography**, vol 38, pp. 413-417.
- van Albada, GA, van der Horst, MG, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'Two mononuclear compounds with bis(pyrimidin-2-yl)amine as a ligand and as a hydrogen-bonded lattice molecule. Synthesis, structure and spectroscopy of $\{[M(dipm)(H_2O)(A)](dipm)(A)(H_2O)\}$ (M = cd with a = ClO₄; and Zn with a = BF₄)', **Journal of Chemical Crystallography**, vol 38, pp. 519-523.
- van Albada, GA, Nur, S, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'Characterisation and structure determination of two mononuclear Cu(II)(ClO₄)(2) compounds with 2,2'-bipyridine-1,1'-dioxide', **Journal of Molecular Structure**, vol 875, no. 1-3, pp. 91-95.
- van Albada, GA, van der Horst, MG, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'New 3,5-dimethylpyrazole copper(II) compounds with a variety of hydrogen bonds, synthesized by using a dehydrating agent: Synthesis, characterization, structures and intermolecular interactions', **Inorganica Chimica Acta**, vol 361, no. 12-13, pp. 3380-3387.
- van Albada, GA, Nur, S, van der Horst, MG, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'Characterisation and structure of two Cu(II) mononuclear compounds with 7-azaindole as a ligand that display interesting H-bond properties', **Journal of Molecular Structure**, vol 874, no. 1-3, pp. 41-45.
- van Albada, GA, Dominicus, I, Viciano-Chumillas, M, Mutikainen, I, Turpeinen, U, Reedijk, J **2008**, 'A unique chain of trinuclear Cu(11) units containing both neutral and anionic N-(pyrimidin-2-yl) acetamide (Haapm, resp aapm) as a ligand and dicyanamide (dca): Synthesis, characterization, X-ray structure and magnetism of $[Cu-3(\mu-aapm)(2)-(\mu-dca)(2)(Haapm)(2)](CF_3SO_3)(2)$ ', **Polyhedron**, vol 27, no. 2, pp. 617-622.
- van Gorkum, R, Berding, J, Mills, AM, Kooijman, H, Tooke, DM, Spek, AL, Mutikainen, I, Turpeinen, U, Reedijk, J, Bouwman, E **2008**, 'The synthesis, structures and characterisation of new mixed-ligand manganese and iron complexes with tripodal, tetradentate ligands', **European Journal of Inorganic Chemistry**, vol 2008, no. 9, pp. 1487-1496.
- van der Horst, MG, van Albada, GA, Ion, R, Mutikainen, I, Turpeinen, U, Tanase, S, Reedijk, J **2008**, 'Extended networks generated from the interaction of rare-earth(III) ions and pyridine-2-carboxamide-based ligands', **European Journal of Inorganic Chemistry**, vol 2008, no. 13, pp. 2170-2176.
- 2009**
- Adriaanse, JH, Askes, SHC, van Bree, Y, van Oudheusden, S, van den Bos, ED, Gunay, E, Mutikainen, I, Turpeinen, U, van Albada, GA, Haasnoot, JG, Reedijk, J **2009**, 'Coordination chemistry of 5,6,7-trimethyl-[1,2,4]triazolo[1,5-a]pyrimidine with first-row transition-metal salts: Synthesis, spectroscopy and single-crystal structures, with counter-anion dependence of the structures', **Polyhedron**, vol 28, no. 14, pp. 3143-3149.
- Ahmad, JU, Figiel, PJ, Räisänen, MT, Leskelä, M, Repo, T **2009**, 'Aerobic oxidation of benzylic alcohols with bis(3,5-di-tert-butylsalicylaldehyde) copper(II) complexes', **Applied Catalysis A: General**, vol 371, no. 1-2, pp. 17-21.
- Balkaran, JM, van Bezouw, SCP, van Bruchem, J, Verasdonck, J, Verkerk, PC, Volbeda, AG, Mutikainen, I, Turpeinen, U, van Albada, GA, Gamez, P, Haasnoot, JG, Reedijk, J **2009**, 'Coordination chemistry of substituted [1,2,4]triazolo[1,5-a]pyrimidines with first-row transition-metal ions: Synthesis, spectroscopy and single-crystal structure', **Inorganica Chimica Acta**, vol 362, no. 3, pp. 861-868.
- Burck, S, Hajdok, I, Nieger, M, Bubrin, D, Schulze, S, Gudat, D **2009**, 'Activation of polarized phosphorus-phosphorus bonds by alkynes: Rational synthesis of unsymmetrical 1,2-Bisphosphine ligands and their complexes', **Zeitschrift für Naturforschung. Section B: A Journal of Chemical Sciences**, vol 64, pp. 63-72.
- Burck, S, Gudat, D, Nieger, M **2009**, 'Cleavage of Polarized P-P Bonds in N-Heterocyclic Diphosphines in Reactions with Metal Olefin Complexes', **Organometallics**, vol 28, no. 5, pp. 1447-1452.
- Burck, S, Gudat, D, Nieger, M, Benkő, Z, Nyulaszi, L, Szieberth, D **2009**, 'Spontaneous phosphorus-halogen bond cleavage in N-heterocyclic halogenophosphanes revisited: The case of P-Br and P-I bonds', **Zeitschrift für anorganische und allgemeine Chemie**, vol 635, no. 2, pp. 245-252.
- Burck, S, Götz, K, Kaupp, M, Nieger, M, Weber, J, Schmedt auf der Gunne, J, Gudat, D **2009**, 'Diphosphines with strongly polarized P-P bonds: Hybrids between covalent molecules and donor-acceptor adducts with flexible molecular structures', **Journal of the American Chemical Society**, vol 131, pp. 10763-10774.
- Chikkali, SH, Gudat, D, Lissner, F, Niemeyer, M, Schleid, T, Nieger, M **2009**, 'Template-controlled assembly of ditopic catechol phosphines: A strategy for the generation of complexes of bidentate phosphines with different bite angles', **Chemistry: A European Journal**, vol 15, no. 2, pp. 482-491.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Dueñas, S, Castán, H, García, H, Gómez, A, Bailón, L, Kukli, K, Niinistö, J, Ritala, M, Leskelä, M 2009, 'Electrical properties of thin zirconium and hafnium oxide high-k gate dielectrics grown by atomic layer deposition from cyclopentadienyl and ozone precursors', **Journal of Vacuum Science and Technology. Part B. Microelectronics and Nanometer Structures**, vol 27, no. 1, pp. 389-393.
- Dueñas, S, Castán, H, García, H, Gómez, A, Bailón, L, Kukli, K, Niinistö, J, Ritala, M, Leskelä, M 2009, 'Comparison between the electrical properties of atomic layer deposited thin ZrO₂ films processed from cyclopentadienyl precursors', **Microelectronic Engineering**, vol 86, no. 7-9, pp. 1689-1691.
- Dötz, KH, Stendel, J, Nieger, M 2009, 'Reactions of Complex Ligands. Part 107 [1] Densely Substituted Hydroquinoid Phenanthrene and Triphenylene Cr(CO)₃ Complexes: Chromium-Templated Synthesis and Molecular Structure', **Zeitschrift für anorganische und allgemeine Chemie**, vol 635, no. 2, pp. 221-237.
- Elo, P, Pärssinen, A, Nieger, M, Leskelä, M, Repo, T 2009, 'Synthesis, ethylene polymerization and dynamic features of titanium and zirconium complexes bearing chelating malonate-based enamino-ketonato ligands', **Journal of Organometallic Chemistry**, vol 694, pp. 2927-2933.
- Figiel, PJ, Sibaoui, A, Ahmad, JU, Nieger, M, Räisänen, MT, Leskelä, M, Repo, T, Jahir Uddin, A 2009, 'Aerobic oxidation of benzylic alcohols in water by 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO)/copper(II) 2-N-arylpyrrolo-carbaldimino complexes', **Advanced Synthesis & Catalysis**, vol 351, no. 16, pp. 2625-2632.
- García, H, Dueñas, S, Castán, H, Gómez, A, Bailón, L, Barquero, R, Kukli, K, Ritala, M, Leskelä, M 2009, 'Irradiation effect on dielectric properties of hafnium and gadolinium oxide gate dielectrics', **Journal of Vacuum Science and Technology. Part B. Microelectronics and Nanometer Structures**, vol 27, no. 1, pp. 416-420.
- Granström, M, Havimo, M, Heikkilä, M, Kilpeläinen, I 2009, 'Synthesis, characterisation and application of novel self-assembled comb-like liquid crystalline biphenyl-cellulose as UV absorber for paper', **Journal of Materials Chemistry**, vol 2009, no. 19, pp. 639-644.
- Granström, M, Majoinen, J, Kavakka, J, Heikkilä, M, Kemell, M, Kilpeläinen, I 2009, 'Effect of self-assembly via π -stacking to morphology and crystallinity on tritylated cellulose', **Materials Letters**, vol 63, no. 3-4, pp. 473-476.
- Gross, U, Nieger, M, Bäse, S 2009, 'Stereoselective synthesis of the epicoccin core', **Organic Letters**, vol 11, no. 20, pp. 4740-4742.
- Hajdok, I, Lissner, F, Nieger, M, Strobel, S, Gudat, D 2009, 'Diphosphination of electron poor alkenes', **Organometallics**, vol 28, pp. 1644-1651.
- Hartmann, CE, Gross, PJ, Nieger, M, Bräse, S 2009, 'Towards an asymmetric synthesis of the bacterial peptide deformylase (PDF) inhibitor fumimycin', **Organic & Biomolecular Chemistry**, vol 7, pp. 5059-5062.
- Hatanpää, T, Pore, V, Ritala, M, Leskelä, M 2009, 'Alkylsilyl compounds of selenium and tellurium: new precursors for ALD', **ECS transactions**, vol 25, no. 8, pp. 609-616.
- Heikkilä, M, Puukilainen, E, Ritala, M, Leskelä, M 2009, 'Effect of thickness of ALD grown TiO₂ films on photoelectrocatalysis', **Journal of Photochemistry and Photobiology, A: Chemistry**, vol 204, pp. 200-208.
- Helten, H, Engeser, M, Gudat, D, Schilling, R, Schnakenburg, G, Nieger, M, Streubel, R 2009, 'Protonation of 2H-azaphosphirene complexes: P-N bond activation and ring-expansion reactions', **Chemistry: A European Journal**, vol 15, no. 10, pp. 2602-2616.
- Helten, H, Frankel, S, Feier-Iova, O, Nieger, M, Ferao, AE, Streubel, R 2009, 'Strong evidence for an unprecedented borderline case of dissociation and cycloaddition in open-shell 1,3-dipole chemistry. Transient nitrilium phosphane-ylide complex radical cations', **European Journal of Inorganic Chemistry**, no. 22, pp. 3226-3237.
- Hyvönen, H, Aksela, R 2009, 'Complexation of N-bis[2-(1,2-dicarboxyethoxy)ethyl]aspartic acid with Fe(II), Co(II), and Ni(II) in aqueous solution', **Journal of Coordination Chemistry**, vol 62, no. 24, pp. 3875-3884.
- Hämäläinen, J, Puukilainen, E, Kemell, M, Costello, L, Ritala, M, Leskelä, M 2009, 'Atomic layer deposition of iridium thin films by consecutive oxidation and reduction steps', **Chemistry of Materials**, vol 21, no. 20, pp. 4868-4872.
- Hämäläinen, J, Munnik, F, Ritala, M, Leskelä, M 2009, 'Study on atomic layer deposition of amorphous rhodium oxide thin films', **Journal of the Electrochemical Society**, vol 156, no. 10, pp. D418-D423.
- Imanishi, SY, Kouvonen, P, Smätt, J, Heikkilä, M, Peuhu, E, Mikhailov, A, Ritala, M, Lindén, M, Corthals, GL, Eriksson, JE 2009, 'Phosphopeptide enrichment with stable spatial coordination on a titanium dioxide coated glass slide', **Rapid Communications in Mass Spectrometry**, vol 23, no. 23, pp. 3661-3667.
- Jainta, M, Nieger, M, Bräse, S 2009, 'Facile synthesis and spectroscopic elucidation of 4,11-bis(dehydroxy)-bipolaroamide', **Journal of Molecular Structure**, vol 921, pp. 85-88.
- Janickis, V, Klinga, M 2009, 'Reaction of selenium with bromine in the presence of methyltriphenylphosphonium bromide: syntheses and crystal structures of [PMePh₃]₂Se₂Br₆] and [PMePh₃]₂SeBr₆(SeBr₂)₂]', **Zeitschrift für anorganische und allgemeine Chemie**, vol 635, no. 2, pp. 323-328.
- Joistgen, O, Pfletschinger, A, Ciupka, J, Dolg, M, Nieger, M, Schnakenburg, G, Fröhlich, R, Kataeva, O, Dötz, KH 2009, 'P-Coligand tuning of the haptotropic metal migration in phenanthrene chromium complexes', **Organometallics**, vol 28, pp. 3473-3484.
- Katainen, J, Paajanen, M, Ahtola, E, Pore, V, Lahtinen, J 2009, 'Adhesion as an interplay between particle size and surface roughness', **Journal of Colloid and Interface Science**, vol 304, pp. 524-529.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Kirste, A, Nieger, M, Malkowsky, IM, Stecker, F, Fischer, A, Waldvogel, SR **2009**, 'ortho-Selective phenol-coupling reaction by anodic treatment on boron-doped diamond electrode using fluorinated alcohols', **Chemistry: A European Journal**, vol 15, no. 10, pp. 2273-2277.
- Knapas, K, Rahtu, A, Ritala, M **2009**, 'Etching of Nb₂O₅ Thin Films by NbCl₅', **Chemical Vapor Deposition**, vol 15, no. 10-12, pp. 269-273.
- Kukli, K, Niinistö, J, Tamm, A, Ritala, M, Leskelä, M **2009**, 'Behavior of zirconium oxide films processed from novel monocyclopentadienyl precursors by atomic layer deposition', **Journal of Vacuum Science and Technology. Part B. Microelectronics and Nanometer Structures**, vol 27, no. 1, pp. 226-229.
- Lahtinen, M, Kruus, K, Boer, H, Kemell, M, Andberg, M, Viikari, L, Sipilä, J **2009**, 'The effect of lignin model compound structure on the rate of oxidation catalyzed by two different fungal laccases', **Journal of Molecular Catalysis B: Enzymatic**, vol 57, no. 1-4, pp. 204-210.
- Leskelä, M, Pore, V, Hatanpää, T, Heikkilä, M, Ritala, M, Schrott, A, Raoux, S, Rossnagel, SM **2009**, 'Atomic layer deposition of materials for phase-change memories', **ECS transactions**, vol 25, no. 8, pp. 399-407.
- Lindner, AS, Nieger, M, Schmidt, A **2009**, 'Synthesis and properties of imidazo[1,2-a]pyridinium-3-olate', **Tetrahedron**, vol 65, pp. 7591-7596.
- Marques-Gallego, P, den Dulk, H, Brouwer, J, Tanase, S, Mutikainen, I, Turpeinen, U, Reedijk, J **2009**, 'Cytotoxic activity and cellular processing in human ovarian carcinoma cell lines of a new platinum(II) compound containing a fluorescent substituted propylene diamine ligand', **Biochemical Pharmacology**, vol 78, no. 4, pp. 365-373.
- Mohamadou, A, van Albada, GA, Mutikainen, I, Turpeinen, U, Marrot, J, Reedijk, J **2009**, 'Synthesis, crystal structure, hydrogen bonding and spectroscopy of transition-metal complexes with the ligand (N,N'-bis(2-pyridylmethyl)-1,3-propanediamine)', **Polyhedron**, vol 28, no. 14, pp. 2813-2820.
- Nevalainen, K, Suihkonen, R, Eteläaho, P, Vuorinen, J, Järvelä, P, Isomäki, N, Hintze, C, Leskelä, M **2009**, 'Mechanical and tribological property comparison of melt-compounded nanocomposites of atomic-layer-deposition-coated polyamide particles and commercial nanofillers', **Journal of vacuum science & technology : an official journal of the American Vacuum Society**, vol 27, no. 4, pp. 929-936.
- Niinistö, J, Rose, M, Michalowski, P, Gerlich, L, Wilde, L, Endler, I, Bartha, JW **2009**, 'Atomic Layer Deposition of Titanium Dioxide Thin Films from Cp*Ti(OMe)(3) and Ozone', **Journal of Physical Chemistry C**, vol 113, no. 52, pp. 21825-21830.
- Niinistö, J, Kukli, K, Sajavaara, T, Ritala, M, Leskelä, M, Oberbeck, L, Sundqvist, J, Schröder, U **2009**, 'Atomic layer deposition of high-permittivity yttrium-doped HfO₂ films', **Electrochemical and Solid-State Letters**, vol 12, no. 1, pp. G1-G4.
- Picazo, O, Alkorta, I, Elguero, J, Sundberg, MR, Valo, J, Zborowski, K **2009**, 'Chiral distinction in square planar Pt and Pd complexes of 2,2'-bipyridine derivatives', **Structural Chemistry**, vol 20, pp. 557-563.
- Pilvi, T, Puukilainen, E, Munnik, F, Leskelä, M, Ritala, M **2009**, 'ALD of YF₃ thin films from TiF₄ and Y(thd)₃ precursors', **Chemical Vapor Deposition**, vol 15, no. 1-3, pp. 27-32.
- Plietzsch, O, Schilling, CI, Tolev, M, Nieger, M, Richert, C, Muller, T, Bräse, S **2009**, 'Four-fold click reactions: Generation of tetrahedral methane- and adamantane-based building blocks for higher-order molecular assemblies', **Organic & Biomolecular Chemistry**, vol 7, pp. 4734-4743.
- Pore, V, Ritala, M, Leskelä, M, Saukkonen, T, Järn, M **2009**, 'Explosive crystallization in atomic layer deposited mixed titanium oxides', **Crystal Growth & Design**, vol 9, no. 7, pp. 2974-2978.
- Pore, V, Hatanpää, T, Ritala, M, Leskelä, M **2009**, 'Atomic layer deposition of metal tellurides and selenides using alkylsilyl compounds of tellurium and selenium', **Journal of the American Chemical Society**, vol 131, no. 10, pp. 3478-3480.
- Puga, AV, Teixidor, F, Sillanpää, R, Kivekäs, R, Arca, M, Barbera, G, Vinas, C **2009**, 'From Mono- to Poly-Substituted Frameworks: A Way of Tuning the Acidic Character of C-c-H in o-Carborane Derivatives', **Chemistry: A European Journal**, vol 15, no. 38, pp. 9755-9763.
- Puga, AV, Teixidor, F, Sillanpää, R, Kivekäs, R, Vinas, C **2009**, 'Iodinated ortho-Carboranes as Versatile Building Blocks to Design Intermolecular Interactions in Crystal Lattices', **Chemistry: A European Journal**, vol 15, pp. 9764-9772.
- Reingruber, R, Vanderheiden, S, Muller, T, Nieger, M, Es-Sayed, M, Bräse, S **2009**, 'Efficient synthesis of substituted 3-acyl-3,4-dihydrobenzo[d][1,2,3]triazines', **Tetrahedron Letters**, vol 50, pp. 3439-3442.
- Riikonen, J, Salonen, J, Kemell, M, Kumar, N, Murzin, DY, Ritala, M, Lehto, V **2009**, 'A novel method of quantifying the u-shaped pores in SBA-15', **Journal of Physical Chemistry C**, vol 113, no. 47, pp. 20349-20354.
- Ritala, M, Niinistö, J **2009**, 'Industrial applications of atomic layer deposition', **ECS transactions**, vol 25, no. 8, pp. 641-652.
- Ritala, M, Pore, V, Hatanpää, T, Heikkilä, M, Leskelä, M, Mizohata, K, Schrott, A, Raoux, S, Rossnagel, SM **2009**, 'Atomic layer deposition of Ge₂Sb₂Te₅ thin films', **Microelectronic Engineering**, vol 86, no. 7-9, pp. 1946-1949.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Romanazzi, G, Marinelli, F, Mastroilli, P, Torsi, L, Sibauhi, A, Räisänen, M, Repo, T, Cosma, P, Suranna, GP, Nobile, CF **2009**, 'Synthesis and characterization of alpha,omega-disubstituted quaterthiophenes functionalized with polar groups for solution processed OTFTs', **Tetrahedron**, vol 65, pp. 9833-9842.
- Rönkkö, H, Korpela, T, Knuutila, H, Pakkanen, TT, Deniff, P, Leinonen, T, Kemell, M, Leskelä, M **2009**, 'Particle growth and fragmentation of solid self-supported Ziegler-Natta-type catalysts in propylene polymerization', **Journal of Molecular Catalysis A: Chemical**, vol 309, pp. 40-49.
- Sahin, H, Nieger, M, Bräse, S **2009**, 'Probing the oxidation of functionalized (Hexahydro)xanthenols', **European Journal of Inorganic Chemistry**, no. 36, pp. 5576-5586.
- Sahin, H, Nieger, M, Nising, CF, Bräse, S **2009**, 'Functionalization of highly oxygenated xanthenes: Unexpected stereochemistry and rearrangements', **Synlett**, vol 19, pp. 3187-3191.
- Salmi, LD, Puukilainen, E, Vehkamäki, M, Heikkilä, M, Ritala, M **2009**, 'Atomic Layer Deposition of Ta₂O₅/Polyimide Nanolaminates', **Chemical Vapor Deposition**, vol 15, no. 7-9, pp. 221-226.
- Santala, E, Kemell, M, Leskelä, M, Ritala, M **2009**, 'The preparation of reusable magnetic and photocatalytic composite nanofibers by electrospinning and atomic layer deposition', **Nanotechnology**, vol 20, no. 3, pp. art. 035602.
- Santala, E, Hämmäläinen, J, Lu, J, Leskelä, M, Ritala, M **2009**, 'Metallic Ir, IrO₂ and Pt Nanotubes and Fibers by Electrospinning and Atomic Layer Deposition', **Nanoscience and Nanotechnology Letters**, vol 1, no. 3, pp. 218-223.
- Santamäki, S, Aitola, E, Kokko, E, Repo, T, Leskelä, M, Seppälä, J **2009**, 'Activation of hafnocene catalyzed polymerization of 1-hexene with MAO and borate', **European Polymer Journal**, vol 45, pp. 863-869.
- Sibauhi, A, Ryan, P, Axenov, KV, Sundberg, MR, Leskelä, M, Repo, T **2009**, 'Efficient coupling of CO₂ and epoxides with bis(phenoxyiminato) cobalt(III)/Lewis base catalysts', **Journal of Molecular Catalysis A: Chemical**, vol 312, no. 1-2, pp. 87-91.
- Sibauhi, A, Ryan, P, Leskelä, M, Rieger, B, Repo, T, Rieger, B **2009**, 'Facile synthesis of cyclic carbonates from CO₂ and epoxides with cobalt(II)/onium salt based catalysts', **Applied Catalysis A: General**, vol 365, pp. 194-198.
- Spirk, S, Nieger, M, Belaj, F, Pietschnig, R **2009**, 'Formation and hydrogen bonding of a novel POSS-trisilanol', **Dalton Transactions**, no. 1, pp. 163-167.
- Spirk, S, Belaj, F, Nieger, M, Köfeler, H, Rechberger, GN, Pietschnig, R **2009**, 'Exploring the anion-cation interaction in m-terphenyltetrafluorosilicates by using multinuclear NMR spectroscopy, X-ray diffraction, and ICR-FT-MS', **Chemistry: A European Journal**, vol 15, pp. 9521-9529.
- Straka, L, Kawakami, H, Romu, J, Ilola, R, Mahlberg, R, Heikkilä, M, Hänninen, H **2009**, 'Effect of substrate deformation on functional properties of atomic-layer-deposited TiO coatings on stainless steel', **Thin Solid Films**, vol 517, pp. 3797-3805.
- Streubel, R, Beckmann, M, Neumann, C, Fankel, S, Helten, H, Feier-lova, O, Jones, PG, Nieger, M **2009**, 'Synthesis, structure, and ring-expansion reactions of a 3-ferrocenyl-substituted 2H-azaphosphine tungsten complex', **European Journal of Inorganic Chemistry**, no. 14, pp. 2090-2095.
- Streubel, R, Bode, M, Perez, JM, Schnakenberg, G, Daniels, J, Nieger, M, Jones, PG **2009**, 'Facile synthesis of pentacarbonyltungsten(0) complexes with oxaphosphirane ligands', **Zeitschrift für anorganische und allgemeine Chemie**, vol 635 (2009), pp. 1163-1171.
- Suarez-Varela, J, Maria Moreno, J, Ben Maimoun, I, Lloret, F, Mrozinski, J, Kivekäs, R, Colacio, E **2009**, 'Novel Bimetallic-Dicyanamide Extended Two- and Three-Dimensional Networks through [Cu(rac-CTH)](2+) Cation Templation', **Crystal Growth & Design**, vol 9, no. 9, pp. 4102-4107.
- Sumerin, V, Schulz, F, Nieger, M, Atsumi, M, Wang, C, Leskelä, M, Pyykkö, P, Repo, T, Rieger, B **2009**, 'Experimental and theoretical treatment of hydrogen splitting and storage in boron-nitrogen systems', **Journal of Organometallic Chemistry**, vol 694, pp. 2654-2660.
- Tian, T, Mutikainen, I, van Wezel, GP, Aliaga-Alcalde, N, Reedijk, J **2009**, 'Chemical, structural and biological studies of cis-[Pt(3-AcPy)(2)Cl-2]', **Journal of Inorganic Biochemistry**, vol 103, no. 9, pp. 1221-1227.
- Vesterinen, V, Aksela, M, Sundberg, MR **2009**, 'Nature of chemistry in the national frame curricula for upper secondary education in Finland, Norway and Sweden', **NorDiNa**, vol 5, no. 2, pp. 200-212.
- Viciano-Chumillas, M, Tanase, S, Mutikainen, I, Turpeinen, U, de Jongh, LJ, Reedijk, J **2009**, 'Manganese(III) compounds with phenol-pyrazole based-ligands: impact of the co-ligand and the carboxylate ligand on the trinuclear core [Mn-3(mu(3)-O)(phpzR)(3)(O2CR')(n)](1-n)', **Journal of the Chemical Society, Dalton Transactions**, vol 2009, no. 36, pp. 7445-7453.
- Viciano-Chumillas, M, Tanase, S, Mutikainen, I, Turpeinen, U, de Jongh, LJ, Reedijk, J **2009**, 'Mononuclear Manganese(III) Complexes as Building Blocks for the Design of Trinuclear Manganese Clusters: Study of the Ligand Influence on the Magnetic Properties of the [Mn-3(mu(3)-O)](7+) Core (vol 47, pg 5926, 2008)', **Inorganic Chemistry**, vol 48, no. 3, pp. 1258.
- Vila-Comamala, J, Jefimovs, K, Raabe, J, Pilvi, T, Fink, RH, Senoner, M, Maaßdorf, A, Ritala, M, David, C **2009**, 'Advanced thin film technology for ultrahigh resolution x-ray microscopy', **Ultramicroscopy**, vol 109, no. 11, pp. 1360-1364.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

Volz, N, Bröhmer, MC, Nieger, M, Bräse, S **2009**, 'Thieme chemistry journal awardees - Where are they now? An asymmetric organocatalytic sequence towards 4a-methyl tetrahydroxanthones: Formal synthesis of 4-dehydroxydiversinol', **Synlett**, no. 4, pp. 550-553.

Volz, N, Bröhmer, MC, Toräng, J, Nieger, M, Bräse, S **2009**, 'Adventures in heterocycle chemistry: The oxa-Michael cascade for the synthesis of complex natural products and highly functionalized bioactive compounds', **Indian Journal of Chemistry. Section B: Organic and Medicinal Chemistry**, vol 48, no. 12, pp. 1699-1703.

Vuorinen, S, Heinämäki, J, Antikainen, O, Lahcini, M, Repo, T, Yliruusi, J **2009**, 'Sugar end-capped poly-D,L-lactides as excipients in oral sustained release tablets', **AAPS PharmSciTech**, vol 10, no. 2, pp. 566-573.

Zhang, X, Honkanen, M, Pore, V, Levänen, E, Mäntylä, T **2009**, 'Effect of heat treating gel films on the formation of superhydrophobic boehmite flaky structures on austenitic stainless steel', **Ceramics International**, vol 35, pp. 1559-1564.

Zhu, SS, Nieger, M, Daniels, J, Felder, T, Kossev, I, Schmidt, T, Sokolowski, M, Vögtle, F, Schalley, CA **2009**, 'Conformational flexibility of tetralactam macrocycles and their intermolecular hydrogen-bonding patterns in the solid state', **Chemistry: A European Journal**, vol 15, no. 20, pp. 5040-5046.

de Hoog, P, Robertazzi, A, Mutikainen, I, Turpeinen, U, Gamez, P, Reedijk, J **2009**, 'An Electron-Poor Host Receptor for Electron-Rich Guests Involving Anion- π and Lone-Pair- π Interactions', **European Journal of Inorganic Chemistry**, vol 2009, no. 18, pp. 2684-2690.

van Albada, GA, van der Horst, MG, Teat, SJ, Gamez, P, Roubeau, O, Mutikainen, I, Turpeinen, U, Reedijk, J **2009**, 'Polynuclear Cu(II), Ni(II) and Cd(II) coordination compounds with bis(pyrimidin-2-yl)amine and dicyanamide', **Polyhedron**, vol 28, no. 8, pp. 1541-1545.

van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2009**, 'A unique Cu(II) bis(chlorido)-bridged linear chain compound with 2-amino-5-nitropyrimidine as a bifunctional axial ligand: Synthesis, characterization, crystal structure and hydrogen-bonding system', **Inorganica Chimica Acta**, vol 362, no. 9, pp. 3373-3376.

van Albada, GA, van der Horst, MG, Fu, WT, Roubeau, O, Mutikainen, I, Turpeinen, U, Reedijk, J **2009**, 'Mononuclear and polynuclear halide and nitrate Cu(II) compounds with 1,4,5-triazanaphthalene as a ligand; Characterization, magnetism and X-ray structures', **Inorganica Chimica Acta**, vol 362, no. 12, pp. 4422-4429.

van Albada, GA, van der Horst, MG, Mutikainen, I, Turpeinen, U, Reedijk, J **2009**, 'Cu(II) Compounds with Pyrimidine-Based Chelating Ligands, Bridged by a Flexible Alkyl Spacer: Synthesis, Characterisation and X-Ray Structures of Methoxide-Bridged Dinuclear-Based Species', **Journal of Chemical Crystallography**, vol 39, no. 5, pp. 358-363.

2010

Abu-Surrah, AS, Lappalainen, K, Leskelä, M, Repo, T **2010**, 'Alidimine 2,6-bis(imino)pyridine iron(II) and cobalt(II)/methyl aluminoxane catalyst systems for polymerization of tert-butylacrylate', **Transition Metal Chemistry**, vol 35, no. 7, pp. 7-11.

Al-Hunaiti, A, Niemi, T, Sibauoui, A, Piho, P, Leskelä, M, Repo, T **2010**, 'Solvent Free Oxidation of Primary Alcohols and Diols Using Thymine Iron(III) Catalyst', **Chemical Communications**, vol 46, no. 48, pp. 9250-9252.

Allendorfer, N, Es-Sayed, M, Nieger, M, Braese, S **2010**, 'Novel Aromatic Fluoroolefins via Fluoro-Julia-Kocienski Olefination', **Synthesis (Stuttgart)**, vol 2010, no. 20, pp. 3439-3448.

Antila, LJ, Heikkilä, MJ, Aumanen, V, Kemell, M, Myllyperkiö, P, Leskelä, M, Korppi-Tommola, JEI **2010**, 'Suppression of Forward Electron Injection from Ru(dcbpy)(2)(NCS)(2) to Nanocrystalline TiO2 Film As a Result of an Interfacial Al2O3 Barrier Layer Prepared with Atomic Layer Deposition', **Journal of Physical Chemistry Letters**, vol 1, no. 2, pp. 536-539.

Ay, S, Ziegert, RE, Zhang, H, Nieger, M, Rissanen, K, Fink, K, Kubas, A, Gschwind, RM, Bräse, S **2010**, 'NMR-Spectroscopic and Solid-State Investigations of Cometal-Free Asymmetric Conjugated Addition: A Dinuclear Paracyclophaneimine Zinc Methyl Complex', **Journal of the American Chemical Society**, vol 132, no. 37, pp. 12899-12905.

Bauer, G, Benko, Z, Nuss, J, Nieger, M, Gudat, D **2010**, 'Assembly and Disassembly of a Metastable Bis-phosphine-Based Copper(I) Helicate', **Chemistry: A European Journal**, vol 16, no. 40, pp. 12091-12095.

Burck, S, Nieger, M, Gudat, D **2010**, 'Interpnictogen Compounds with Polarised Phosphorus-Element Bonds', **Zeitschrift für anorganische und allgemeine Chemie**, vol 636, no. 7, pp. 1263-1267.

Cametti, M, Ilander, L, Valkonen, A, Nieger, M, Nissinen, M, Nauha, E, Rissanen, K **2010**, 'Non-Centrosymmetric Tetrameric Assemblies of Tetramethylammonium Halides with Uranyl Salophen Complexes in the Solid State', **Inorganic Chemistry**, vol 49, no. 24, pp. 11473-11484.

Chikkali, SH, Nieger, M, Gudat, D **2010**, 'Stoichiometry controlled self-assembly of tri- and octa-nuclear palladium-yttrium complexes', **New Journal of Chemistry**, vol 34, no. 7, pp. 1348-1354.

Costa, JS, Markus, CM, Mutikainen, I, Gamez, P, Reedijk, J **2010**, '[Molybdenum(VI)/aminopyridinium] system as catalyst for the epoxidation of cyclooctene with H2O2', **Inorganica Chimica Acta**, vol 363, pp. 2046-2050.

Elo, P, Pärssinen, A, Rautiainen, S, Nieger, M, Leskelä, M, Repo, T **2010**, 'Titanium complexes with modifiable pyrazolonato and pyrazolonato-ketimine ligands: Synthesis, characterization and ethylene polymerization behavior', **Journal of Organometallic Chemistry**, vol 695, no. 1, pp. 11-17.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Färm, E, Kemell, M, Santala, E, Ritala, M, Leskelä, M 2010, 'Selective-area atomic layer deposition using poly(vinyl pyrrolidone) as a passivation layer', **Journal of the Electrochemical Society**, vol 157, no. 1, pp. K10-K14.
- Gross, U, Nieger, M, Bräse, S 2010, 'A Unified Strategy Targeting the Thiodiketopiperazine Mycotoxins Exserohilone, Gliotoxin, the Epicoccins, the Epicorazines, Rostratin A and Aranotin', **Chemistry: A European Journal**, vol 16, no. 38, pp. 11624-11631.
- Gross, PJ, Furche, F, Nieger, M, Braese, S 2010, 'Asymmetric total synthesis of (+)-fumimycin via 1,2-addition to ketimines', **Journal of the Chemical Society. Chemical communications**, vol 46, no. 48, pp. 9215-9217.
- Gross, PJ, Hartmann, CE, Nieger, M, Bräse, S 2010, 'Synthesis of Methoxyfumimycin with 1,2-Addition to Ketimines', **Journal of Organic Chemistry**, vol 75, no. 1, pp. 229-232.
- Guo, H, Kemell, M, Heikkilä, M, Leskelä, M 2010, 'Noble metal-modified TiO₂ thin film photocatalyst on porous steel fiber support', **Applied Catalysis B: Environmental**, vol 95, no. 3-4, pp. 358-364.
- Günay, E, Mutikainen, I, Turpeinen, U, van Albada, GA, Haasnoot, JG, Reedijk, J 2010, 'Red and Blue Compounds Formed from Copper(II) Bromide and the Ligand 7-Isobutyl-5-methyl-[1,2,4]triazolo [1,5-a]pyrimidine: Synthesis, Spectroscopy and Single-Crystal Structures', **Journal of Chemical Crystallography**, vol 40, no. 11, pp. 1006-1010.
- Hakola, M, Kallioinen, A, Kemell, M, Lahtinen, P, Lankinen, E, Leskelä, M, Repo, T, Riekkola, T, Siika-aho, M, Uusitalo, J, Vuorela, S, von Weymarn, N 2010, 'Liberation of Cellulose from the Lignin Cage: A Catalytic Pretreatment Method for the Production of Cellulosic Ethanol', **ChemSusChem (Print)**, vol 3, no. 10, pp. 1142-1145.
- Hatanpää, T, Vehkamäki, M, Ritala, M, Leskelä, M 2010, 'Study of bismuth alkoxides as possible precursors for ALD', **Dalton Transactions**, vol 39, no. 13, pp. 3219-3226.
- Hegele, P, Santhamma, B, Schnakenburg, G, Fröhlich, R, Kataeva, O, Nieger, M, Kotsis, K, Neese, F, Dötz, KH 2010, 'Hydroquinoid Chromium Complexes Bearing an Acyclic Conjugated Bridge: Chromium-Templated Synthesis, Molecular Structure, and Haptotropic Metal Migration', **Organometallics**, vol 29, no. 23, pp. 6172-6185.
- Heljo, P, Jouppila, K, Hatanpää, TT, Juppo, A 2010, 'The Use of Disaccharides in Inhibiting Enzymatic Activity Loss and Secondary Structure Changes in Freeze-Dried B-Galactosidase during Storage', **Pharmaceutical Research**, vol 28, no. 3, pp. 540-552.
- Helten, H, Daniels, J, Nieger, M, Streubel, R 2010, 'Extended pi conjugation in 2H-1,4,2-diazaphosphole complexes', **New Journal of Chemistry**, vol 34, no. 8, pp. 1593-1602.
- Huang, S, Pilvi, T, Wang, X, Leskelä, M, Richmond, MG 2010, 'New octahedral Ta(V) hydrazido-substituted compounds for atomic layer deposition: Syntheses, X-ray diffraction structures of TaCl(NMe₂)(3)[N(TMS)NMe₂] and Ta(NMe₂)(4)[N(TMS)NMe₂], and fluxional behavior of the amido and hydrazido ligands in solution', **Polyhedron**, vol 29, no. 7, pp. 1754-1759.
- Hyvönen, H, Aksela, R 2010, 'Complexation of 3-hydroxy-2,2'-iminodisuccinic acid (HIDS) with Mg²⁺, Ca²⁺, Mn²⁺, Fe³⁺, Fe²⁺, Co²⁺, Ni²⁺, Cu²⁺, and Zn²⁺ ions in aqueous solution', **Journal of Coordination Chemistry**, vol 63, no. 12, pp. 2013-2025.
- Hämäläinen, J, Hatanpää, T, Puukilainen, E, Costelle, L, Pilvi, T, Ritala, M, Leskelä, M 2010, '(MeCp)Ir(CHD) and molecular oxygen as precursors in atomic layer deposition of iridium', **Journal of Materials Chemistry**, vol 20, no. 36, pp. 7669-7675.
- Jogi, I, Tamm, A, Kukli, K, Kemell, M, Lu, J, Sajavaara, T, Ritala, M, Leskelä, M 2010, 'Investigation of ZrO₂-Gd₂O₃ Based High-k Materials as Capacitor Dielectrics', **Journal of the Electrochemical Society**, vol 157, no. 10, pp. G202-G210.
- Jögi, I, Kukli, K, Ritala, M, Leskelä, M, Aarik, J, Aidla, A, Lu, J 2010, 'Atomic layer deposition of high capacitance density Ta₂O₅-ZrO₂ based dielectrics for metal-insulator-metal structures', **Microelectronic Engineering**, vol 87, no. 2, pp. 144-149.
- Kemell, M, Härkönen, E, Pore, V, Ritala, M, Leskelä, M 2010, 'Ta₂O₅- and TiO₂-based nanostructures made by atomic layer deposition', **Nanotechnology**, vol 21, no. 3, pp. art. 035301.
- Knapas, K, Hatanpää, T, Ritala, M, Leskelä, M 2010, 'In Situ Reaction Mechanism Studies on Atomic Layer Deposition of Sb₂Te₃ and GeTe from (Et₃Si)(2)Te and Chlorides', **Chemistry of Materials**, vol 22, no. 4, pp. 1386-1391.
- Knapas, K, Rahtu, A, Ritala, M 2010, 'Reaction Mechanism Studies on Atomic Layer Deposition of Nb₂O₅ from Nb(OEt)₅ and Water', **Langmuir**, vol 26, no. 2, pp. 848-853.
- Kukli, K, Aarik, J, Aidla, A, Uustare, T, Jögi, I, Lu, J, Tallarida, M, Kemell, M, Kiessler, A, Ritala, M, Leskelä, M 2010, 'Structure and Morphology of Ru Films Grown by Atomic Layer Deposition from 1-ethyl-1'-methyl-ruthenocene', **Journal of Crystal Growth**, vol 312, no. 12-13, pp. 2025-2032.
- Kukli, K, Ritala, M, Kemell, M, Leskelä, M 2010, 'High temperature atomic layer deposition of Ruthenium from N,N-dimethyl-1-ruthenocenylolethylamine', **Journal of the Electrochemical Society**, vol 157, no. 1, pp. D35-D40.
- Kulovesi, P, Telenius, J, Koivuniemi, A, Brezesinski, G, Rantamäki, A, Viitala, T, Puukilainen, E, Ritala, M, Wiedmer, SK, Vattulainen, IT, Holopainen, JM 2010, 'Molecular Organization of the Tear Fluid Lipid Layer', **Biophysical Journal**, vol 99, no. 8, pp. 2559-2567.
- Kuutti, L, Putkisto, K, Hyvärinen, S, Peltonen, S, Koivunen, K, Paulapuro, H, Tupala, J, Leskelä, M, Virtanen, T, Maunu, SL 2010, 'Starch-hybrid fillers for paper', **Nordic Pulp & Paper Research Journal**, vol 25, no. 1, pp. 114-123.
- Königs, P, Rinker, B, Maus, L, Nieger, M, Rheinheimer, J, Waldvogel, SR 2010, 'Structural Revision and Synthesis of Altechromone A', **Journal of Natural Products**, vol 73, no. 12, pp. 2064-2066.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Laine, P, Lampi, A, Peura, M, Kansikas, J, Mikkonen, K, Willfor, S, Tenkanen, M, Jouppila, K **2010**, 'Comparison of Microencapsulation Properties of Spruce Galactoglucomannans and Arabic Gum Using a Model Hydrophobic Core Compound', **Journal of Agricultural and Food Chemistry**, vol 58, no. 2, pp. 981-989.
- Liu, W, Repo, E, Heikkilä, M, Leskelä, M, Sillanpää, M **2010**, 'Hierarchical paramecium-like hollow and solid Au/Pt bimetallic nanostructures constructed using goethite as template', **Nanotechnology**, vol 21, pp. 395604.
- Lokajová, J, Laine, J, Puukilainen, E, Ritala, M, Holopainen, JM, Wiedmer, SK **2010**, 'Liposomes for entrapping local anesthetics: A liposome electrokinetic chromatographic study', **Electrophoresis**, vol 31, no. 9, pp. 1540-1549.
- Mallissery, SK, Nieger, M, Gudat, D **2010**, 'On the Surface Reactivity of Functionalized Phosphinines on Inorganic Supports', **Zeitschrift für anorganische und allgemeine Chemie**, vol 636, no. 7, pp. 1354-1360.
- Melchionna, M, Nieger, M, Helaja, J **2010**, 'Isolation of a Zwitterionic Dienegold(III) Complex Intermediate in the Direct Conversion of Enyne-Amines to Cyclopentadienes', **Chemistry: A European Journal**, vol 16, no. 28, pp. 8262-8267.
- Mohamadou, A, van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2010**, 'Synthesis, crystal structure, hydrogen bonding and spectroscopy of Co³⁺, Mn³⁺ and Ni²⁺ oxalate complexes with the ligand (N,N'-bis(2-pyridylmethyl)-1,3-propanediamine)', **Inorganica Chimica Acta**, vol 363, pp. 3023-3027.
- Mohamadou, A, van Albada, GA, Mutikainen, I, Turpeinen, U, Reedijk, J **2010**, 'A novel hexagonal honeycomb K-Cr-oxalate anionic network with layers separated by a five-coordinated Cu(II)-pypn complex (pypn = N,N'-bis(2-pyridylmethyl)-1,3-propanediamine). Synthesis, characterisation, spectroscopy and crystal structure of {[KCr(C₂O₄)(3)][Cu(pypn)(H₂O)](H₂O)(4)}', **Inorganic Chemistry Communications**, vol 13, no. 10, pp. 1221-1224.
- Mumm, F, Kemell, M, Leskelä, M, Sikorski, P **2010**, 'A bio-originated porous template for the fabrication of very long, inorganic nanotubes and nanowires', **Bioinspiration & Biomimetics**, vol 5, no. 2, pp. art. 026005.
- Murali, M, Nayak, S, Sanchez Costa, J, Ribas, J, Mutikainen, I, Turpeinen, U, Clemancey, M, Garcia-Serres, R, Latour, J, Gamez, P, Blondin, G, Reedijk, J **2010**, 'Discrete Tetrairon(III) Cluster Exhibiting a Square-Planar Fe-4(mu₄-O) Core: Structural and Magnetic Properties', **Inorganic Chemistry**, vol 49, pp. 2427-2434.
- Niinistö, J, Mäntymäki, M, Kukli, K, Costelle, L, Puukilainen, E, Ritala, M, Leskelä, M **2010**, 'Growth and phase stabilization of HfO₂ thin films by ALD using novel precursors', **Journal of Crystal Growth**, vol 312, no. 2, pp. 245-249.
- Nygard, K, Gorelick, S, Vila-Comamala, J, Farm, E, Bergamaschi, A, Cervellino, A, Gozzo, F, Patterson, BD, Ritala, M, David, C **2010**, 'Beam-induced damage on diffractive hard X-ray optics', **Journal of Synchrotron Radiation**, vol 17, pp. 786-790.
- Orola, L, Veidis, MV, Mutikainen, I, Arais, R **2010**, 'The Crystal and Molecular Structure of Atipamezole Base and Atipamezole Hydrochloride', **Journal of Chemical Crystallography**, vol 40, pp. 302-305.
- Pelto, J, Haimi, S, Puukilainen, E, Whitten, PG, Spinks, GM, Bahrami-Samani, M, Ritala, M, Vuorinen, T **2010**, 'Electroactivity and biocompatibility of polypyrrole-hyaluronic acid multi-walled carbon nanotube composite', **Journal of Biomedical Materials Research. Part A**, vol 93A, pp. 1056-1067.
- Plietzsch, O, Schilling, CI, Nieger, M, Muller, T, Braese, S **2010**, 'Asymmetric synthesis of chiral tectons with tetrapodal symmetry: fourfold asymmetric reactions', **Tetrahedron: Asymmetry**, vol 21, no. 11-12, pp. 1474-1479.
- Puranen, A, Linnolahti, M, Piel, T, Elo, P, Mutikainen, I, Pakkanen, T, Löfgren, B, Aitola, E, Seppälä, J, Leskelä, M, Repo, T **2010**, 'Rotating Benzyl Substituent in ansa-Bis(indenyl)zirconocenes Controls Propene Polymerization', **Organometallics**, vol 29, pp. 4018-4024.
- Pärssinen, A, Kohlmayr, M, Leskelä, M, Lahcini, M, Repo, T **2010**, 'Catalytic Polymerization of ε-Caprolactone in Air', **Polymer Chemistry**, vol 2010, no. 1, pp. 834-836.
- Pärssinen, A, Luhtanen, T, Pakkanen, T, Leskelä, M, Repo, T **2010**, 'Ethene Polymerization Behavior of MAO-Activated Dichloridotitanium Complexes Bearing Bi- and Tetradentate Salicylaldehyde Derivatives', **European Journal of Inorganic Chemistry**, vol 2010, no. 2, pp. 266-274.
- Ritala, H, Kiihamäki, J, Heikkilä, M **2010**, 'Studies on aluminium corrosion during and after HF vapour treatment', **Microelectronic Engineering**, vol 87, no. 3, pp. 501-504.
- Rose, M, Niinistö, J, Ender, I, Bartha, JW, Kücher, P, Ritala, M **2010**, 'In Situ Reaction Mechanism Studies on Ozone-Based Atomic Layer Deposition of Al₂O₃ and HfO₂', **ACS Applied Materials & Interfaces**, vol 2, no. 2, pp. 347-350.
- Räsänen, MT, Klinga, M, Leskelä, M, Nieger, M, Repo, T **2010**, 'Structural and spectroscopic characterization of Cu(salen) complexes bearing long alkoxy chains', **Journal of Coordination Chemistry**, vol 63, no. 24, pp. 4280-4289.
- Rüger, AJ, Nieger, M, Es-Sayed, M, Bräse, S **2010**, 'Novel 2,5-Disubstituted 1,3-Dioxanes and Oxazolidines as Potential Chemoprevention Agents and Building Blocks for Organic Synthesis', **European Journal of Organic Chemistry**, vol 2010, no. 20, pp. 3837-3846.
- Schmid, D, Bubrin, D, Förster, D, Nieger, M, Roeben, E, Strobel, S, Gudat, D **2010**, 'Unsymmetrically substituted N-heterocyclic phosphonium ions', **Comptes Rendus. Chimie**, vol 13, no. 8-9, pp. 998-1005.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

- Schulz, S, Kuczkowski, A, Nieger, M, Saxell, H **2010**, 'Structural characterization of a completely alkyl-substituted Al-Sb Lewis acid-base adduct', **Journal of Organometallic Chemistry**, vol 695, no. 21, pp. 2281-2283.
- Schulz, S, Kuczkowski, A, Nieger, M **2010**, 'Lewis Acid-Base Adduct Me₃Sb-Ga(t-Bu)(3)', **Journal of Chemical Crystallography**, vol 40, no. 12, pp. 1163-1166.
- Schulz, F, Sumerin, V, Leskela, M, Repo, T, Rieger, B **2010**, 'Frustrated Lewis pairs: reactivities of TMS protected amines and phosphines in the presence of B(C₆F₅)(3)', **Dalton Transactions**, vol 39, no. 8, pp. 1920-1922.
- Sivakov, VA, Höflich, K, Becker, M, Berger, A, Stelzner, T, Elers, K, Pore, V, Ritala, M, Chrsitansen, SH **2010**, 'Silver Coated Platinum Core-Shell Nanostructures on Etched Si Nanowires: Atomic Layer Deposition (ALD) Processing and Application in SERS', **ChemPhysChem**, vol 11, no. 9, pp. 1995-2000.
- Streubel, R, Perez, JM, Helten, H, Daniels, J, Nieger, M **2010**, 'Developing click reactions of a 3-ferrocenyl-2H-azaphosphirene complex', **Journal of the Chemical Society. Dalton Transactions**, vol 39, no. 47, pp. 11445-11450.
- Sundberg, MR, Ugglä, RÅM, Sillanpää, RJ, Zborowski, KK, Sanchez-Gonzalez, A, Matikainen, JKT, Kaltia, SAA, Hase, TA **2010**, 'Adduct formed by chromium trioxide and zwitterionic quinolinic acid', **Central European Journal of Chemistry**, vol 8, no. 3, pp. 486-493.
- Suni, NM, Haapala, M, Färm, E, Härkönen, E, Ritala, M, Sainiemi, L, Franssila, S, Kotiaho, T, Kostainen, R **2010**, 'Fabrication of nanocluster silicon surface with electric discharge and the application in desorption/ionization on silicon-mass spectrometry', **Lab On a Chip**, vol 10, no. 13, pp. 1689-1695.
- Tamm, A, Heikkilä, M, Kemell, M, Kozlova, J, Kukli, K, Sammelselg, V, Ritala, M, Leskelä, M **2010**, 'Atomic layer deposition and characterization of zirconium oxide-erbium oxide nanolaminates', **Thin Solid Films**, vol 519, no. 2, pp. 666-673.
- Tamm, A, Kemell, M, Kozlova, J, Sajavaara, T, Tallarida, M, Kukli, K, Sammelselg, V, Ritala, M, Leskelä, M **2010**, 'Atomic Layer Deposition and Characterization of Erbium Oxide-Doped Zirconium Oxide Thin Films', **Journal of the Electrochemical Society**, vol 157, no. 10, pp. G193-G201.
- Tang, J, Nayak, S, Sanchez Costa, J, Robertazzi, A, Pievo, R, Mutikainen, I, Roubeau, O, Teat, SJ, Gamez, P, Reedijk, J **2010**, 'Manganese(III)-mediated cyclodimerization of a hydrazinyl derivative generating an unprecedented 1,2,3,5,6-substituted leuco-verdazyl ring', **Dalton Transactions**, vol 39, pp. 1361-1365.
- Viciano-Chumillas, M, de Ruiter, G, Tanase, S, Smits, JMM, de Gelder, R, Mutikainen, I, Turpeinen, U, de Jongh, LJ, Reedijk, J **2010**, 'High nuclearity manganese(III) compounds containing phenol-pyrazole ligands: the influence of the ligand on the core geometry', **Dalton Transactions**, vol 39, pp. 4991-4998.
- Vila-Comamala, J, Gorelick, S, Guzenko, VA, Färm, E, Ritala, M, David, C **2010**, 'Dense high aspect ratio hydrogen silsesquioxane nanostructures by 100 keV electron beam lithography', **Nanotechnology**, vol 21, no. 28, pp. 285305.
- van Albada, GA, van der Horst, MG, Bijvoets, SM, Mutikainen, I, Turpeinen, U, Reedijk, J **2010**, 'New Cu(II) compounds with ligands synthesized through nucleophilic addition of pyrazoles to dicyanamide. Synthesis, crystal structures and spectroscopy', **Polyhedron**, vol 29, no. 12, pp. 2473-2480.
- van den Bos, ED, Mutikainen, I, Turpeinen, U, van Albada, GA, Haasnoot, JG, Reedijk, J **2010**, 'Two Different Compounds Formed from Copper(II) tetrafluoroborate and [1,2,4]triazolo[1,5-a]pyrimidine. Synthesis, Spectroscopy and Single-Crystal Structures', **Journal of Chemical Crystallography**, vol 40, pp. 656-660.

A2 Review in scientific journal

2005

Kemell, M, Ritala, M, Leskelä, M **2005**, 'Thin film deposition methods for CuInSe₂ solar cells', **Critical Reviews in Solid State & Materials Sciences**, vol 30, no. 1, pp. 1-31.

2006

Leskelä, M, Kukli, K, Ritala, M **2006**, 'Rare-earth oxide thin films for gate dielectrics in microelectronics', **Journal of Alloys and Compounds**, vol 418, no. 1-2, pp. 27-34.

Melnik, M, Sundberg, MR, Garaj, J **2006**, 'Structural and computational characterization of Fe-M bonds (M = Ru or Os): From heterobinuclear compounds to oligonuclear iron clusters', **Inorganica Chimica Acta**, vol 359, no. 3, pp. 727-735.

2007

Leskelä, M, Kemell, M, Kukli, K, Pore, V, Santala, E, Lu, J, Ritala, M **2007**, 'Exploitation of atomic layer deposition for nanostructured materials', **Materials Science & Engineering, C, Biomimetic Materials, Sensors and Systems**, vol 27, pp. 1504-1508.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

2008

Melnik, M, Ondrejovicova, I, Sundberg, MR, Holloway, CE **2008**, 'Crystallographic and structural analysis of iron heterometallic compounds: Part III. Heterotetranuclear compounds', **Reviews in Inorganic Chemistry**, vol 28, no. 4-6, pp. 237-456.

2009

Balducci, G, Ciccio, A, De Maria, G, Hodaj, F, Rosenblatt, GM, Leskelä, M **2009**, 'Teaching high-temperature materials chemistry at university', **Pure and Applied Chemistry**, vol 81, pp. 299-338.

Ikkala, O, Ras, RHA, Houbenov, N, Ruokolainen, J, Pääkkö, M, Laine, J, Leskelä, M, Berglund, LA **2009**, 'Solid state nanofibers based on self-assemblies: from cleaving from self-assemblies to multilevel hierarchical constructs', **Faraday Discussions**, vol 143, pp. 95-107.

Niinistö, J, Kukli, K, Heikkilä, M, Ritala, M, Leskelä, M **2009**, 'Atomic layer deposition of high-k oxides of the group 4 metals for memory applications', **Advanced Engineering Materials**, vol 11, no. 4, pp. 223-234.

A3 Contribution to book/other compilations (refereed)

2006

Kukli, K, Ritala, M, Leskelä, M **2006**, 'Impact of Atomic Layer Deposition Chemistry to the Quality of High-Permittivity Metal Oxide Thin Solid Films', in S Dueñas, H Castán (eds), **New Materials and Processes for Incoming Semiconductor Technologies, Transworld Research Network, Trivandrum, Kerala, India**, pp. 1-40.

2007

Niinistö, J, Päiväsaari, J, Myllymäki, P, Dezelah, C, Winter, CH, Putkonen, M, Nieminen, M, Niinistö, L **2007**, 'Atomic layer deposition of rare earth oxides', in M Fanciulli, G Scarel (eds), **Rare Earth Oxide Thin Films. Growth, Characterization, and Applications, Topics in applied physics, vol. 106, Springer, Berlin**, pp. 15-32.

2008

Grafov, A **2008**, 'Russian translation of terms and Russian key', in A Grafov, E Mano (eds), **Nine Language Dictionary of Polymers and Composites, John Wiley & Sons cop., Hoboken**.

Grafov, A, Mano, E **2008**, 'English terms', in A Grafov, E Mano (eds), **Nine Language Dictionary of Polymers and Composites, John Wiley & Sons cop., Hoboken**.

Ritala, M, Niinistö, J **2008**, 'Atomic layer deposition', **Chemical vapour deposition, Royal Society of Chemistry, Cambridge**, pp. 158-206.

2009

Lindroos, S, Leskelä, M **2009**, 'Successive Ionic Layer Adsorption and Reaction (SILAR) and Related Sequential Solution-Phase Deposition Techniques', in DB Mitzi (ed.), **Solution Processing of Inorganic Materials, Wiley, Hoboken, New Jersey**, pp. 239-282.

A4 Article in conference publication (refereed)

2005

Aaltonen, T, Ritala, M, Leskelä, M **2005**, 'Atomic Layer Deposition of Noble Metals', in **Proceedings of Advanced Metallization Conference 2004**, pp. 663-667 **MRS Conference Proceedings Series, vol. 20**.

Alen, P, Ritala, M, Leskelä, M **2005**, 'Atomic Layer Deposition of Molybdenum Nitride Films', in **Advanced Metallization Conference 2004 (AMC 2004)**, pp. 763-768 **MRS Conference Proceedings Series, vol. 20**.

Dueñas, S, Castán, H, García, H, Barbolla, J, Kukli, K, Ritala, M, Leskelä, M **2005**, 'Electrical characterization of atomic-layer-deposited hafnium silicate for alternative gate dielectric application', in **2005 Spanish Conference on Electron Devices: Proceedings**, pp. 45-48.

Dueñas, S, Castán, H, García, H, Barbolla, J, Kukli, K, Aarik, J, Ritala, M, Leskelä, M **2005**, 'A comparative study of atomic layer deposited advanced high-k dielectrics', in **2005 Spanish Conference on Electron Devices**, pp. 29-32.

Kozlov, V, Leskelä, M, Sipilä, H **2005**, 'Annealing and characterisation of TiBr crystals for detector applications', in **6th International Workshop on Radiation Imaging Detectors - Radiation Imaging Detectors 2004**, pp. 200-204.

Laakkonen, P, Turunen, J, Pietarinen, J, Siitonen, S, Laukkanen, J, Jefimovs, K, Orava, J, Ritala, M, Pilvi, T, Tuovinen, H, Ventola, K, Vallius, T, Kaipainen, M, Kuitinen, M **2005**, 'Diffractive optics in industry and research: novel components for optical security systems', in **Optical Security Systems (Proceedings Volume) / Editor(s): Zbigniew Jaroszewicz; Sergei Y. Popov; Frank Wyrowski. - SPIE-The International Society for Optical Engineering, 2005**, pp. art no 595402.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

Leskelä, M, Aaltonen, T, Hämäläinen, J, Niskanen, AJ, Ritala, MK **2005**, 'Atomic Layer Deposition of Metal Thin Films', in **EUROCV-15: Fifteenth European Conference on Chemical Vapor Deposition**, pp. 545-554.

2006

Dueñas, S, Castán, H, Garcia, H, Bailón, L, Kukli, K, Ritala, M, Leskelä, M **2006**, 'Electrical Defects in Atomic Layer Deposited HfO₂ Films on Silicon: Influence of Precursor Chemistries and Substrate Treatment', in **NATO Science Series II : Mathematics, Physics and Chemistry**, pp. 287-298.

Kozlov, V, Leskelä, M, Kemell, M, Sipilä, H **2006**, *Effects of polishing and etching on T1Br single crystals*, Paper presented at **7th International Workshop on Radiation Imaging Detectors, Grenoble, France**. 04. - 07. July, 2005. Nuclear Instruments & Methods in Physics Research. Section A: Accelerators, Spectrometers, Detectors, and Associated Equipment 563 1 ELSEVIER BV.

Kukli, K, Dueñas, S, Castán, H, Garcia, H, Barbolla, J, Aarik, J, Aidla, A, Ritala, M, Leskelä, M **2006**, 'Disordered Structure and Density of Gap States in High-Permittivity Thin Solid Films', in **Defects in High-k Gate Dielectric Stacks: Nano-Electronic Semiconductor Devices**, pp. 123-134 **NATO Science Series II. Mathematics, Physics and Chemistry**, vol. 220.

2007

Dueñas, S, Castán, H, Garcia, H, Gómez, A, Bailón, L, Kukli, K, Hatanpää, T, Lu, J, Ritala, M, Leskelä, M **2007**, *Study of Atomic Layer Deposited Gadolinium Oxide Thin Films on Silicon*, Paper presented at **2007 MRS Spring Meeting, San Francisco**, United States. 09. - 13. April, 2007. Materials Research Society Symposia Proceedings 996 NORTH-HOLLAND.

Dueñas, S, Castán, H, Garcia, H, Bailón, L, Kukli, K, Ritala, M, Leskelä, M **2007**, 'Electrical Characterization of High-k Dielectrics by Means of Flat-Band Voltage Transient Recording', in **Materials Research Society Symposium Proceedings**, pp. 169 -174.

Kozlov, V, Kemell, M, Vehkamäki, M, Leskelä, M **2007**, 'Degradation effects in T1Br single crystals under prolonged bias voltage', in **8th International Workshop on Radiation Imaging Detectors**, pp. 10-14.

Kozlov, V, Leskelä, M, Vehkamäki, M, Sipilä, H **2007**, 'Effects of metallisation on T1Br single crystals for detector applications', in **7th International Conference on Position-Sensitive Detectors**, pp. 212-215.

Leskelä, M, Kemell, M, Lautala, M, Pilvi, T, Pore, V, Santala, E, Ritala, M **2007**, 'Atomic layer deposition in nanotechnology applications', in **Abstracts of Papers: 234th ACS National Meeting**, pp. INOR-413.

Leskelä, M, Kemell, M, Pore, V, Santala, E, Ritala, M **2007**, 'Photocatalytic nanofibers and nanotubes made by atomic layer deposition', in **Abstracts of Papers, 233rd ACS National Meeting**, pp. INOR-028.

Mäkelä, JM, Keskinen, H, Aromaa, M, Hupa, L, Piispanen, M, Deppert, K, Persson, S, Lang, M, Gunnarsson, G, Pimenoff, J, Kronberg, T, Pore, V, Ritala, M, Raulio, M, Salkinoja-Salonen, MS, Airaksinen, VM **2007**, 'A Nordic Project on Enhanced Functionality of Self-cleaning and Antibacterial Surface Coatings (FUNCOAT)', in **10th International Conference and Exhibition of European Ceramic Society, Berlin 2007, Extended Abstracts: Proceeding**.

2008

Chen, T, Cameron, TM, Nguyen, SD, Stauf, GT, Peters, DW, Maylott, L, Li, W, Xu, C, Roeder, JF, Hendrix, BC, Hilgarth, M, Niinistö, J, Kukli, K, Ritala, M, Leskelä, M **2008**, *Novel Zirconium Precursors for Atomic Layer Deposition of ZrO₂ Films*, Paper presented at **ECS Meeting: Atomic Layer Deposition Applications 4, Honolulu**, United States. 12. - 17. October, 2008. ECS transactions 16 4 Electrochemical Society, Inc..

Kozlov, V, Andersson, H, Gostilo, V, Leskelä, M, Owens, A, Shorohov, M, Sipilä, H **2008**, 'Improved process for the T1Br single-crystal detector', in **9th International Workshop on Radiation Imaging Detectors**, pp. 209-212.

Lahtinen, P, Weymarn, NV, Lankinen, E, Repo, T, Leskelä, M, Kallioinen, A, Uusitalo, J, Siika-aho, M, Tamminen, T **2008**, 'Catalytic Pre-treatment of Lignocellulosic Raw Materials', in **10th European Workshop on Lignocellulosics and Pulp**, pp. 16-19.

Suni, N, Haapala, M, Mäkinen, A, Sainiemi, L, Franssila, S, Färm, E, Ritala, M, Puukilainen, E, Kostainen, R **2008**, 'Electric discharge method for selective surface modification in the fabrication on microfluidic structures', in **Proceedings of μ TAS 2008**, pp. 898-900.

2009

Castán, H, Dueñas, S, García, H, Gómez, A, Bailón, L, Kukli, K, Niinistö, J, Ritala, M, Leskelä, M **2009**, 'Study of Atomic Layer Deposited Zirconium Oxide Thin Films by Using Mono-Cyclopentadienyl Based Precursors', in **Proceedings of the 2009 Spanish Conference on Electron Devices**, pp. 8-11.

García, H, Dueñas, S, Castán, H, Gómez, A, Bailón, L, Hatanpää, T, Aarik, J, Aidla, A, Ritala, M, Leskelä, M **2009**, 'Electrical characterization of high-k based MIS capacitors using flat-band voltage transients', in **Proceedings of the 2009 Spanish Conference on Electron Devices**, pp. 223-226.

Gómez, A, Dueñas, S, Castán, H, García, H, Bailón, L, Kukli, K, Niinistö, J, Ritala, M, Leskelä, M **2009**, 'Electrical characterization of ZrO₂-based MIS structures with highly doped Si substrates', in **Proceedings of the 2009 Spanish Conference on Electron Devices**, pp. 227-230.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

Kostamo, P, Shorohov, M, Gostilo, V, Sipilä, H, Kozlov, V, Lisitsky, IS, Kouznetsov, MS, Lankinen, A, Danilewsky, AN, Lipsanen, H, Leskelä, M **2009**, 'Characterization of TlBr for X-ray and γ -ray detector applications', in **10th International Workshop on Radiation Imaging Detectors**, pp. 129-131.

Kozlov, V, Andersson, H, Gostilo, V, Kemell, M, Kostamo, P, Kouznetsov, MS, Leskelä, M, Lipsanen, H, Lisitsky, IS, Shorohov, M, Sipilä, H **2009**, 'Improvements and problems of Bridgman-Stockbarger method for fabrication of TlBr single crystal detectors', in **10th International Workshop on Radiation Imaging Detectors**, pp. 126-128.

Nissilä, T, Sainiemi, L, Karikko, M, Kemell, ML, Ritala, M, Franssila, S, Kostiaainen, R, Ketola, R **2009**, 'TiO₂-Microchip combined to mass spectrometer for mimicking phase I metabolic reactions', in **Proceedings of the 13th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μTAS 2009), November 1-5, Jeju, Korea**, pp. 1922-1924.

Ritala, M, Pore, V, Hatanpää, T, Heikkilä, M, Leskelä, M, Schrott, A, Raoux, S, Rossnagel, SM **2009**, 'Atomic Layer Deposition of Germanium Antimony Telluride Thin Films', in **Proceedings: European/Phase Change and Ovonic Symposium, 6th-8th September, 2009 in Aachen, Germany / hosted by Dr. Martin Salinga and Prof.Dr. Matthias Wuttig**, pp. 151-156.

Suni, N, Haapala, M, Färm, E, Ritala, M, Kotiaho, T, Sainiemi, L, Franssila, S, Kostiaainen, R **2009**, 'Fabrication of Silicon Nanostructures with Electric Discharge', in **13th International Conference on Miniaturized Systems for Chemistry and Life Sciences**, pp. 254-256.

Tamminen, T, Alakurtti, S, von Weymar, N, Repo, T, Lahtinen, P **2009**, 'Chemistry of Catalysed Oxygen Delignification', in **15th International Symposium on Wood, Fiber and Pulping Chemistry (ISWFPC): Proceedings**, pp. O-061.

Tamminen, T, Leskelä, M, Argyropoulos, D, Viikari, S, Kolppo, K, Wiiför, S, Poppius-Levlin, K, Fernyhough, A, Lucia, L **2009**, 'Lignin:Val Added Value to Lignin', in **Science & Technology of Biomasses: Advances and Challenges**, pp. 121-124.

Vila-Comamala, J, Jefimovs, K, Pilvi, T, Ritala, M, Sarkar, SS, Solak, HH, Guzenko, VA, Stampanoni, M, Marone, F, Raabe, J, Tzvetkov, G, Fink, RH, Grolimund, D, Borca, CN, Kaulich, B, David, C **2009**, *Advanced x-ray diffractive optics*, Journal of Physics : Conference Series 186 1 Institute of Physics Publishing .

2010

Nikolaou, N, Dimitrakis, P, Normand, P, Giannakopoulos, K, Mergia, K, Ioannou-Sougleridis, V, Kukli, K, Niinistö, J, Ritala, M, Leskelä, M **2010**, 'Charge trapping memories with atomic layer deposited high-k dielectrics capping layers', in **Materials Research Society Symposium Proceedings**, pp. 1250-G07-03.

Ryynänen, T, Nurminen, K, Hämäläinen, J, Leskelä, M, Leikkala, J **2010**, *pH electrode based on ALD deposited iridium oxide: Proc. Eurosensors XXIV, September 5-8, 2010, Linz, Austria.*, Paper presented at **Eurosensors XXIV Conference, Linz, Austria**. 05. - 08. September, 2010. Procedia Engineering 5 Elsevier.

Tamm, A, Kukli, K, Niinistö, J, Lu, J, Ritala, M, Leskelä, M **2010**, *Properties of HfO₂ and HfO₂:Y Films Grown by Atomic Layer Deposition in an Advanced Monocyclopentadienyl-based Process.*, Paper presented at **Fundamentals and Technology of Multifunctional Oxide Thin Films, Strasbourg, France**. 08. - 12. June, 2009. IOP Conference Series: Materials Science and Engineering 8 1 IOP Publishing.

Vila-Comamala, J, Dierolf, M, Kewish, CM, Thibault, P, Pilvi, T, Färm, E, Guzenko, V, Gorelick, S, Menzel, A, Bunk, O, Ritala, M, Pfeiffer, F, David, C **2010**, 'High Spatial Resolution STXM at 6.2 keV Photon Energy', in **Proceedings of the 20th International Congress on X-ray Optics and Microanalysis: AIP Conference Proceedings**, pp. 80-84 .

B3 Unrefereed article in conference proceedings

2005

Kurten, TC, Sundberg, M, Torpo, LM, Vehkamäki, H, Kulmala, M **2005**, 'Ab initio and QAIM calculations on sulfuric acid hydrates and ammonium bisulfate', in **Proceedings of the NOSA Aerosol Symposium**.

2007

Kurten, T, Torpo, L, Vehkamäki, H, Sundberg, MR, Laasonen, K, Kerminen, V, Noppel, M, Salonen, M, Kulmala, M **2007**, 'Investigating the Role of Ammonia in Atmospheric Nucleation', in **Nucleation and atmospheric aerosols**, pp. 52-56.

2008

Kurten, T, Torpo, L, Sundberg, MR, Vehkamäki, H, Kulmala, M **2008**, 'The role of ammonia in neutral atmospheric sulfuric acid nucleation', in **Proceedings of the Nordic Center of Excellence BACCI (Biosphere-Atmosphere-Cloud-Climate Interactions) and the Finnish Center of Excellence 'Research Unit on Physics, Chemistry and Biology of Atmospheric Composition Climate Change' activities in 2002-2007 / editors: Markku Kulmala, Jaana Bäck and Martta Salonen**, pp. 99-102 Report series in aerosol science, no. 93.

Toivola, M, Kurten, TC, Sundberg, M, Vehkamäki, H **2008**, 'Quantum chemical calculations of the binding energies of (H₂SO₄)₂, HOSO₂ x H₂SO₄ and HOSO₄ x H₂SO₄', in **Nucleation and Atmospheric Aerosols, Part I: 17th International Conference on Nucleation and Atmospheric Aerosols ICNAA**, pp. 218-221.



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

C2 Edited book, compilation, conference proceeding or special issue of journal

2008

Grafov, A, Mano, E (eds) **2008**, *Nine Language Dictionary of Polymers and Composites*, John Wiley & Sons cop., Hoboken.

D1 Article in professional journal

2007

Leskelä, M **2007**, 'Nanoputket – tieteellistä leikkiä vai hyödyllistä tutkimusta', *Sphinx*, vol 2006-2007, pp. 93-100.

D2 Article in professional hand or guide book or in a professional data system, or text book material

2009

Ritala, M, Niinistö, J **2009**, 'Atomic Layer Deposition ', in AC Jones, MJ Hitchman (eds), *Chemical Vapour Deposition . Precursors, Processes and Applications .*, Royal Society of Chemistry, pp. 158-

D5 Text book or professional handbook or guidebook or dictionary

2005

Leskelä, M, Hannola-Teitto, M, Jokela, R, Näsäkkälä, E, Pohjakallio, M, Rassi, M **2005**, *Neon 2: Kemian mikromaailma*, Edita, Helsinki.

2006

Leskelä, M, Hannola-Teitto, M, Jokela, R, Näsäkkälä, E, Pohjakallio, M, Rassi, M **2006**, *Neon 3: Reaktiot ja energia*, Edita, Helsinki.

Leskelä, M, Hannola-Teitto, M, Jokela, R, Näsäkkälä, E, Pohjakallio, M, Rassi, M **2006**, *Neon 4: Metallit ja materiaalit*, Edita, Helsinki.

2007

Leskelä, M, Hannola-Teitto, M, Jokela, R, Näsäkkälä, E, Pohjakallio, M, Rassi, M **2007**, *Neon 5: Reaktiot ja tasapaino*, Edita, Helsinki.

2008

Leskelä, M, Antila, A, Karppinen, M, Mölsä, H, Pohjakallio, M **2008**, *Tekniikan Kemia*, vol. 2008, 10.painos edn, Edita, Helsinki.

Leskelä, M, Hannola-Teitto, M, Jokela, R, Näsäkkälä, E, Pohjakallio, M, Rassi, M **2008**, *Neon: Kemian kertauskirja*, Edita, Helsinki.

2010

Lindroos, S (ed.) **2010**, *Epäorgaanisen kemian perustyöt 1 A*, Limes ry, Helsinki.

H1 Patents

2007

Hamalainen, J, Ritala, M, Leskela, M Jan. 18 2007, *Atomic Layer Deposition of Noble Metal Oxides*, 20070014919.

2009

Leskelä, M, Vehkamäki, M, Hatanpää, TT, Ritala, M Nov. 17 2009, *Process for Producing Bismuth-Containing Oxide Films*, 7,618,681 .

Niinistö, J, Ritala, M, Niskanen, A, Putkonen, M, Räisänen, P, Leskelä, M **2009**, *Method of depositing rare earth oxide thin films*, US 7498272.

Pore, V, Hatanpää, TT, Ritala, M, Leskelä, M **2009**, *Synthesis and Use of Precursors for ALD of Tellurium and Selenium Thin Films.*, US 2010/0009078 A1.

Pore, V, Hatanpää, TT, Ritala, M, Leskelä, M **2009**, *Methods for Forming Thin Films Comprising Tellurium*, 20090324821.

Pore, V, Ritala, M, Leskelä, M **2009**, *Methods for Forming of Conductive Titanium Oxides Thin Films*, 20090297696.

Vehkamäki, M, Hatanpää, T, Ritala, M, Leskelä, M **2009**, *Process for producing bismuth-containing oxide films* , 7,618,681 .



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

LIC/Leskelä

2010

Grafov, A, Leskelä, M Nov. 11 2010, *Novel Inorgano-bioorganic Nanocomposite Materials, Their Preparation and Use*, 20095502.

Hatanpää, T, Vehkamäki, M, Ritala, M, Leskelä, M **2010**, *Process for producing oxide films* , 7,713,584 .

Lahtinen, P, Kallioinen, A, Siika-aho, M, Suurnäkki, A, Tamminen, T, Uusitalo, J, Repo, T, Leskelä, M, von Weymarn, N Apr. 15 2010, *Menetelmä hiilihydraattipitoisen raaka-aineen prosessoimiseksi*, 120878.

Ritala, M, Hatanpää, TT, Vehkamäki, M, Leskelä, M May. 11 2010, *Process for Producing Oxide Films*, US 7713584 .



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

LIC/Leskelä

1 Analysis of activities 2005-2010

Associated person is one of Jahir Uddin Ahmad , Erkki Tapio Aitola , Petra Johanna Alen, Afnan Al-Hunaiti , afnan.al-hunaiti@helsinki.fi, Fedaa Al-Qaisi , Kirill Axenov, Timothee Blanquart , Pascal Castro, Kostiantyn Chemichenko , Pertti Elo , Santeri Feodorow , Elina Färm , Timo Tapio Andriy Grafov , Iryna Grafova , Hongfan Guo , Jani Hämäläinen , Hatunpää , Mikko Heikkilä , Helena Kristiina Hyvönen , Jarno Kansikas , Emma Härkönen , Jarkko Ihanus , Kaisa Pauliina Kervinen, Raikko T I Kivekäs, Martti Klinga, Kjell Maarit Kariniemi , Marianna Leena Kemell , Kaupo Kukli , Petro Lahtinen, Mikko Lankinen, Johan Patrik Knapas , Vasilij Kozlov , Markus Lindqvist , Seppo Lindroos , Kristian Päiviö Lappalainen, Markku Leskelä , Ilpo Mutikainen , Miia Mäntymäki , Ville Mikkulainen , Jaakko Niinistö , Antti Niskanen, Tero Pilvi , Martin Nieger , Arto Juhani Puranen , Esa Puukkilainen , Mika Tapio Polamo , Viljami Pore , Sari Rautiainen , Timo Repo , Mikko Ritala , Paul William Ryan, Minna Räisänen , Heikki Saarinen , Leo Salmi , Eero Santala , Tiina Sarnet , Victor Sumerin , Markku Sundberg , Jere Tupala , Imre Miklos Szilagyi , Markku Talja , Yoann Tomezak , Sirpa Elina Vuorinen , Urho Turpeinen, Jaana Valo , Marko Vehkamäki , Katariina Yliheikkilä

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	25
Prizes and awards	6
Editor of research journal	48
Peer review of manuscripts	23
Editor of series	3
Assessment of candidates for academic posts	10
Membership or other role in review committee	11
Membership or other role in national/international committee, council, board	34
Membership or other role in public Finnish or international organization	11
Participation in radio programme	3
Participation in interview for web based media	1



LIC/Leskelä

2 Listing of activities 2005-2010

Supervisor or co-supervisor of doctoral thesis

Markku Leskelä ,

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2005

Ohjaaja, Markku Leskelä, 2006

Ohjaaja, Markku Leskelä, 2006

Ohjaaja, Markku Leskelä, 2006

Ohjaaja, Markku Leskelä, 2006

Ohjaaja, Markku Leskelä, 2006

Ohjaaja, Markku Leskelä, 2007

Ohjaaja, Markku Leskelä, 2007

Ohjaaja, Markku Leskelä, 2007

Ohjaaja, Markku Leskelä, 2008

Ohjaaja, Markku Leskelä, 2008

Ohjaaja, Markku Leskelä, 2008

Ohjaaja, Markku Leskelä, 2009, Finland

Ohjaaja, Markku Leskelä, 2009, Finland

Ohjaaja, Markku Leskelä, 2010, Finland

Ohjaaja, Markku Leskelä, 2010, Finland

Ohjaaja, Markku Leskelä, 2010

Mikko Ritala ,

Supervisor of PhD thesis, Mikko Ritala, 1996 → ...

Prizes and awards

Markku Leskelä ,

Finnish Academy of Science and Letters, member, Markku Leskelä, 1991 → ...

Finnish Academy of Technical Sciences, member, Markku Leskelä, 1996 → ...

ISI Highly cited scientist (materials science), Markku Leskelä, 2004 → ...

Finnish Society of Sciences and Letters, member, Markku Leskelä, 2005 → ...

Knight (First Class), Order of the White Rose of Finland, Markku Leskelä, 2005

Mikko Ritala ,

Award - Alfred Kordelin foundation, Mikko Ritala, 06.11.2010, Finland

Editor of research journal



INTERNATIONAL EVALUATION OF RESEARCH AND DOCTORAL TRAINING AT THE
UNIVERSITY OF HELSINKI

RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

LIC/Leskelä

Markku Leskelä ,

Applied Physics Letters, Markku Leskelä, 31.07.2006 → 31.12.2006, United States
Chemical Vapour Deposition, Markku Leskelä, 08.05.2006 → 31.12.2006, United Kingdom
Chemistry of Materials, Markku Leskelä, 01.01.2006 → 31.12.2006, United States
Electrochemical and Solid State Letters, Markku Leskelä, 15.01.2006 → 24.10.2006, United States
Electrochemistry Communications, Markku Leskelä, 22.09.2006 → 31.12.2006, Netherlands
European Journal of Inorganic Chemistry, Markku Leskelä, 01.01.2006 → 31.12.2006, Germany
Inorganic Chemistry, Markku Leskelä, 22.12.2006 → 31.12.2006, United States
International Journal of Photoenergy, Markku Leskelä, 05.04.2006 → 31.12.2006, Egypt
Journal of Alloys and Metals, Markku Leskelä, 02.06.2006 → 31.12.2006, Netherlands
Journal of Applied Physics, Markku Leskelä, 09.02.2006 → 23.02.2006, United States
Journal of Materials Chemistry, Markku Leskelä, 02.01.2006 → 31.12.2006, United Kingdom
Journal of Photochemistry and Photobiology A, Markku Leskelä, 29.01.2006 → 31.12.2006, Netherlands
Journal of Physical Chemistry, Markku Leskelä, 01.01.2006 → 31.12.2006, United States
Journal of Solid State Chemistry, Markku Leskelä, 01.01.2006 → 31.12.2006, United States
Journal of Vacuum Science and Technology, Markku Leskelä, 06.02.2006 → 31.12.2006, United States
Journal of the American Chemical Society, Markku Leskelä, 01.01.2006 → 31.12.2006, United States
Journal of the Electrochemical Society, Markku Leskelä, 01.01.2006 → 31.12.2006, United States
Langmuir, Markku Leskelä, 28.07.2006 → 31.12.2006, United States
Materials Research Bulletin, Markku Leskelä, 01.01.2006 → 31.12.2006, United States
Optical Materials, Markku Leskelä, 24.11.2006 → 31.12.2006
Thin Solid Films, Markku Leskelä, 01.01.2006 → 31.12.2006, Netherlands
Applied Physics Letters, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Chemical Vapor Deposition, Markku Leskelä, 01.01.2007 → 31.12.2007, United Kingdom
Chemistry of Materials, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Critical Reviews in Solid State Science, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Electrochemical Communications, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands
Electrochemical and Solid State Letters, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
European Journal of Inorganic Chemistry, Markku Leskelä, 01.01.2007 → 31.12.2007, Germany
European Polymer Journal, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands
Journal of Applied Physics, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Journal of Crystal Growth, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands
Journal of Nanoscience and Nanotechnology, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands
Journal of Physical Chemistry, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Journal of Solid State Chemistry, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Journal of Thermal Analysis and Calorimetry, Markku Leskelä, 01.01.2007 → 31.12.2007, United Kingdom
Journal of organometallic Chemistry, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands
Journal of the American Chemical Society, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Journal of the Electrochemical Society, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Langmuir, Markku Leskelä, 01.01.2007 → 31.12.2007, United States
Materials Chemistry and Physics, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands



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RC-SPECIFIC TUHAT COMPILATIONS OF OTHER SCIENTIFIC ACTIVITIES 2005-2010

LIC/Leskelä

Materials Science in Semiconductor Processing, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands

Optical materials, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands

Powder technology, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands

Research Letters in Materials Science, Markku Leskelä, 01.01.2007 → 31.12.2007, Egypt

Solid State Ionics, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands

Surface and Coating Technology, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands

Thin Solid Films, Markku Leskelä, 01.01.2007 → 31.12.2007, Netherlands

Martin Nieger ,

Acta Crystallographica Section E, Martin Nieger, 12.2010 → ..., United Kingdom

Peer review of manuscripts

Andriy Grafov ,

European Polymer Journal, Andriy Grafov, 2007 → ...

Crystal Research and Technology, Andriy Grafov, 2010 → ...

Helena Kristiina Hyvönen ,

Reviewer in solution chemistry, Helena Kristiina Hyvönen, 2007 → ...

Jarkko Ihanus ,

Journal of The Electrochemical Society, Jarkko Ihanus, 01.01.2005 → 31.12.2005, United States

Inorganic chemistry communication, Jarkko Ihanus, 01.01.2006 → 31.12.2006, Netherlands

Journal of the Electrochemical Society, Jarkko Ihanus, 01.01.2007 → 31.12.2007, United States

European Physical Journal - Applied Physics (The), Jarkko Ihanus, 01.01.2009 → 31.12.2009, France

Journal of the Electrochemical Society, Jarkko Ihanus, 01.01.2009 → 31.12.2009, United States

Marianna Leena Kemell ,

Chemical Vapor Deposition, Chemistry of Materials, Electrochemical and Solid-State Letters, Industrial & Engineering Chemistry Research, International Journal of Biological Macromolecules, Journal of Colloid and Interface Science, Journal of Crystal Growth, Journal of Electroanalytical Chemistry, Journal of Materials Chemistry, Journal of new materials for electrochemical systems, Journal of Sol-Gel Science and Technology, Journal of Solid State Chemistry, Journal of the American Chemical Society, Journal of the Electrochemical Society, Langmuir, Materials Chemistry and Physics, Materials Research Bulletin, Physica E, Physica Status Solidi A, Plasma Processes and Polymers, Polymer, Small, Thin Solid Films, Marianna Leena Kemell, 01.01.2002 → ...

Markku Leskelä ,

Journal of the Electrochemical Society, Journal of Thermal Analysis and Calorimetry, Journal of Vacuum Science and Technology A & B, Langmuir, Materials Chemistry and Physics, Materials Letters, Materials Research Bulletin, Materials Science in Semiconductor Processing, Nano Letters, Markku Leskelä, 2005 → ...

Lehdet: ACS Applied Materials and Interfaces, ACS Nano, Acta Materialia, Advanced Syntheses and Catalysis, Angewandte Chemie, Applied Physics Letters, Applied Surface Science, Bulletin of Chemical Society of Ethiopia, Catalyst Letters, Chemical Communications, Chemical Vapor Deposition, Dalton Transactions, European Journal of Inorganic Chemistry, European Polymer Journal, Inorganic Chemistry, Journal of Alloys Metals, Journal of Applied Physics, Journal of Crystal Growth, Journal of Luminescence, Journal of Materials Chemistry, Journal of Micromechanics and Microengineering, Journal of Nanoscience and Nanotechnology, Journal of Organometallic Chemistry, Journal of Photochemistry and Photobiology A, Journal of Physical Chemistry B and C, Journal of Solid State Chemistry, Journal of the American Chemical Society, Markku Leskelä, 2005 → ...

Nanoscale, Nature Nanotechnology, New Journal of Chemistry, Optical Materials, Organometallics, Physica Scripta, Physical Chemistry Chemical Physics, Physical Reviews B, Phosphorous, Sulfur, Silicon and Related Elements, Powder Technology, Progress in PhotoVoltaics, Rapid Communications in Mass Spectroscopy, Small, Solid State Ionics, Surface and Coating Technology, Thin Solid Films, Markku Leskelä, 2005 → ...

Seppo Lindroos ,

Materials Research Bulletin, Seppo Lindroos, 01.01.1999 → 31.12.2010

Applied Surface Science, Seppo Lindroos, 01.01.2001 → 31.12.2009, Netherlands

Electrochimica Acta, Seppo Lindroos, 01.01.2008 → 31.12.2008



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Journal Fizika (Zagreb), Seppo Lindroos, 01.01.2008 → 31.12.2008
Physics Letters A, Seppo Lindroos, 01.01.2008 → 31.12.2009
The Journal of Physical Chemistry, Seppo Lindroos, 01.01.2009 → 31.12.2009
Journal of Alloys and Compounds, Seppo Lindroos, 01.01.2010 → 31.12.2010

Esa Puukilainen ,

Referee/reviewer in materials science journal, Esa Puukilainen, 2010 → ...

Mikko Ritala ,

Referee/reviewer in various journals for repeated times, Mikko Ritala, 1993 → ...

Minna Räisänen ,

CrystEngComm, Minna Räisänen, 2010 → ...

Journal of Coordination Chemistry, Minna Räisänen, 2010 → ...

Editor of series

Markku Leskelä ,

Research Letters in Materials Science, Markku Leskelä, 2007 → 2009

Advances in Materials Science and Engineering, Markku Leskelä, 2009 → ...

Jordan Journal of Chemistry, Markku Leskelä, 2009 → ...

Assessment of candidates for academic posts

Markku Leskelä ,

Asiantuntija, Markku Leskelä, 2005, Finland

Asiantuntija, Markku Leskelä, 2006, Finland

Asiantuntija, Markku Leskelä, 2007, Finland

Asiantuntija, Markku Leskelä, 2007, Finland

Asiantuntija, Markku Leskelä, 2008, Netherlands

Asiantuntija, Markku Leskelä, 2008 → ..., Norway

Asiantuntija, Markku Leskelä, 2009, Norway

Asiantuntija, Markku Leskelä, 2010, Sweden

Asiantuntija, Markku Leskelä, 2010, Finland

Asiantuntija, Markku Leskelä, 2010, Malaysia

Membership or other role in review committee

Markku Leskelä ,

Asiantuntija, Markku Leskelä, 1993 → 2006, Finland

Asiantuntija, Markku Leskelä, 1997 → ..., United States

Asiantuntija, Markku Leskelä, 1998 → ..., Sweden

Asiantuntija, Markku Leskelä, 2003 → 2007, Singapore

Asiantuntija, Markku Leskelä, 2005 → 2007, Norway

Asiantuntija, Markku Leskelä, 2005 → ..., United States

Asiantuntija, Markku Leskelä, 2005, Sweden

Asiantuntija, Markku Leskelä, 2007 → 2011, Slovenia

Asiantuntija, Markku Leskelä, 2007, Spain

Asiantuntija, Markku Leskelä, 2007 → 2009, Netherlands



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Markku Sundberg ,

Science and Technology Assistance Agency, Slovakia, Markku Sundberg, 2005 → ..., Slovakia

Membership or other role in national/international committee, council, board

Andriy Grafov ,

Expert, Andriy Grafov, 2010, Belgium

Expert, Andriy Grafov, 2010 → ..., Bulgaria

Markku Leskelä ,

Hallituksen jäsen, Markku Leskelä, 1991 → 2011, Finland

Hallituksen jäsen, Markku Leskelä, 1992 → 2012, Finland

Hallituksen jäsen, Markku Leskelä, 1994 → 2012, Finland

hallituksen jäsen, Markku Leskelä, 1996 → 2012, Finland

Puheenjohtaja, Markku Leskelä, 2002 → ..., Finland

Hallituksen jäsen, Markku Leskelä, 2003 → 2010, Finland

Puheenjohtaja, Markku Leskelä, 2004 → 2008, Finland

Jäsen, Markku Leskelä, 2005 → 2010, Finland

IUPAC (International Union for Pure and Applied Chemistry), Division II, Markku Leskelä, 01.01.2006 → 31.12.2006, United States

Jäsen, Markku Leskelä, 2006 → 2009, United States

Kemian Päivien Säätiö, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Kemianteollisuus ry:n tieteellinen neuvottelukunta, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Kordelinin Säätiö, Gust Kompan rahasto, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Orionin tutkimussäätiö, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Outokumpu Oy:n tutkimussäätiö, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Suomalainen Tiedeakatemia, kemian ryhmä, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Suomalaisten Kemistien Seura, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Suomen Kemian Seura, Markku Leskelä, 01.01.2006 → 31.12.2006, Finland

Kemianteollisuus ry tieteellinen neuvottelukunta, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Kemian Päivien Säätiö, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Orion-Farmos tutkimussäätiö, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Outokumpu Oyn Säätiö, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Suomalainen Tiedeakatemia, kemian ryhmä, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Suomalaisten Kemistien Seura, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Suomen Kemian Seura, Markku Leskelä, 01.01.2007 → 31.12.2007, Finland

Jäsen, Markku Leskelä, 2008 → 2010, Finland

Member of board, Markku Leskelä, 2008 → 2013, Finland

Asiantuntijajäsen, Markku Leskelä, 2009 → ..., Finland

Hallituksen jäsen, Markku Leskelä, 2009 → ..., Finland

Jäsen, Markku Leskelä, 2009 → 2011, United States

Mikko Ritala ,

Member of the board, Mikko Ritala, 1999 → ...

Member of the board, Mikko Ritala, 2001 → 2009



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Membership or other role in public Finnish or international organization

Andriy Grafov ,

Expert, Andriy Grafov, 1998 → 2006, Belgium

Fellow, Andriy Grafov, 2002 → ..., United Kingdom

Expert, Andriy Grafov, 2009, Belgium

Markku Leskelä ,

Tieteellinen neuvosto, Markku Leskelä, 2004 → 2007

Tutkimusvararyhmä, Markku Leskelä, 2004 → 2007, Finland

Hallituksen jäsen, Markku Leskelä, 2009 → 2013, Finland

Timo Repo ,

Laitosneuvoston jäsen, Timo Repo, 2004 → 2009

Suomen Kemian Seuran synteettisen kemian jaosto, Timo Repo, 2004 → 2006, Finland

Suomen Puu- ja Polymeerikemian yhdistys, Timo Repo, 2007 → ..., Finland

EuChems, Timo Repo, 2008 → ...

COST/CMST, Timo Repo, 2010 → 2014

Participation in radio programme

Esa Puukilainen ,

Radio interview by Sisko Loikkanen, Esa Puukilainen, 11.11.2009, Finland

Radio interview by Sisko Loikkanen, Esa Puukilainen, 15.09.2010, Finland

Timo Repo ,

Radiohaastattelu, Timo Repo, 2010, Finland

Participation in interview for web based media

Timo Repo ,

Haastattelu, Timo Repo, 09.10.2007, Finland



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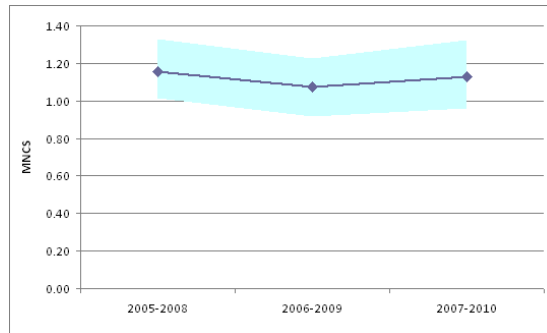
Web of Science(WoS)-based bibliometrics of the RC's publications data 1.1.2005-31.12.2010
by CWTS, Leiden University, the Netherlands

Research Group: Leskelä M

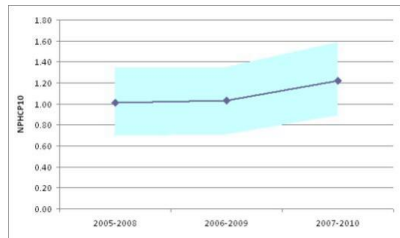
Basic statistics

Number of publications (P)	447
Number of citations (TCS)	2,003
Number of citations per publication (MCS)	4.48
Percentage of uncited publications	28%
Field-normalized number of citations per publication (MNCS)	1.14
Field-normalized average journal impact (MNJS)	1.19
Field-normalized proportion highly cited publications (top 10%)	1.16
Internal coverage	.79

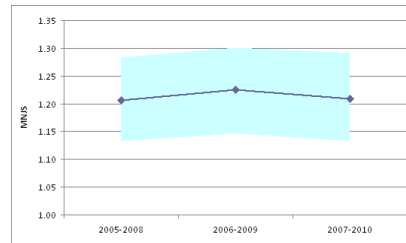
Trend analyses



MNCS

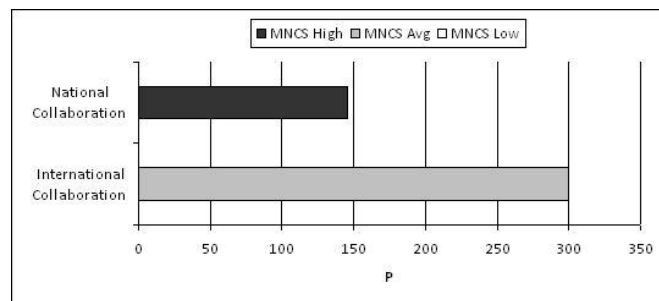


THCP10



MNJS

Collaboration



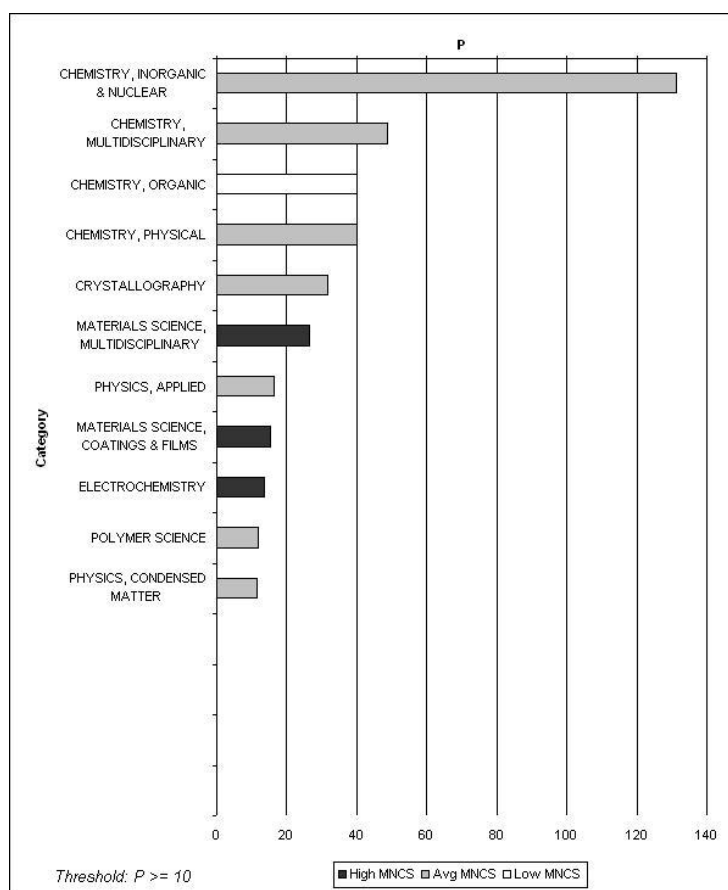
Performance (MNCS) by collaboration type



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