



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 HUBI – Helsinki University Biorefining

Seppo Saari & Antti Moilanen (Eds.)



Evaluation Panel: Natural Sciences



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University of Helsinki  
Administrative Publications 80/55  
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<b>Title:</b> International Evaluation of Research and Doctoral Training at the University of Helsinki 2005–2010 : RC-Specific Evaluation of HUBI – Helsinki University Biorefining	<b>Type of publication:</b> Evaluations
<b>Summary:</b> 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.	
<b>RC-specific information:</b>	
<b>Main scientific field of research:</b> Natural Sciences	<b>RC-specific keywords:</b> Biorefinery, Bio-based materials, wood, forest, agricultural residues, tree, biodegradable materials, green chemistry, sustainable development
<b>Participation category:</b> 4. Research of the participating community represents an innovative opening	
<b>RC's responsible person:</b> Kilpeläinen, Ilkka	
<b>Keywords:</b> Research Evaluation, Meta-evaluation, Doctoral Training, Bibliometric Analyses, Researcher Community	

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## Contents

<b>Panel members</b> .....	<b>1</b>
<b>1 Introduction to the Evaluation</b> .....	<b>5</b>
1.1 RC-specific evaluation reports .....	5
1.2 Aims and objectives in the evaluation .....	5
1.3 Evaluation method .....	5
1.4 Implementation of the external evaluation .....	6
1.5 Evaluation material .....	7
1.6 Evaluation questions and material .....	8
1.7 Evaluation criteria .....	10
1.8 Timetable of the evaluation .....	13
1.9 Evaluation feedback – consensus of the entire panel .....	13
<b>2 Evaluation feedback</b> .....	<b>15</b>
2.1 Focus and quality of the RC's research .....	15
2.2 Practises and quality of doctoral training .....	16
2.3 The societal impact of research and doctoral training .....	18
2.4 International and national (incl. intersectoral) research collaboration and researcher mobility .....	19
2.5 Operational conditions .....	19
2.6 Leadership and management in the researcher community .....	20
2.7 External competitive funding of the RC .....	20
2.8 The RC's strategic action plan for 2011–2013 .....	21
2.9 Evaluation of the category of the RC in the context of entity of the evaluation material (1-8) .....	22
2.10 Short description of how the RC members contributed the compilation of the stage 2 material ...	23
2.11 How the UH's focus areas are presented in the RC's research .....	23
2.12 RC-specific main recommendations .....	23
2.13 RC-specific conclusions .....	24
2.14 Preliminary findings in the Panel-specific feedback .....	24
2.15 Preliminary findings in the University-level evaluation .....	25
<b>3 Appendices</b> .....	<b>27</b>



## 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-evaluation<sup>1</sup> 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.<sup>2</sup>
- 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.

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<sup>1</sup> 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.

<sup>2</sup> [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 led 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. TUHAT<sup>3</sup> compilations on publications and other scientific activities<sup>4</sup>
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.

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<sup>3</sup> TUHAT (acronym) of Research Information System (RIS) of the University of Helsinki

<sup>4</sup> 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)<sup>5</sup>**

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.

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<sup>5</sup> 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 Helsinki University Biorefining (HUBI) research community (RC) consists of five (5) research groups from three (3) departments and has six (6) professors, 14 postdoctoral researchers, 20 doctoral candidates and also active contacts to undergraduate students both in BSc and MSc levels (via teaching and inviting students to the research groups). The RC members are from two faculties at Helsinki University (HU) and the Departments of Chemistry, Physics, and Food and Environmental Sciences. The groups have been active in establishing common MSc and doctoral training since 2005, i.e. in 2005 the doctoral training program on 'Natural Polymers' and in 2010 a national 'Graduate School on Biomass Refining' (BIOREGS) were established and further extended via Nordic researcher network 'Refining lignocellulosics to advanced polymers and fibers'. The main focus is on developing new methods and processes to utilise biomass efficiently and in a sustainable manner. The groups have been obtaining research funding for this area from e.g. Finnish programmes on biomass refining, especially projects in the Tekes-funded BioRefine-programme and the research programmes of Forestcluster Ltd. The comparative funding in 2005–2010 has been distributed as follows: AF 3.42 M€, Tekes 1.46 M€, EU 0.89 M€, foundations 1.41 M€, companies 2.45 M€ and Ministries 1.19 M€, which are great numbers. The main scientific output in 2005–2010 has been 237 refereed articles. The field-normalized number of citations per publication (MNCS), average journal impact (MNJS) and proportion highly cited publications (top 10 %) are 57%, 33% and 45% above average, respectively. These numbers are excellent.

The research of HUBI RC focuses on developing new, advanced and innovative lignocellulosic biomass based innovative products, processes and reaction routes to replace current mineral oil based fuels, chemicals and materials, i.e. the biorefining concept. The aim is to do high-level research and to educate experts for the field. The main objective of HUBI is to educate a new generation of young multidisciplinary doctors with the knowledge on basic sciences related to the utilization of renewable raw materials, i.e. chemistry (organic/polymer/carbohydrate/inorganic), physics (surface/material physics), biotechnology, and analytical methods. Knowledge in these fields is needed to understand the phenomena and materials in question. The RC has the leading, both nationally and in some fields also internationally, and acknowledged role in these research fields.

The need to increase the use of biomass in the production of fuels, chemicals and materials, is a very important and timely research field, since new phenomena based information is needed to replace fossil based processes and to develop processes for new products. This field is also considered to be one of the key areas for sustainable development. There is also a strong demand from the society for sustainability (environmental, economic and social sustainability) via efficient use of different biomasses. Lignocellulosic materials provide an excellent starting point for this research and researcher education. This means e.g. more efficient refining of all lignocellulosic components into value-added products. The societies need experts having this know-how and thus the aim of the RC to provide top level doctoral training in this field is realistic and also strategically important. This has been also recognized by the AF when doing the decision to fund the before mentioned GS in Biomass Refining. The students in the field, doctoral students and young post-doctoral researchers will benefit from RC in many ways. The aim to create links and research collaboration between members in RC and in a wider context in academia (e.g. fields of technology) as well as with industrial partners is crucial in this research field.

### **Strengths**

The HUBI is a multidisciplinary consortium including a strong focus on science and thus putting science into force when designing new and novel biomass based products for the benefit of companies and new academic experts. It has an excellent funding record, funding in basic and applied fields, and a very good support for researcher training from different funding organizations (AF, Nordic funding, researcher training funding from e.g. COST Actions). The RC has excellent infrastructure and contacts to European research groups via EU projects and networks, Finnish industry and research groups via Tekes-funded projects and Forestcluster Ltd. programmes. The consortium projects funded by the basic research funding (Academy of Finland) are also important fields of collaboration. The groups have expertise to develop novel biomass based fuels, materials and chemicals. The basis in this RC collaboration was in the umbrella structure and contacts based on individual researchers. This has been a bottom-up approach and has grown to an RC that brings important fields together but at the same time gives the groups a freedom to act also independently for the benefit of highly successful research and doctoral training.

### **Areas of development**

The lack of contacts or partners coming from the relevant technology fields, e.g. chemical engineering, bioprocess engineering, materials engineering, is seen as a development area by the panel. Collaboration with Aalto University and Abo Akademi University is mentioned but not opened in the report. Also the areas of sustainability and sustainable development are highlighted but not discussed in detail. When educating experts to the field in question, the need to understand and even use the tools and procedures for the sustainability assessment analysis is very relevant. These analyses can give a hand to researchers in a very early stage of process/product design to make proper solutions how to proceed in research. Researchers also need to be ready to give answers to the society about the best procedures and activities in bio-economy, which can be supported by the relevant and early knowledge on sustainability of the designed utilization of biomass. This should be included into the future activities or knowledge area of the HUBI RC.

Collaboration with the LIC RC inside the University of Helsinki could be beneficial since the research themes inside these two RCs seem to overlap in biomass utilization and green chemistry. This could also improve the possibilities to do novel innovations in this field since research groups that are experts in organic, analytical and biochemistry (HUBI) as well as inorganic chemistry and material science (LIC) would meet. Sharing of knowhow in the expertise area of catalysis (biocatalysis, homogeneous and heterogeneous catalysis) could be beneficial to head towards novel innovations.

### **Other remarks**

The group members from Metso and DESY Hamburg are recognized and the willingness to form more close collaboration with international and industrial partners. The HUBI RC is quite a new community but the work has started in a very promising way. Excellent results are already seen.

### **Recommendations**

An action plan how to include the needed engineering fields into the everyday activities of the HUBI RC is proposed. The focus in relevant research areas could be improved and deepened, e.g. what parts of the lignocellulosic area are the groups going to touch and how the sustainability assessment will be taken into account. Discussions with the LIC RC inside the University of Helsinki about joint activities are recommended by the panel.

**Numeric evaluation: 4 (Excellent)**

## **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 doctoral training started the HUBI RC collaboration in 2005 (Doctoral training on Natural Polymers, coordinated by Prof. Tenkanen). In 2010 this collaboration was further widened when the Academy of Finland decided to fund the GS on Biomass Refining (BIOREGS, coordinated by Prof. Viikari). Nordic researcher network 'Refining lignocellulosics to advanced polymers and fibers' is also offering an international dimension in doctoral education. Funding is also coming from various foundations, as well as through national and EU funded projects. PhD students with funding from other sources are also accepted as matching fund students to the BIOREGS training programme. Presently 15 doctoral candidates are doing their PhD in the HUBI RC, six of them are enrolled within BIOREGS. Funding is also received from other graduate schools (6 GSs mentioned). This number of possibilities to have researcher position within or close to the HUBI RC activities is impressive. During the evaluation period, seven doctors have graduated from the RC. This number is very good since the collaboration is new (since 2005) and the timely field has also matured very rapidly during the past 5 years. The doctors are besides that supervising several other PhDs on the topics outside the biorefining field. The balance between the supervision capacity and the number of doctoral candidates is very good (20:20). The share of female doctoral candidates is 64% showing a good gender balance.

The selection of students is based on high quality and public calls. In the M.Sc. level students are invited to the research groups to be acquainted with research and to develop their skills towards research oriented fields. The doctoral training is based on good scientific practices and joint multidisciplinary supervision (supervision groups, follow-up groups). Doctoral candidates are encouraged to spend visiting periods abroad, in industry or other national research groups. Transferrable skills are seen important but no specified plan is proposed to that, only some courses are mentioned to develop special transferrable skills.

The existing collaboration with companies in e.g. Forestcluster Ltd is seen very relevant for the researcher education. Most of the young doctors are going to find places later in industry, and this collaboration is giving information of the needs in industry as well as possible recruiting places for the becoming young doctors.

### **Strengths**

The HUBI RC comprises a good doctoral education environment. When establishing the RC the doctoral education was the basis for all the activities. The RC has a good possibility to recruit new doctoral candidates, because the funding and also the important and timely field that is found important among young students seeking doctoral candidate positions. The plan to give doctoral education and to supervise the candidates is strong. However, focus could be paid to the contents of different studies, e.g. studies on transferrable skills, research ethics and sustainability related knowledge. In spite of the new collaboration, the doctoral training has already been successful. This gives the promise to wait for even better results in the future.

### **Areas of development**

The RC should highlight sustainability and ethics related issues in doctoral training, e.g. relevant courses and skills. Joint courses with chemical and bioprocess engineering fields in collaboration with national Graduate Schools, e.g. GSCE, would improve the technology oriented knowledge of doctoral candidates and would also help supervisors to orient themselves to the engineering fields that are relevant in biomass based production, i.e. in biorefining and bio-economy related areas.

### **Recommendations**

Collaboration in researcher/doctoral education (e.g. joint courses on biomass utilization) with existing national graduate schools (e.g. GSCE) is recommended by the panel.

**Numeric evaluation: 4 (Excellent)**

## **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 scientific field of RC is of high importance for the future society and the societal impact of the HUBI is thus very big. This is the field where people from academia, industry and administration are meeting frequently today. The increased use of biomasses for the production of fuels, chemicals and materials is considered to benefit sustainable development and it should go hand by hand with it. Societies are for the time being waiting for new solutions and products based on different biomasses and the field is also seen to enhance social, economic and environmental sustainability at large. Refining of all lignocellulosic components, which is the core of this RC, will benefit societies with e.g. value-added products, new employment and wellbeing (e.g. creativity and innovations as driving forces for good life of employees and citizens). The RC research and doctoral training topics are relevant and new experts are needed in this field. Thus, care should be taken when designing the proper education of experts and planning the research under which the researcher education is realized. This RC has so far fulfilled this approach and can improve its activities towards sustainable development. The supervisors are active in scientific societies, foundations, committees and editorial boards and referees of scientific journals. Popularization of science is also seen important.

### **Areas of development**

Knowledge on sustainability criteria and assessment tools for the design phase of new reaction routes, processes and products is needed. This should be provided by wise collaboration. Knowledge on certain engineering fields would also help to realize and analyse the sustainability related issues, e.g. social sustainability and impacts.

### **Other remarks**

This part of the RC specific material was not that well written.

HUBI RC can actively contribute to educate a new generation of research intensive doctors for companies and can provide completely new knowledge for companies active in this field.

### **Recommendations**

The societal impact of new biomass based products and processes needs careful evaluation. This field could be taken more specifically into account in doctoral education via collaboration with specialists in the field or via inviting experts of the field to the RC. The HUBI RC represents a research area which is very suitable to form a sustainable and systematic interaction platform between academia and industry, which also can be developed along the concept of the "knowledge triangle".

**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*

### **Strengths**

The HUBI RC is involved in many international and national collaboration activities, e.g. national and international research projects, Nordic and European research networks and use of international large-scale infrastructures. There has been and is running many international projects, e.g. ERA-NET projects (3), EU FP7 projects (3), COST Actions (10), Nordic networks (3), which form an excellent basis for future collaboration. National collaboration with researchers from other universities and research institutes is realized through Tekes and the Academy of Finland funded projects. In biorefining the main collaboration forum is the Forestcluster Ltd where HUBI is playing a very active role. Networking activities are above all those on which good and long-lasting collaboration can be established. This is already done with research groups in Germany, Sweden and France. Researcher mobility, e.g. short term scientific missions and student exchange, sharing of facilities and joint publications have been the results of these activities.

### **Areas of development**

Joint international activities inside the HUBI RC are seen important by the panel, e.g. EU projects, networks, bilateral collaboration with research communities working in the same field.

**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*

### **Strengths**

The HUBI RC has very good facilities and infrastructure for laboratory work and analysis. The HUBI research groups and departments have constantly acquired funding for smaller research instruments and the RC members have been active and successful in the larger scale infrastructure calls of the UH and AF. Industry has also been actively supporting infrastructures of the RC. The RC is also collaborating in the use of infrastructure and is jointly planning the funding applications in the infrastructure calls. The infrastructure is excellent for research and research training as well as for collaboration with companies and research institutes nationally and internationally.

### **Areas of development**

The research groups have a large responsibility of the undergraduate education of the departments, both in BSc and MSc levels. This offers a forum to educate and invite young students to consider this field as their future expertise field. Strong commitment in education has, however, also a negative side. Teaching diminishes the time that can be devoted to research and researcher education. Thus, the HUBI needs to have a good plan how the teaching responsibilities are shared between the supervisors and doctoral candidates. A teaching load of 5% can be considered for the doctoral candidates – not more. The other

route to go is to diminish the number of undergraduate teaching courses. To offer leaves from teaching duties to professors (sabbaticals) and the senior staff can be one solution to stand the situation without influencing very much on the results (PhD theses and scientific articles).

#### **Other remarks**

Additional administrative and planning work should be diminished.

#### **Recommendations**

A teaching plan should be done to have a wise division of teaching load in different researcher education levels. Teaching can also enhance doctoral studies and it can be one part of the studies to obtain credits and to learn theory. Teaching experience is also important for post docs with an ambition of an academic career and there might be an option to involve the post docs more in teaching.

## **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*

#### **Strengths**

When the HUBI RC was established it was as an umbrella organization for scientists with the same enthusiasm, disciplines and interest areas within the lignocellulose science area. Thus, it should not be that difficult to manage the researchers who are really willing to collaborate. This collaboration anyhow needs procedures and rules, which should be in strong hands of the leader of the RC. Each member group of the RC has kept its own leadership practices and cultures, and follows the general managerial procedures of the faculties and departments involved. The members are thus organizationally, economically and physically separated. However, the leadership of the RC has become more important. Since the leadership of the RC will rotate between the core members in order to share the administrative workload the collaboration needs procedures and rules. The major tasks of the leader of the RC are highlighted in the report and seem to be very realistic and important. What is also excellent in the activities and sharing the responsibilities inside the RC is the division of duties between the professors, i.e. Prof. Kilpeläinen is acting as the responsible leader of the HUBI RC, Prof. Viikari and Prof. Tenkanen are having responsibilities in leading the national GS, University of Helsinki GS and Nordic networking.

#### **Areas of development**

The active collaboration and change of information within the RC. In a longer time perspective and with a successful development of the HUBI RC there might be a need to change both organization and management structure.

## **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*

### **Strengths**

The funding of the HUBI RC is very balanced and excellent, both for research and researcher education. The funding consists the most important funding sources and the division of basic and applied funding, funding for networking and researcher education is very balanced. Funding for infrastructures seems also to be wisely allocated. Thus, the RC can concentrate to develop its contents and excellence. This plan is very nicely opened in the report. The RC also shows high commitment to the research field and researcher education in its field and no doubt will focus in the funding applications to the field in question.

The comparative funding in 2005–2010 has been distributed as follows: AF 3.42 M€, Tekes 1.46 M€, EU 0.89 M€, foundations 1.41 M€, companies 2.45 M€ and Ministries 1.19 M€, which are great numbers. The companies and their needs are met in the Tekes and company funded projects. The AF funding is showing the quality of research and also its significance. The research areas are very timely and important for the whole society, both from the researcher education point of view as well as a need for new scientific knowledge to develop new biomass based chemicals, fuels and materials and their sustainable production processes.

### **Areas of development**

The RC has a good plan for the future funding. The plan to establish high level international and national research networks with academia and industry is on its way, e.g. active participation in national GSs, Nordic and European research networks is testifying it. The competition of research funding and focusing the research will be an even more relevant matter in the future. It is, however, expected that this RC can be competitive after developing its structure towards relevant engineering fields mentioned before. Wise networking with the best national and international research groups is one of the key success factors.

### **Other remarks**

With the increasing external funding there might be a future need within the RC to strengthen the administrative support in the application stage, project coordination and the financial administration.

### **Recommendations**

Constant follow-up of external research funding possibilities for full-time researchers at all levels of research is needed. The RC should also be open and try to influence the thematic of coming research programmes at AF, EU etc. Via being wisely open do not spoil the possibilities to be the one doing the research and gaining the funding since the RC has already gained its visibility and trust among scientists of the field – good collaboration is much better than unhealthy competition.

## **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, timely and appropriate. It contains a strong networking with domestic groups through Forestcluster Ltd and Tekes programmes and emerging international

research collaboration. Discussions are active with the Wallenberg Wood Science Center on coordination of different biorefinery programs in Finland and Sweden. Plans to have close collaboration with pulp and paper industry through the Forestcluster Ltd, with chemical industry and oil refining industry are highly supported by the panel. The networking and researcher mobility projects are also of outmost importance. National graduate school BIOREGS and Nordic collaboration in doctoral training are important development areas of the RC.

In its strategy the HUBI RC highlights three important challenges, namely the recruitment of the best of the young scientists to the research teams, both from Finland and from abroad, guaranteeing attractive career development for the most qualified young scientists, and increasing the quality and outcome of research. These challenges are important to keep in mind, and the activities should be focused to them. The RC has already very good basis to be attractive since the funding of doctoral candidates is coming from many different sources, the thematic is important and the need of specialists in this field is crucial. Besides, young researchers are willing to study the fields and to have their future occupation in it.

Better visibility and wise marketing are proposed by the panel to gain interest among international top level researchers and doctoral students. For this it is really the professors who need to do the marketing work. Once again the biomass conversion field is the one that has a great interest among young people. This is really the area of future research. Wise combination on sustainability related issues to the thematic will improve the possibilities to increase interest among young scientists.

The key target area in the future in HUBI research is development of commodity chemicals from biomass. Process intensification methods as well as development of catalytic processes are important research areas. The most important catalysis fields, i.e. homogeneous, heterogeneous or biocatalysis, is, however, not mentioned in the plan. Catalysis is a very wide area and the future activities should be headed towards combining the best features of these three areas into the new catalysis technology development.

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

The HUBI RC sets the participation category to the category 4: The research of the participating community represents an innovative opening.

The RC is doing research and educating doctors and experts in a very innovative field, utilization of biomass resources and especially lignocellulosic biomass to develop new and innovative fuels, chemicals and materials in a sustainable manner. This RC has a potential to make innovative openings in the field. They have proper expertise, excellent networking, critical mass of researchers and proper infrastructure as well as enough relevant research funding, doctoral candidate funding and graduate school positions to fulfil this goal. The advisor-to-doctoral candidate ratio is proper to take care of the researcher education in an optimal manner. Industry is also seeking new solutions for biomass as a resource, i.e. the biorefining area. Good contacts to companies and other research groups, visibility and RC's own activity in designing new research programmes are enhancing the possible development to a centre of excellence in the research area relevant for the group. Proper collaboration with engineering fields and companies as well as the leading research teams abroad and in Finland are helping to gain this goal.

**Numeric evaluation: 5 (Outstanding)**

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

All the members of RC have been involved in the documentation either by contributing to this document or to the TUHAT database. The RC members have had meetings and shared duties when preparing the evaluation documents. Active e-mail and phone discussions have also taken place during the planning and data collection stages. Prof. Kilpeläinen has been the responsible person in collecting and writing the evaluation material. The other sub-group leaders have contributed to this and have written selected parts of the material.

The materials provided form a solid document that is easy to be evaluated. Sometimes even deeper information could have improved the presentation of the goals and working methods in the RC.

## 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*

The RC's research represents the following focus area of UH: *The basic structure, materials and natural resources of the physical world*. The focus area is mentioned and no doubt the research and researcher education activities of the RC belong to this focus area. The evaluation material is, however, not analyzing in a more detailed way how the University's strategy and the focus in the RC activities are related to each other and if the selection of the RC's research field has been based on the University's strategy.

## 2.12 RC-specific main recommendations

The focus in relevant research areas could be improved and deepened, e.g. what parts of the lignocellulosic area are the groups going to touch and how the sustainability assessment will be taken into account.

An action plan how to include the needed engineering fields into the everyday activities of the HUBI RC is proposed.

Discussions with the LIC RC inside the University of Helsinki about joint activities are recommended.

Combining sustainability related assessment issues and understanding to teaching and research is recommended. The becoming experts need at least the knowledge related to the assessment. This can be gained via e.g. wise networking with the experts in the field.

The societal impact of new biomass based products and processes needs careful evaluation. This field could be taken more specifically into account in doctoral education via collaboration with specialists in the field or via inviting experts of the field to the RC.

Recruitment of high-level scientists and excellent students is vital and for that a clear plan is needed with proper procedures, marketing materials and improved visibility.

The HUBI RC could consider its development based on the KIC concept developed by EIT (European Institute of Innovation and Technology), i.e. so called knowledge and innovation communities (KICs) formed for a more integrated approach of research, education and innovation.

A plan for combining of teaching and research activities should be done to have a wise division of teaching load in different researcher education levels.

Collaboration in researcher/doctoral education (e.g. joint courses on biomass utilization) with existing national graduate schools (e.g. GSCE) is recommended.

The RC should also be open and try to influence the thematic areas of coming research programmes at AF, EU etc.

## 2.13 RC-specific conclusions

The HUBI RC is acting in the field where innovative openings are possible and probable. Thus, it fits the category 4 area excellently. The research area of the RC is very timely and relevant for academia, industry and societies. Education of new high-level experts is needed as well as new research data to design sustainable biomass based production processes, new chemicals, materials and fuels. The way how the RC was established some years ago (a bottom-up approach) guarantees a good progress in doctoral education and research focusing on relevant research fields. It may be said that almost everything has found its place in the RC research environment and networking. High-level research collaboration and industry-specific new collaboration and networking, as well as research outcomes, e.g. journal articles, patents, publicity, need still improvements and more focused approaches.

## 2.14 Preliminary findings in the Panel-specific feedback

The research focus of the HUBI RC (Biorefining) is timely and innovative. It exactly fits into the participation category 4. The RC is a multidisciplinary consortium including strong a focus on science and thus putting science into force when designing new and novel biomass based products for the benefit of companies and when educating new academic experts. It represents a research area which is very suitable to form a sustainable and systematic interaction platform between academia and industry, which also can be developed along the concept of the "knowledge triangle". HUBI belongs to one of the focus area of the University of Helsinki ('The basic structure, materials and natural resources of the physical world') and it gives contents to that.

The HUBI RC comprises a good doctoral education environment. When establishing the RC the doctoral education was the basis for all the activities. The RC has a good possibility to recruit new doctoral candidates, because the funding and also the important and timely field that is found important among young students seeking doctoral candidate positions. The plan to give doctoral education and to supervise the candidates is strong.

The scientific field of the HUBI RC is of high importance for the future society and the societal impact of the HUBI activities is thus very high. This is the field where people from academia, industry and societies are meeting frequently today and societies are waiting for new solutions and products based on different biomasses. The field is also seen to enhance social, economic and environmental sustainability at large. The RC research and doctoral training topics are relevant and new experts are needed in this field.

The HUBI RC is involved in many international and national collaboration activities. In biorefining the main collaboration forum is the Forestcluster Ltd where HUBI is playing a very active role.

The RC collaboration needs procedures and rules, which should be in strong hands of the leader of the RC. This should be supported by the University. The leadership of the RC will, however, rotate between the core members in order to share the administrative workload. What is excellent in the activities and sharing the responsibilities inside the RC is the division of duties between the professors, i.e. Prof. Kilpeläinen is acting as the responsible leader of the HUBI RC, Prof. Viikari and Prof. Tenkanen are having responsibilities in leading the national GS, University of Helsinki GS and Nordic networking.

The HUBI RC has an excellent funding record, funding in basic and applied fields and a very good support for researcher training from different funding organizations (AF, Nordic funding, researcher training funding from e.g. COST Actions). The RC has contacts to European research groups via EU projects and networks, Finnish industry and research groups via Tekes-funded projects and Forestcluster Ltd. programmes. The consortium projects funded by the basic research funding (Academy of Finland) are also showing the scientific excellence.

The strategic action plan for 2011–2013 is relevant, timely and appropriate. It contains a strong networking with domestic groups through Forestcluster Ltd and Tekes programmes and emerging international research collaboration. The HUBI RC highlights three important challenges, namely 1) the recruitment of the best of the young scientists to the research teams, 2) guaranteeing attractive career developments for the most qualified young scientists, and 3) increasing the quality and outcome of

research. The RC has funding for doctoral candidates from many different sources, the thematic is important and the need of specialists in this field is crucial. Besides, young researchers are willing to study the fields and to have their future occupation in it. Better visibility and wise marketing are proposed by the panel to gain interest among international top level researchers and doctoral students. Wise combination on sustainability related issues to the thematic will improve the possibilities to increase interest among young scientists.

## **2.15 Preliminary findings in the University-level evaluation**

### **Findings and recommendations for improvement**

#### **Research focus**

The focus of the HUBI RC in the relevant research areas related to the UH focus areas 'The basic structure, materials and natural resources of the physical world' could be improved and deepened. The themes of this RC could be named as a development area inside the focus area of UH. There should also be a procedure how the sustainability assessment related research field will be taken into account inside HUBI. The University could support the activities how to include the needed engineering fields into the everyday activities of the HUBI RC and also collaboration with the LIC RC inside the University of Helsinki.

Practices and quality of doctoral training in HUBI RC are excellent. Collaboration in researcher/doctoral education (e.g. joint courses) with existing national graduate schools (e.g. GSCE) should be supported.

The HUBI RC represents a research area which is very suitable to form a sustainable and systematic interaction platform between academia and industry, which also can be developed along the concept of the "knowledge triangle". Thus, this should be taken into account in University's strategy, focus areas and development activities.

Recruitment of high-level international and national scientists and excellent students to this RC is vital and the University should help the RC to create procedures and marketing materials to enhance recruitment.

The HUBI RC could consider its development based on the KIC concept developed by EIT (European Institute of Innovation and Technology), i.e. so called knowledge and innovation communities (KICs) formed for a more integrated approach of research, education and innovation.

The main scientific output in 2005–2010 has been excellent with 237 refereed articles. The field-normalized number of citations per publication (MNCS), average journal impact (MNJS) and proportion highly cited publications (top 10 %) are 57%, 33% and 45% above average, respectively.

#### **Summary of the evaluation**

The research area of HUBI RC is very timely and important for Finland and globally, i.e. biorefining. HUBI is a multidisciplinary consortium including strong focus on science and thus putting science into force when designing new and novel biomass based products. It has an excellent funding record, funding in basic and applied fields, and a very good support for researcher training from different funding bodies. The RC has excellent contacts to European research groups via EU projects and networks, Finnish industry and research groups via Tekes-funded projects and Forestcluster Ltd. programmes. The projects funded by the basic research funding (Academy of Finland) are showing the scientific excellence of the RC. The groups have expertise to develop novel biomass based fuels, materials and chemicals. Collaboration with LIC RC, national graduate schools and engineering fields is recommended as well as knowledge on sustainability assessment analysis.



# 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:

Helsinki University Biorefining (HUBI)

LEADER OF THE RESEARCHER COMMUNITY:

Professor Ilkka Kilpeläinen, Department of Chemistry, Faculty of Science

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: Kipeläinen, Ilkka

E-mail:

Phone: +358 50 5181148

Affiliation: Professor

Street address: A.I. Virtasen aukio 1

2 DESCRIPTION OF THE PARTICIPATING RESEARCHER COMMUNITY (RC)

Name of the participating RC (max. 30 characters): Helsinki University Biorefining

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

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): The cross-disciplinary HUBI research community (RC) consists of five research groups from three departments who have been active in establishing common MSc and doctoral training on the topic and collaborated in research during the past five years. This cooperation started in 2005 by opening the new University of Helsinki doctoral training program on "Natural Polymers". Few years later the common doctoral training was enlarged and developed to a national "Graduate School on Biomass Refining" (BIOREGS), which started in the beginning of 2010. The training was recently (2010) further extended via Nordic researcher network "Refining lignocellulosics to advanced polymers and fibers". The RC members have met regularly and arranged yearly a joint open research seminar. The doctoral students enrolled within RC are actively collaborating with other research groups. The RC's aim is to promote joint multidisciplinary supervision of doctoral candidates.

The research of the participating groups focuses in developing new methods and pathways to utilise the biomass resources efficiently and in a sustainable way, and also to replace current mineral oil based products with renewable materials. RC members participate actively on EU and national research programmes on biomass refining, especially projects in the Tekes-funded BioRefine-programme and the research activities run by Forestcluster Ltd. The research projects include active collaboration between RC members as well with other research groups. All RC's groups have well equipped up-to-date facilities with latest instrumentation which are jointly utilized.

There is currently a strong demand from the society for sustainable development. We believe that this strong collaborative RC with different disciplines combining know-how on chemistry (organic, polymer, carbohydrate, inorganic, analytical), physics and biotechnology opens unique opportunities for doctoral training and also for major research breakthroughs. The RC considered the research evaluation an excellent opportunity to obtain valuable feedback from its efforts and activities, and to get constructive advices for further development.



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

3 SCIENTIFIC FIELDS OF THE RC

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

RC's scientific subfield 1: Chemistry, Multidisciplinary

RC's scientific subfield 2: Materials Science, Biomaterials

RC's scientific subfield 3: Materials Science, Multidisciplinary

RC's scientific subfield 4: Biotechnology and Applied Microbiology

Other, if not in the list:

4 RC'S PARTICIPATION CATEGORY

Participation category: 4. Research of the participating community represents an innovative opening

Justification for the selected participation category (MAX. 2200 characters with spaces): The research community forms a multidisciplinary, well functioning, complementary and innovative group of experts within two campuses, two faculties and three departments of the UH. The RC consists of five research groups with different distinct disciplines: organic chemistry, green chemistry, polymer chemistry, bioproduction chemistry, soft matter physics and biomass refining.

The RC has started its collaboration by establishing high level M.Sc. and doctoral training aiming for experts in biorefining (i.e. utilization of renewable materials for future consumables/chemicals etc.). This collaboration has also led to a multidisciplinary collaborative network and to naissance of common research projects. The scientific level of the participating groups is high, but we have not yet reached status as a "top" RC. However, due to our common passion and goals, we foresee that this collaboration has good premises to become a worldwide recognized research community in the future. Within this new research community, an active collaboration on doctoral training and research has been initiated. In all, the RC forms a innovative opening which has very good potential to become an internationally recognized research and doctoral training unit.

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): The increased use of renewable biomass for production of fuels, chemicals and materials is considered as one of the key issues of sustainable development. There is also a strong demand from the society for sustainability and towards efficient and economic exploitation of the renewable biomass that is not competing with the food production. This means more efficient refining of all lignocellulosic components into value-added products. Biorefining exploits different natural and biological sciences and integrate various technologies in order to meet these demands. The research of the consortium focuses in developing new, advanced and innovative solutions to utilise the natural lignocellulosic resources efficiently, and to replace current mineral oil based consumables with renewable materials. Our aim is to conduct high-level research and to produce experts for the future society. The focus is to train a new generation of multidisciplinary open-minded doctors with a solid background in potentials of biomass



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

### RC-SPECIFIC STAGE 1 MATERIAL (registration form)

utilisation and upgrading to products and materials for the increasingly bio-based economy and society, and for the needs of diversifying forest product industry.

Significance of the RC's research and doctoral training for the University of Helsinki (MAX. 2200 characters with spaces): The new biobased economy, foreseen to be of utmost importance to the future national economy of Finland, will need experts on many areas related to value addition from biomass. The SHOK activities, especially the Forestcluster Ltd, is presently developing new products and processes for the forest industry. Novel lignocellulose-based materials are one essential key to future viable forest industry.

The main objective of the RC is to educate a new generation of young multidisciplinary doctors with knowledge in basic sciences related to renewable raw materials; chemistry (organic, polymer, carbohydrate, inorganic), physics (surface and material physics), and biotechnology of lignocellulosics, as well as related analytical methodologies. The RC with the leading acknowledged research groups aims at the top level doctoral training. The doctoral students and young post doctoral researchers will benefit from RC by strengthening their future professional networks as well as their scientific capabilities. Further aims are creation of links and research collaborations between members in RC as well as industry.

The new PhD graduate school on Biomass refining (BIOREGS), was selected as one of the few new graduate schools to be funded by the Finnish Academy in 2009, emphasizing the importance of the area. The RC activities strengthen the research carried out at UH Kumpula and Viikki campuses in the field of materials science. Through this collaboration, the RC has know-how and access to excellent research infrastructure (instrumentation) of both campuses. The basis of the doctoral training is the yearly organized graduate courses in e.g. organic chemistry, polymer chemistry, physics, and biotechnology at Kumpula and Viikki campuses. Here, the aim is to provide the doctoral students a broad and multidisciplinary basic knowledge on the topic.

The doctoral students are also encouraged to participation of international summer schools and training courses organized by graduate schools and research networks (COST actions and Nordforsk funded Nordic networks etc.). The research groups also host visiting doctoral students via these networks.

Keywords: Biorefinery, Bio-based materials, wood, forest, agricultural residues, tree, biodegradable materials, green chemistry, sustainable development

#### 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 RC consists of five research groups which are of good international level. Alltogether, the scientific achievements of the RC has resulted to over 227 international refereed journal articles between 2005 and 2010. The RC has been active in arranging doctoral training on the topic and it also has good potential to grow into a top class research unit. The aim of the current proposal is to find unbiased feedback from RCs efforts in doctoral training as well as on our emerging scientific collaboration.



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

RC-SPECIFIC STAGE 1 MATERIAL (registration form)

As the RC represents a new opening, the amount of graduated Ph.D. students is still limited. However, it should be noted that all the graduated students have been employed to good positions after graduation, which emphasizes the importance of the topic.

Comments on how the RC's scientific productivity and doctoral training should be evaluated (MAX. 2200 characters with spaces): The RC should be evaluated with normal scientific evaluation criteria.

In order to achieve an internationally recognized status, the RC aims to publish the results in highest level scientific publications. Further, all commercially viable technologies and inventions will be patented prior to publication.

## LIST OF RC MEMBERS

NAME OF THE RESEARCHER COMMUNITY:		Helsinki University Biorefining			
RC-LEADER		I. Kilpeläinen			
CATEGORY		4			
	Last name	First name	PI-status (TUHAT, 29.11.2010)	Title of research and teaching personnel	Affiliation
GROUP KILPELÄINEN					
1	Kilpeläinen	Ilkka	x	Professor	Faculty of Science, Department of Chemistry
2	Kyllönen	Lasse		Postdoctoral researcher	Faculty of Science, Department of Chemistry
3	Matikainen	Jorma		Postdoctoral researcher	Faculty of Science, Department of Chemistry
4	Karhunen	Pirkko		Postdoctoral researcher	Faculty of Science, Department of Chemistry
5	Kavakka	Jari		Postdoctoral researcher	Faculty of Science, Department of Chemistry
6	Kulomaa	Tuomas		Doctoral candidate	Faculty of Science, Department of Chemistry
7	Labaf	Sara		Doctoral candidate	Faculty of Science, Department of Chemistry
8	Jalomäki	Jarno		Doctoral candidate	Faculty of Science, Department of Chemistry
9	Järvi	Paula		Doctoral candidate	Faculty of Science, Department of Chemistry
10	Granström	Mari		Doctoral candidate	Faculty of Science, Department of Chemistry
11	Veistinen	Annastiina		Doctoral candidate	Faculty of Science, Department of Chemistry
GROUP SERIMAA					
12	Serima	Ritva	x	professor	Department of Physics
13	Penttilä	Paavo		doctoral candidate	Department of Physics
14	Andersson	Seppo		PhD, amanuensis	Department of Physics
15	Vainio	Ulla		postdoctoral researcher	DESY, Hamburg
16	Sarén	Matti		research director	Metso, Kajaani
GROUP MAUNU					
17	Maunu	Sirkka Liisa	x	Professor	UH, Faculty of Science, Laboratory of Polymer Chemistry
18	Aseyev	Vladimir	x	University lecturer	UH, Faculty of Science, Laboratory of Polymer Chemistry
19	Hiltunen	Mia		Doctoral candidate	UH, Faculty of Science, Laboratory of Polymer Chemistry
20	Parviainen	Helena		Doctoral candidate	UH, Faculty of Science, Laboratory of Polymer Chemistry
21	Mänttari	Mikko		Doctoral candidate	UH, Faculty of Science, Laboratory of Polymer Chemistry
22	Rämänen	Pirita		Doctoral candidate	UH, Faculty of Science, Laboratory of Polymer Chemistry
23	Virtanen	Tommi		Doctoral candidate	UH, Faculty of Science, Laboratory of Polymer Chemistry
GROUP TENKANEN					
24	Tenkanen	Maija	x	professor	Department of Food and Environmental Sciences
25	Tuomainen	Päivi		university lecturer	Department of Food and Environmental Sciences
26	Koutaniemi	Sanna		postdoctoral researcher	Department of Food and Environmental Sciences
27	Mikkonen	Kirsi		doctoral candidate / postdoctoral researcher	Department of Food and Environmental Sciences
28	Pitkänen	Leena		doctoral candidate	Department of Food and Environmental Sciences
29	Heikkinen	Susanna		doctoral candidate	Department of Food and Environmental Sciences
30	Chong	Sun-Li		doctoral candidate	Department of Food and Environmental Sciences
31	Heikkilä	Mari		university researcher	Department of Food and Environmental Sciences
GROUP REPO					
32	Repo	Timo	x	professor	Department of Chemistry
33	Asikkala	Janne		postdoctoral researcher	Department of Chemistry
34	Wrigstedt	Pauli		doctoral candidate	Department of Chemistry
35	Riekkola	Tiina		doctoral candidate	Department of Chemistry
36	Hakola	Maija		doctoral candidate	Department of Chemistry
GROUP VIKARI					
37	Viikari	Liisa	x	professor	Department of Food and Environmental Sciences
38	Szijarto	Nora		postdoctoral researcher	Department of Food and Environmental Sciences
39	Zhanga	Junhua		postdoctoral researcher	Department of Food and Environmental Sciences
40	Varnai	Aniko		doctoral candidate	Department of Food and Environmental Sciences



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

RC-SPECIFIC STAGE 2 MATERIAL

BACKGROUND INFORMATION

Name of the RC's responsible person: Kilpeläinen, Ilkka

E-mail of the RC's responsible person:

Name and acronym of the participating RC: Helsinki University Biorefining, HUBI

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).**

Background

The research of the RC HUBI (Helsinki University Biorefining, <http://www.helsinki.fi/hubi/>) focuses in developing new, advanced and innovative solutions to utilise the natural lignocellulosic resources efficiently, and to replace current mineral oil based products with renewable materials which will not compete with food use. Our aim is to conduct high-level research and to produce experts for the future society. The focus is to train a new generation of multidisciplinary open-minded doctors with a solid scientific background and deep understanding of the potential of biomass utilisation and upgrading to products and materials for the increasingly important bio-based economy and society. This expertise will be crucial especially for the needs and future success of the diversifying Finnish forest product industry.

Description of HUBI RC

The cross-disciplinary HUBI research community (RC) consists of five research groups from three departments and two faculties who have been active in establishing common MSc and doctoral training on the topic and started collaboration in research during the past five years. The HUBI RC groups with their research focus areas are:

Ilkka Kilpeläinen (Department of chemistry, laboratory of organic chemistry): Chemistry of lignocellulosics (ionic liquid aided fractionation, cellulose derivatives, lignin chemistry).

Sirkka Liisa Maunu (Department of chemistry, laboratory of polymer chemistry): Morphological studies of lignocellulosics, chemical modification of cellulose and development of hybrid copolymers.

Timo Repo (Department of chemistry, laboratory of inorganic chemistry): Catalytic conversion of biomass (green chemistry, catalytic transformations, cellulose, hemi-cellulose, lignin).

Ritva Serimaa (Department of physics, division of materials physics): Structural studies on polymeric materials using x-rays and synchrotron radiation, cell wall structure of wood.

Maija Tenkanen (Department of food and environmental sciences, division of chemistry and biochemistry): Characterization, modification (mainly enzymatic) and utilization of polysaccharides, especially plant-derived hemicelluloses.

Liisa Viikari (Department of food and environmental sciences, division of chemistry and biochemistry): Enzymology and conversion of lignocellulosic raw materials to energy carriers.



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

### RC-SPECIFIC STAGE 2 MATERIAL

As can be seen from above, the HUBI RC embodies/involves a unique combination of research topics from chemistry to physics and biotechnology. Each group has its special expertise area, which complement each other. We believe that this strong collaborative RC with different disciplines combining know-how on chemistry (organic, polymer, carbohydrate, inorganic, analytical), physics (soft materials) and biotechnology (enzymatic conversions) opens unique opportunities for doctoral training and also for major research breakthroughs. The RC members meet regularly and joint open research seminars have been arranged yearly. The versatile combination of the RC warrants access to a wide variety of different research equipment and techniques and thus the RC researchers are actively collaborating with other research groups. The RC's aim is to promote joint multidisciplinary supervision of doctoral candidates.

#### Description of HUBI research (focus)

The research of the participating groups focuses in developing new methods and pathways to efficiently utilise and add value to biomass resources in a sustainable way, and thus, to replace current mineral oil based products with renewable materials. RC members participate actively on EU and national research programmes on biomass refining, especially projects in the Tekes-funded BioRefine-programme, the research activities run by Forestcluster Ltd and Wood Wisdom-Net. The RC has been also successful in the highly competitive basic research funding from the Academy of Finland. Many of the research projects are based on active collaboration between RC members, as well with national and international research groups. This collaboration has led to a multidisciplinary collaborative network and to naissance of common research projects. In all, the RC forms an new opening at the University of Helsinki and has very good potential to become an internationally recognized research and doctoral training unit.

#### Scientific level of the RC

Altogether, the RC research has resulted to about 230 international refereed journal articles between 2005 and 2010. More importantly, both the amount of publications, as well as their scientific quality is steadily increasing. This is apparent from the rapid growth of citations to the RC's articles in recent years (number of annual citations ~700 in 2010 for years 2005-2010). The RC has been active in arranging doctoral training on the topic and has also excellent potential to grow into a top class research unit. In order to achieve an internationally recognized status, the RC aims to publish the results in highest level scientific publications. Further, all commercially viable technologies and inventions will be patented prior to publication.

The scientific level of the participating groups is already high, although not yet a "top" RC. However, due to our common passion and goals, we foresee that in the future this collaboration has good premises to become a worldwide recognized research community. The RC members active in chemistry area were recently evaluated by the Academy of Finland as a part of the national chemistry research evaluation (See: [http://www.aka.fi/Tiedostot/Tiedostot/Julkaisut/1\\_11\\_Chemistry Research in FinlandUUSI.pdf](http://www.aka.fi/Tiedostot/Tiedostot/Julkaisut/1_11_Chemistry%20Research%20in%20FinlandUUSI.pdf)). In this evaluation, the RC groups were estimated from "good" to "excellent". However, it should be emphasized that this evaluation was carried out for research units (laboratories and divisions) and the comments do not directly apply for individual research groups.

The main scientific achievements of the RC include various topics from basic research including the development of improved analytical methodologies to industrial applications, for example: dissolution and fractionation of wood with ionic liquids, new bio-based materials (films, barriers, reactive materials, lubrication oils, polymers) and catalytic and enzymatic reactions to produce fine chemicals. Further, the RC has also developed advanced techniques for characterizing structures of wood and natural polymer based materials using x-rays and NMR.



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

RC-SPECIFIC STAGE 2 MATERIAL

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

The RC already has identified its own strong expertise areas within the scientific community in Finland and worldwide. The core of the RC, lignocellulosic polymers; their physical and chemical analysis, enzymology, conversion and upgrading, already comprises a clear focus area. The focus can be further strengthened by developing various special expertise areas, e.g. various analytical, pretreatment and processing methodologies. We will enhance the emerging collaboration by focusing on identification of common key scientific questions, multidisciplinary supervision of doctoral candidates and building joint research infrastructure.

Further, we will strengthen our collaboration with world top groups. In this connection, we aim at strong cohesion, which would yield in expanding the core of RC. The quality of the RC's research is clearly most critically affected by identifying and recruiting the highest quality PhD students. An enthusiastic atmosphere and challenging scientific questions within the groups will create a spirit which will attract new future professionals to the area.

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 aim of the HUBI research community is to train a new generation of multidisciplinary open-minded doctors with a solid background in basic sciences but also with an overall understanding of biomass utilisation and upgrading to products. The RC members indeed started the collaboration through the common interests in the doctoral education by establishing the joint University of Helsinki funded doctoral training on Natural Polymers in 2005 (coordinated by Prof. Tenkanen). In the beginning of 2010 started the new national, the Academy of Finland funded Biomass Refining Graduate School (BIOREGS, coordinated by Prof. Viikari, <http://www.helsinki.fi/bioregs/index.html>), which presently forms the core of the doctoral training programme in the HUBI, and will guarantee continuous, steady funding for a number of doctoral candidates in future. In addition, funding for the doctoral training is realized through various foundations, as well as through national and EU funded projects. PhD students with funding from other sources are also accepted as matching fund students to the BIOREGS training programme. Presently, six doctoral candidates in RC are enrolled within BIOREGS. The HUBI supervisors are also active in other nation graduate schools which have hosted several doctoral candidates during the evaluation period: National Graduate School of Organic Chemistry and Chemical Biology (GSOCCB), Glycoscience Graduate School (GGS), Applied Bioscience - Bioengineering, Food & Nutrition, Environ (ABS), National Graduate School in Materials Physics (NGSMP) and Inorganic Materials Chemistry Graduate Program (EMTKO). During the evaluation period, seven doctors have graduated from the RC. The members have also during this period participated in supervision of several other PhDs on the topics outside the biorefining field. Presently 15 doctoral candidates are conducting the doctoral studies in the RC.

The doctoral training of the HUBI follows the general principles and good practise recommended by the University of Helsinki and the Academy of Finland. Doctoral candidates are selected after evaluation based on quality criteria. Open graduate school positions are announced through public calls as well as are many of the open doctoral positions in research projects. In addition, a number of younger students are selected already as master's students to grow and develop within the research groups. The selection criteria include previous success in studies, scientific content of the research plan, devotion to scientific



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

### RC-SPECIFIC STAGE 2 MATERIAL

career, study plan and progress, as well as international activities, taking into account equality with respect to gender and nationality. Of the past and present doctoral candidates in RC, 64 % are females and three from other countries (Hungary, Iran, Malaysia). The research and study plans of incoming doctoral candidates are evaluated and approved by the participating faculties. The aim is to guarantee the financial support for the doctoral candidates for a period of four years enabling full time research.

The RCs aims at promoting joint multidisciplinary supervision of doctoral candidates. The main supervisors are professors or docents. Post doctoral researchers are actively encouraged to participate also to the doctoral training as co-supervisors. Ideally each doctoral candidate has a supervising group consisting of members with different knowledge. More than one supervisor ensures that the candidate will have help and guidance when needed. In addition, the good practise in the doctoral training is to have a follow-up group which may also contain members from other universities or research institutes. The group gives feed-back and ideas on the research and doctoral studies, and ensures the proper supervision and working conditions of the students. The doctoral training is based on the high quality research carried out in the groups and the students can adopt the spirit and enthusiasm of scientific work. Many of the doctoral candidates enrolled within the RC are actively collaborating with other research groups. One of the aims of the RC is that each doctoral candidate should work a period within another research group in RC, Finland or abroad to adopt multidisciplinary methodologies and views. Visits abroad are supported though the graduate school travelling funds, Nordic networks, such as Nordforsk, and COST actions. Many of the research projects, which are funding the doctoral candidates, contain national and/or international collaboration. For example, six of the past and present doctoral candidates have conducted  $\geq 1$  month research period abroad (Austria, Germany, Netherlands, Sweden, USA). The internationalization of the doctoral candidates is also promoted by hosting research visits of foreign doctoral candidates and post doctoral researchers. During the evaluation period, four doctoral candidates from other European countries (Denmark, France, Lithuania) visited the RC  $\geq 1$  month.

The cross-disciplinary HUBI research community consists of five research groups from two faculties and three departments which offer together a large portfolio of courses for the doctoral candidates in the basic sciences related to renewable raw materials; chemistry (organic, polymer, carbohydrate, inorganic), physics (surface and material physics), and biotechnology of lignocellulosic materials, as well as related analytical methodologies. The BIOREGS graduate school organizes the more specialized courses on biomass refining, and through which the doctoral candidates get access to the topic related courses also in the Aalto University and the Åbo Akademi University. The possibility to participate on the suitable courses in other Nordic countries was improved lately through the new Nordforsk funded researcher network on Refining Lignocellulosics to Advanced Polymers and Fibers (coordinated by Prof. Tenkanen). The aim of the RC is to focus on arranging few top level post graduate courses in BIOREGS. Some of the courses are arranged in collaboration with other national graduate schools in which RC supervisors are also partners. Doctoral candidates have also the possibility to participate on interesting courses in other national graduate schools (if space allows) to widen the education and viewpoint. The idea is, that the doctoral candidates are actively encouraged and supported to take courses in other universities in Finland and to participate on international summer schools and training courses to build up individual doctoral studies to result in a new generation of multidisciplinary experts for the future biorefining challenges. In addition to the courses, the RC doctoral candidates have met regularly in joint open research seminars organized by the Natural Polymers training group and during the past year by the BIOREGS graduate school.

Presentation skills are trained by academic writing courses and by practising talks first in local seminars and later in international conferences. The doctoral candidates are also involved in teaching, which is excellent training for social skills and group leading. The participating groups have excellent connections



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

### RC-SPECIFIC STAGE 2 MATERIAL

with various stake holders within the society and industry. Thus, one of the aims of the RC is also to create links and research collaborations between RC and industry. Representatives of industry have already expressed their interest in hosting the students as visiting scientists and to act as their mentors. So far, all the graduated students have been employed to good positions after graduation, which emphasizes the importance of the focus area of the RC.

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

The RC has a relatively short history but, already, clear strengths and challenges can be seen. The scientific core of the training programme has been fixed and the doctoral teaching programme has been designed based on existing and novel courses. On the other hand, the training programme develops when experience on courses is collected. New courses will also increasingly be planned and realized in collaboration with national and international universities.

One of the clear strengths is the multidisciplinary and unique character of the training programme of the RC. The programme also has a clear demand within the society thus providing clear motivation for the students and expected successful career either within the academia or industry.

In spite of the active collaboration within European networks and projects, both out- and in-coming visits with research groups in Europe or overseas will be further supported. Visits abroad should form an essential part of the doctoral training. In addition, the number of foreign doctoral students enrolled in RC will be increased.

#### 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 increased use of renewable biomass for production of fuels, chemicals and materials is considered as one of the key issues of sustainable development. There is a strong demand from the society for sustainability and towards efficient and economic exploitation of the renewable biomass that is not competing with the food production. This means more efficient refining of all lignocellulosic components into value-added products. Biorefining exploits different natural and biological sciences and integrate various technologies in order to meet these demands. The RC research and doctoral training topic is rapidly developing to be extremely important to the future community worldwide. Further, the whole chemical industry sector of Finland is relying on high-level education of researchers in chemistry and physics.

Societal impact of the individual people is also remarkable. We are active in scientific societies (including management and administrative councils), foundations, and committees as well as editorial boards of scientific journals & referees. Popularization of science is an important but challenging topic. The personnel of the RC have given interviews to TV, radio and various newspapers and other journals and magazines. The research connected with the RC research topic has already gained interest among general public. However, there still exists need for better public visibility of the RC.

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

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

RC-SPECIFIC STAGE 2 MATERIAL

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.

The HUBI research collaborations and student training are based on national and international research projects, on European research networks, and on the use of the international large-scale facilities like synchrotrons. National collaboration with a numerous researchers from other universities and research institutes, mostly from VTT, is realised through TEKES and the Academy of Finland funded projects. An exceptionally broad national research collaboration effort in biorefining, in which HUBI members are actively participating, is run by the Forestcluster Ltd, which is one of Finland's six Strategic Centres for science, technology and innovation ([www.forestcluster.fi/d/fc-home](http://www.forestcluster.fi/d/fc-home)). Forestcluster aims at doubling the value of the industry's products and services by the year 2030 when compared to 2006. The goal is to ensure that at least 50 per cent of production value is based on new and innovative world-class products and services.

On the international research collaboration, the members of the RC have during the period 2005-2010 participated in three WoodWisdom-Net projects (ERA-NET) and in three FP7 EU projects of which one, "High efficiency consolidated bioprocess technology for lignocellulose ethanol (HYPE)", is coordinated by prof. Viikari. In addition, RC members have participated altogether in ten COST actions of which one, COST FP0602 Biotechnology for Lignocellulose Biorefineries (2007-2011), is coordinated by prof. Viikari, and three Nordforsk funded researcher networks of which one, Refining Lignocellulosics to Advanced Polymers (2010-2012), is coordinated by prof. Tenkanen. These actions and networks have offered excellent possibilities for researcher mobility by funding the short term scientific missions between the participating countries and research groups.

The doctoral students of the RC come from Helsinki University and from other universities in Finland and abroad. Furthermore, two of the senior scientists in HUBI are immigrants and there are several post docs from abroad. During the period (2007-2010) the department of chemistry hosted FiDiPro professor Dimitris Argyropoulos, whose project was "Green chemistry of wood and wood components", which also strengthened the natural polymers research of HUBI. The research groups of RC have already established a long-term collaborative research programs with foreign groups (for example collaboration with a catalysis group at TU München, where professor Timo Repo is a visiting professor, as well as with groups from France and Sweden on biomass fractionation), such as with the Wallenberg Wood Science Center, which is a newly established research center in Sweden with a focus on new materials from trees (<http://wwsc.se>). These collaborations also involve extensive student exchange and sharing of research facilities, as well as joint publications.

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

The HUBI research activities on biomass utilization and properties give a valuable contribution to materials and nanoscience research carried out at campuses of Kumpula and Viikki (University of Helsinki) and Otaniemi (Aalto University and VTT). HUBI community utilizes and contributes to the development of the prominent research infrastructures of Viikki and Kumpula campuses. The challenges are to increase active international collaboration and to improve the infrastructure to be attractive for doctoral students and post doctoral fellows also from abroad to facilitate internationalization of the RC in future. An item in the action plan for the future is to utilize the international large scale facilities even more effectively than today. In this the training courses are also of importance.



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

RC-SPECIFIC STAGE 2 MATERIAL

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).

The RC has very good up-to-date facilities and infrastructure for practical laboratory work and competent personnel to operate and maintain high-end research instruments. The relatively good instrumentation of the RC is a result of two strategies: i) the research groups and departments have been constantly acquiring smaller research instruments and ii) the RC members have been active and successful in the infrastructure calls of the University of Helsinki and the Academy of Finland to acquire larger instruments. These include both liquid and solid state NMR spectrometers, high-resolution MS, X-ray microtomography, asymmetric flow field flow fractionation (AFFF) equipment and larger-scale synthesis reactors. Many of the instruments, especially the more expensive ones, are shared with other research groups outside this RC. Further, equipments (even larger ones like 600 MHz NMR spectrometer, HPSEC and capillary electrophoresis instruments) have been donated to the RC due to good relations to other institutions and industry. The RC is collaborating in the use of infrastructure and is jointly planning the funding applications in the infrastructure calls.

The RC groups have in-laboratory following equipment/research instruments:

Synthesis & purification: Normal & special synthesis equipment, glove-boxes, microwave instruments, Parr-reactors (60ml-1L scales), hydrogenation and ozonolysis devices, HPLC's ranging from analytical to semi-quantitative scale, Instrumentation for larger-scale purification (like flash-chromatographs etc.),

Characterization: NMR-spectrometers (liquid & solid state, 300-600 MHz), X-ray diffractometers, WAXS/SAX, X-ray microtomography, high-resolution and routine MS-spectrometers (HPLC-MS, GC-MS), several gas and liquid chromatography and HPSEC instruments with UV, RI and MALLS detectors, IR's, microscopes, TGA, DSC, zetasizers, instrumentation for rheology & polymer properties and practically all other routine characterization methods.

In addition to the techniques available in the laboratories of the RC, we have access to high-end instrumentation in x-ray (synchrotron), microscopy (AFM, SEM, FESEM, FIB) and NMR (800-900 MHz, NMR core facility in Viikki campus).

The RC members bear large responsibility of the undergraduate education at the departments. The workload of the bachelor courses is especially high, due to large number of students (from 120 up to 250 on the basic chemistry lecture courses). The practical laboratory exercises for bachelor students are carried out in small groups and this binds a lot of resources for both in form of teachers and equipment. The university lecturers take care of both laboratory works and some lecture courses and their educational load easily exceeds 50 % of the total time (including the planning of teaching). The professors are responsible of basic, intermediate and advanced lecture courses. All teachers participate in supervision of Bachelor, Master and PhD theses. In addition doctoral students (as teaching assistants) and post doctoral researchers use approximately from 10 % to 25 % of their time in teaching mainly on laboratory courses. In addition, they participate in other teaching duties, like tutoring and guiding Bachelor and Master theses works.

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

The joint efforts of the RC have enabled gaining a very good instrumentation and facilities. As already stated above, the RC has common strategy for acquiring larger research instruments from infrastructure



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

### RC-SPECIFIC STAGE 2 MATERIAL

calls, which has succeeded very well. However, somewhat contradictorally it is presently often difficult to find funding for smaller everyday instruments with the price range of 10-50 k€, especially for upgrading or replasing of existing equipments, as the infrastructure calls are usually directed to new openings and high-end instruments.

The recent renewal of Finnish university law has caused additional administrative and planning work. The new status will bring universities more freedom in governing their economy. Unfortunately, no signs are seen for professors of diminished load of management duties. By contrast, controlling the budgets of the departments, laboratories and projects requires even more careful attention and planning than previously. In this connection, the university is hoped to increase the efforts to diminish the byrocratic load of the researchers.

#### 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.

The RC was originally initiated as an umbrella organization for scientists with the same enthusiasm, disciplines and interest areas within the lignocellulose science area. The RC was formed to strengthen the overall status of the research area within the UH, to increase the critical mass and to find synergistic benefits of collaboration and education. Each member group of the RC has its own leadership practices and culture, and follows the general managerial procedures of the faculties and departments involved. The RC members are thus organizationally, economically and physically separated, making every-day management of the RC an irrelevant issue. However, with the emerging needs for more structured organization of the RC, the leadership of the RC has become more important. The leadership (currently Prof. Ilkka Kilpeläinen) of the RC rotates in between the core members in order to share the administrative workload. The major tasks of the leader of the RC is to: i) Promote collaboration, ii) Create a fruitful, challenging and open atmosphere, iii) To search for research disciplines of common interest, iv) Initiate actions to improve the output of the RC and v) Improve the infrastructure of the RC by coordinating joint proposals in infrastructure calls within UH and Academy of Finland. Within the RC, the management responsibilities are divided only based on the scientific and educational disciplines.

**Scientific management** In the RC member groups, the scientific responsibilities are divided among the group members, based on the structure, dynamics and culture of the group. The core group of the RC reviews the advances in the lignocelluloses science area, with a special emphasis on the emerging scientific challenges and common synergistic areas.

**Educational management** Members of the RC are active in various doctoral training programmes as explained in chapter 2. The key doctoral programmes of the RC members are the doctoral training programme are the national Graduate school of biomass refining, BIOREGS and the Nordic researcher network on Refining lignocellulosics to advanced polymers and fibers. Prof. Liisa Viikari the leader of the first two years' period of the BIOREGS graduate school and Prof Maija Tenkanen is the national coordinator of the Nordic researcher network on Refining lignocellulosics to advanced polymers and fibers. Each group leader is responsible for the high quality education of the PhD students. The common PhD education programmes of the RC will, however, lead to harmonization of the good practises and will raise the educational level of the PhD students of the RC.



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

### RC-SPECIFIC STAGE 2 MATERIAL

Each member group of the RC aims at high level scientific quality and has its own scientific goals. The RC management has supported efforts for creating an open and enthusiastic atmosphere within the RC by organizing common meetings and seminars. The BIOREGS graduate school has already shown to be a fruitful platform for organizing different events and creating an enthusiastic spirit among the PhD students. Further, also the PhD students have been actively searching for common research interests and increased synergies, which is quite uncommon in Finnish research culture.

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

The main task of the RC in future is to focus the research to areas where, in addition to the individual goals, also common synergistic benefits to reach top quality research can be foreseen. This goal is of utmost importance not only for raising the visibility of the RC, but also for promoting the strategies of bio-based economy. The RC's research goals are already currently discussed as part of the future Forest cluster strategies as well as on the Nordic level.

The RC's leadership and management is deliberately planned to be flexible and smooth. There is no need to build an organizational structure as there are no (financial or other) means to control the function of the RC. The strength of the RC is that it is almost independent of managerial burdens and is only driven by the common enthusiasm and desire to increase the scientific quality of research. Thus, the plans for developing the processes mainly include plans on better management of the PhD programmes, as well as common attempts to maintain and improve the scientific spirit and ambiguousness of the RC member groups.

#### 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: 3420000
- 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: 1460000
- 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: 890000
- 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: 0
- 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: Found. for Nat. Res. in Finland
  - University of Helsinki



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

RC-SPECIFIC STAGE 2 MATERIAL

- Danisco Foundation
  - Fortumin säätiö
  - Kulttuurirahasto
  - total amount of funding (in euros) from the above-mentioned foundations: 1410000
- 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: Industrial (national) funding (2360 k€)
    - SamNordisk Skogsforskning
    - INTAS (90 k€)
    - total amount of funding (in euros) from the above-mentioned funding organizations: 2450000
  - 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: Ministry of education and University of Helsinki graduate schools
    - total amount of funding (in euros) from the above-mentioned funding organizations: 1190000

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.

In order to plan for future actions, it is usually fruitful to look critically at the current situation.

The Strengths of the RC include:

  - i) Strong networking with domestic groups through Forestcluster Ltd and TEKES biorefinery programs and emerging international research collaboration. RC members are currently participating in discussion with the Wallenberg Wood Science Center on coordination of different biorefinery programs in Finland and Sweden.
  - ii) Close collaboration with pulp and paper industry especially through the actions of Forestcluster Ltd and with chemical industry – An excellent example of this work is the decision of the Finnish main oilrefinery (Neste Oil) to start a new plant that will produce high-quality bio-based base (lubrication) oils.
  - iii) Active involvement in mobility projects (DAAD-Academy of Finland, COST actions, Norforsk).
  - iv) Establishment of national graduate school BIOREGS and nordic collaboration in doctoral training.

The Challenges of the RC for the future are:

  - i) How to recruit the best of the young scientists to the research teams, both from Finland and especially abroad.
  - ii) Assuring attractive career development for the most qualified young scientists.
  - iii) Increasing both the quality and outcome of research in order to gain international visibility.



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

### RC-SPECIFIC STAGE 2 MATERIAL

There still exists need for better visibility of the RC to both the public and to top academic community internationally. This is achievable through publication, promotion and placement. Increased emphasis on publication in medium to high impact factor journals is a necessity. Promotion of the group as a whole via new media outlets (websites, forums, facebook, youtube) and the dissemination of informative public-friendly documents, specifically on the need for development of new green and sustainable technologies, as replacement for fossil fuels and to stimulate Finland's bio-based economy. Placement of promising and astute young scientists in the laboratories of internationally recognised researchers and national industries in the research area will go a long way toward the personal development of the young scientists and will help bring the relevant technologies to the RC and Finnish industry. This will also help raise the status of the group on the international stage. These actions may be partly satisfied with the organisation of regular internal symposia for the RC, where the group members get to contribute their research as extended abstracts. Key international academic speakers and national industry associates may be invited to promote the exchange of ideas and mobility of researchers.

#### Research Perspective

The development of commodity chemicals from biomass is a key target area, for which the RC should start to focus on. To achieve this, novel technologies are of course a prime target. In addition to this, process intensification methods and in particular, the development of catalytic processes are of considerable importance to develop selective reactions for the production of commodities. New projects will be developed and existing projects will be encouraged toward this area.

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

All members of the groups contributed to each chapter/question. To prepare for the evaluation, we had two physical meetings and continuous email/phone discussions. The main writing was conducted by prof. Ilkka Kilpeläinen. The responsibilities for different chapters were divided as: prof. Majja Tenkanen (chapter 2), prof. Liisa Viikari (chapters 3 and 6), prof. Ritva Serimaa (chapter 4) and Dr. Alistair King (chapter 8). Dr. Kirsti Parikka collected the funding data. In addition, the responsibility for compiling the information and writing the chapter was divided between the RC members.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

**1 Analysis of publications**

- Associated person is one of Ilkka Kilpeläinen , Lasse Kyllönen , Joma Matikainen ,  
Pirkko Karhunen , Jari Kavakka , Tuomas Kulomaa ,  
Sara Rahim Labafzadeh , Jarno Antero Jalomäki , Paula Katarina Järvi , Mari Granström ,  
Annastiina Maaria Veistinen , Ritva Serimaa , Paavo Aleksii Penttälä ,  
Seppo V Andersson , Ulla Vainio, Matti-Paavo Saren, Sirkka Liisa Maunu ,  
Vladimir Aseyev , Mia Hiltunen , Helena Parviainen , Mikko Mänttari ,  
Pirita Rämänen , Tommi Antti Petteri Virtanen , Maija Tenkanen ,  
Päivi Tuomainen , Sanna Koutaniemi , Kirsi Mikkonen ,  
Leena Pitkänen , Susanna Heikkinen , Sun-Li Chong , sun-  
li Mari Heikkilä , Timo Repo , Janne Asikkala , Pauli Wrigstedt ,  
Tiina Riekkola , Majaja Hakola , Liisa Viikari , Nora Szjarto ,  
Aniko Varnai ,

Publication type	Publication year						Total Count 2005 - 2010
	2005	2006	2007	2008	2009	2010	
A1 Refereed journal article	40	35	40	45	42	35	237
A2 Review in scientific journal						1	1
A3 Contribution to book/other compilations (refereed)	1	1		2	2	2	8
A4 Article in conference publication (refereed)	2	2	4	4	4	8	24
B3 Unrefereed article in conference proceedings	2		3	3	8	3	19
C1 Published scientific monograph				1			1
C2 Edited book, compilation, conference proceeding or special issue of journal			1				1
D1 Article in professional journal					1		1
E1 Popular article, newspaper article	1	1		1		1	4
H1 Patents			4			1	5



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

## 2 Listing of publications

### A1 Refereed journal article

#### 2005

- 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.
- Andersson, S, Serimaa, R, Väänänen, T, Paakkari, T, Jämsä, S, Viitaniemi, P **2005**, 'X-ray scattering studies of thermally modified Scots pine (Pinus sylvestris L.)', **Holzforschung**, vol 59, pp. 422-427.
- Aseyev, V, Hietala, S, Laukkanen, A, Nuopponen, M, Confortini, O, Du Prez, FE, Tenhu, H **2005**, 'Mesoglobules of thermoresponsive polymers in dilute aqueous solutions above the LCST', **Polymer**, vol 46, no. 18, pp. 7118-7131.
- 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.
- Burova, TV, Grinberg, NV, Grinberg, VY, Kalinina, EV, Lozinsky, VI, Aseyev, V, Holappa, S, Tenhu, H, Khokhlov, AR **2005**, 'Unusual Conformational Behavior of Complexes of Poly(N-isopropylacrylamide) with Poly(methacrylic acid)', **Macromolecules**, vol 38, no. 4, pp. 1292-1299.
- Bäcklund, TG, Sadberg, HGO, Österbacka, R, Stubb, H, Torkkeli, M, Serimaa, R **2005**, 'A novel method to orient semiconducting polymer films', **Advanced Functional Materials**, vol 15, no. 7, pp. 1095-1099.
- 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.
- Dudkina, M, Aseyev, V, Tenkovtsev, A, Tenhu, H **2005**, 'Interaction and ionic network formation process between polyamidine and nonlinear optically active dyes.', **Journal of Polymer Science. Part B, Polymer Physics**, vol 43, no. 4, pp. 398-404.
- Fernandez, M, Keyriläinen, J, Serimaa, R, Torkkeli, M, Karjalainen-Lindsberg, M, Leidenius, M, Smitten, KV, Tenhunen, M, Fiedler, S, Bravin, A, Weiss, TM, Suortti, P, Trokkeli, M **2005**, 'Human breast cancer in vitro: matching histo-pathology with small-angle x-ray scattering and diffraction enhanced x-ray imaging', **Physics in Medicine and Biology**, vol 50, no. 13, pp. 2991-3006.
- Hynninen, PH, Kavakka, JS, Mesilaakso, M **2005**, 'Electronic structure of the enolate anion of chlorophyll b', **Tetrahedron Letters**, vol 46, no. 7, pp. 1145-1147.
- 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.
- Kisko, K, Torkkeli, M, Vuorimaa, E, Lemmetyinen, H, Seeck, OH, Linder, M, Serimaa, R **2005**, 'Langmuir-Blodgett films of hydrophobins HFBI and HFBII', **Surface Science**, vol 584, no. 1, pp. 35-40.
- Knaapila, M, Stepanyan, R, Lyons, BP, Torkkeli, M, Hase, TPA, Serimaa, R, Güntner, R, Seeck, OH, Scherf, U, Monkman, AP **2005**, 'The Influence of the Molecular Weight on the Thermotropic Alignment and Self-Organized Structure Formation of Branched Side Chain Hairy-Rod Polyfluorene in Thin Films', **Macromolecules**, vol 38, no. 7, pp. 2744-2753.
- Knaapila, M, Lyons, BP, Hase, TPA, Pearson, C, Petty, MC, Bouchenoire, L, Thompson, P, Serimaa, R, Torkkeli, M, Monkman, AP **2005**, 'Influence of molecular weight on the surface morphology of aligned, branched side-chain polyfluorene', **Advanced Functional Materials**, vol 15, no. 9, pp. 1517-1522.
- Knaapila, M, Stepanyan, R, Torkkeli, M, Lyons, BP, Ikonen, T, Almsy, L, Foreman, JP, Serimaa, R, Güntner, R, Scherf, U, Monkman, AP **2005**, 'Influence of molecular weight on the phase behavior and structure formation of branched side-chain hairy-rod polyfluorene in bulk phase', **Physical Review E : Statistical, Nonlinear, and Soft Matter Physics**, vol 71, no. 4.
- Koponen, T, Karpinen, T, Hæggström, E, Saranpää, P, Serimaa, R **2005**, 'The stiffness modulus in Norway spruce as a function of year ring', **Holzforschung**, vol 59, pp. 451-455.
- 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.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

- Koskela, H, Kilpeläinen, I, Heikkinen, S **2005**, 'Some aspects of quantitative 2D NMR', **Journal of Magnetic Resonance**, vol 174, no. 2, pp. 237-244.
- Koutaniemi, S, Toikka, M, Kärkönen, A, Mustonen, M, Lundell, T, Simola, LK, Kilpeläinen, I, Teeri, T **2005**, 'Characterization of basic p-coumaroyl and coniferyl alcohol oxidizing peroxidases from a lignin-forming *Picea abies* suspension culture', **Plant Molecular Biology**, vol 58, no. 2, pp. 141-157.
- 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(imino)pyridine nitrogen ligands bearing chiral bulky aliphatic and aromatic substituents: Crystal structure of [CoCl<sub>2</sub>{2,6-bis[R-(+)-(boronylimino)methyl]pyridine}], **Zeitschrift für anorganische und allgemeine Chemie**, vol 631, pp. 763-768.
- Legrand, S, Luukinen, H, Isaksson, R, Kilpeläinen, I, Lindström, M, Nicholls, IA, Unelius, CR **2005**, 'Synthesis, NMR conformational studies and host-guest behaviour of new (+)-tartaric acid derivatives', **Tetrahedron: Asymmetry**, vol 16, no. 3, pp. 635-640.
- Ohra-aho, T, Tenkanen, M, Tamminen, T **2005**, 'Direct analysis of lignin and lignin-like components from softwood kraft pulp by PY-GC/MS techniques', **Journal of Analytical and Applied Pyrolysis**, vol 74, no. 1/2, pp. 123-128.
- 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.
- Raulo, E, Tumova, S, Pavlov, I, Pekkanen, M, Hienola, A, Klankki, E, Kalkkinen, N, Taira, T, Kilpeläinen, I, Rauvala, H **2005**, 'The two thrombospondin type 1 repeat domains of the heparin-binding growth-associated molecule bind to heparin/heparan sulfate and regulate neurite extension and plasticity in hippocampal neurons', **Journal of Biological Chemistry**, vol 280, no. 50, pp. 41576-41583.
- Ristolainen, N, Vainio, U, Paaavola, S, Torkkeli, M, Serimaa, R, Seppälä, J **2005**, 'Polypropylene/organoclay nanocomposites compatibilized with hydroxyl-functional polypropylenes', **Journal of Polymer Science. Part B, Polymer Physics**, vol 43, no. 14, pp. 1892-1903.
- Ruotsalainen, T, Turku, J, Heikkilä, P, Ruokolainen, J, Nykänen, A, Laitinen, T, Torkkeli, M, Serimaa, R, ten Brinke, G, Harlin, A, Ikkala, O **2005**, 'Towards Internal Structuring of Electrospun Fibers by Hierarchical Self-Assembly of Polymeric Comb-Shaped Supramolecules', **Advanced Materials**, vol 17, no. 8, pp. 1048-1052.
- Saren, M, Serimaa, R **2005**, 'Determination of microfibril angle distribution by X-ray diffraction', **Wood Science and Technology**, vol 40, no. 6, pp. 445-460.
- Saren, M, Peura, M, Serimaa, R **2005**, 'Interpretation of microfibril angle distributions in wood using microdiffraction experiments on single cells', **Journal of X-Ray Science and Technology**, vol 13, pp. 191-197.
- Saren, AM, Ravanti, JJ, Benson, SD, Burnett, RM, Paulin, L, Bamford, DH, Bamford, JKH **2005**, 'A snapshot of viral evolution from genome analysis of the Tectiviridae family', **Journal of Molecular Biology**, vol 350, no. 3, pp. 427-440.
- Silvennoinen, L, Koivunen, P, Myllyharju, J, Kilpeläinen, I, Permi, P **2005**, 'Letter to the editor: NMR assignment of the N-terminal domain a of the glycoprotein chaperone ERp57', **Journal of Biomolecular NMR**, vol 33, pp. 136.
- Silver, S, Puranen, A, Sjöholm, R, Repo, T, Leino, R **2005**, 'Chiral indenyl and group-4 metallocene dichlorides containing alpha- and beta-pinenyl-derived ligand substituents: Synthesis and catalytic applications in polymerization and carbocyclization reactions', **European Journal of Inorganic Chemistry**, pp. 1514-1529.
- Suhonen, H, Fernandez, M, Serimaa, R, Suortti, P **2005**, 'Simulation of small-angle x-ray scattering from collagen fibrils and comparison with experimental patterns', **Physics in Medicine and Biology**, vol 50, no. 22, pp. 5401-5416.
- Tiitu, M, Torkkeli, M, Serimaa, R, Mäkelä, T, Ikkala, OT **2005**, 'Self-assembly and flow alignment of protonically conducting complexes of polystyrene-block-poly(4-vinylpyridine) diblock copolymer with phosphoric acid', **Solid State Ionics**, vol 176, no. 13-14, pp. 1291-1299.
- Viitala, R, Jokinen, M, Maunu, S, Jalonen, H, Rosenholm, JB **2005**, 'Chemical characterization of bioresorbable sol-gel derived SiO<sub>2</sub> matrices prepared at protein-compatible pH', **Journal of Non-Crystalline Solids**, vol 351, no. 40-42, pp. 3225-3234.
- Vilkman, M, Kosonen, H, Nykänen, A, Ruokolainen, J, Torkkeli, M, Serimaa, R, Ikkala, O **2005**, 'Electrical conductivity transitions and self-assembly in comb-shaped complexes of polyaniline based on crystallization and melting of the supramolecular side chains', **Macromolecules**, vol 38, no. 18, pp. 7793-7797.
- Virkki, L, Johansson, L, Ylinen, M, Maunu, S, Ekholm, P **2005**, 'Structural characterization of water-insoluble nonstarchy polysaccharides of oats and barley', **Carbohydrate Polymers**, vol 59, no. 3, pp. 357-366.
- Väänänen, T, Ikonen, T, Rokka, V, Kuronen, P, Serimaa, R, Ollilainen, V **2005**, 'Influence of incorporated wild *Solanum* genomes on potato properties in terms of starch nanostructure and glycoalkaloid content', **Journal of Agricultural and Food Chemistry**, vol 53, no. 13, pp. 5313-5325.
- 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

HUBI/Kilpeläinen

- Ajithkumar, A, Andersson, R, Siika-Aho, M, Tenkanen, M, Åman, P **2006**, 'Isolation of cellotriosyl blocks from barley  $\beta$ -glucan with endo-1, 4- $\beta$ -glucanase from *Trichoderma reesei*', **Carbohydrate Polymers**, vol 64, pp. 233-238.
- Andersson, T, Holappa, S, Aseyev, V, Tenhu, H **2006**, 'Effect of Polycation Length on Its Complexation with DNA and with Poly(oxyethylene-block-sodium methacrylate).', **Biomacromolecules**, vol 7, no. 11, pp. 3229-3238.
- Andersson, M, Hietala, S, Tenhu, H, Maunu, S **2006**, 'Polystyrene latex particles coated with crosslinked poly(N-isopropylacrylamide)', **Colloid and Polymer Science**, vol 284, pp. 1255-1263.
- Andersson, M, Maunu, S **2006**, 'Volume phase transition and structure of poly(N-isopropylacrylamide) microgels studied with  $^1\text{H-NMR}$  spectroscopy in  $\text{D}_2\text{O}$ ', **Colloid and Polymer Science**, vol 285, pp. 293-303.
- Andersson, M, Maunu, S **2006**, 'Structural studies of poly(N-isopropylacrylamide) microgels: effect of SDS surfactant concentration in the microgel synthesis', **Journal of Polymer Science. Part B, Polymer Physics**, vol 44, no. 23, pp. 3305-3314.
- Aseyev, V, Tenhu, H, Winnik, FM **2006**, 'Temperature dependence of the colloidal stability of neutral amphiphilic polymers in water.', **Advances in Polymer Science**, vol 196, no. Conformation-Dependent Design of Sequences in Copolymers II, pp. 1-85.
- Askolin, S, Linder, M, Scholtmeijer, K, Tenkanen, M, Penttilä, M, Vocht, MLD, Wösten, HAB **2006**, 'Interaction and comparison of a class I hydrophobin from *Schizophyllum commune* and class II hydrophobins from *Trichoderma reesei*', **Biomacromolecules**, vol 7, pp. 1295-1301.
- Axenov, KV, Kilpeläinen, I, Klinga, M, Leskelä, M, Repo, T **2006**, 'Titanium and zirconium benzyl complexes bearing bulky bis(amido)cyclodiphosph(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)cyclodiphosph(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.
- 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.
- Johansson, L, Virkki, L, Anttila, H, Esselström, H, Tuomainen, P, Sontag-Strohm, T **2006**, 'Hydrolysis of beta-glucan', **Food Chemistry**, vol 97, pp. 71-79.
- Knaapila, M, Torkkeli, M, Lyons, BP, Hunt, MRC, Hase, TPA, Seeck, OH, Bouchenoire, L, Serimaa, R, Monkman, AP **2006**, 'Influence of star-like iridium complexes in the graphoepitaxy of polyfluorene thin films', **Physical Review B, Condensed Matter and Materials Physics**, vol 74, no. 21.
- Kontkanen, H, Tenkanen, M, Reinikainen, T **2006**, 'Purification and characterisation of a novel steryl esterase from *Melanocarpus albomyces*', **Enzyme and Microbial Technology**, vol 39, no. 2, pp. 265-273.
- 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.
- Kotel'nikova, NE, Lysenko, EL, Serimaa, R, Pirkkalainen, K, Vainio, U, Shakhmin, AL, Saprykina, NN, Lavrent'ev, VK, Medvedeva, DA, Novoselov, NP **2006**, 'Cellulose matrix as a nanoreactor for preparing nanoparticles of nickel and its oxides using hydrazine dihydrochloride as reductant', **Russian Journal of Applied Chemistry**, vol 79, no. 11, pp. 1902-1906.
- Kujawa, P, Aseyev, V, Tenhu, H, Winnik, FM **2006**, 'Temperature-sensitive properties of poly(N-isopropylacrylamide) mesoglobules formed in dilute aqueous solutions heated above their demixing point', **Macromolecules**, vol 39, pp. 7686-7693.
- Marjamaa, K, Hilden, K, Kukkola, E, Lehtonen, M, Holkeri, H, Haapaniemi, P, Koutaniemi, S, Teeri, TH, Fagerstedt, K, Lundell, T **2006**, 'Cloning, characterization and localization of three novel class III peroxidases in lignifying xylem of Norway spruce (*Picea abies*)', **Plant Molecular Biology**, vol 61, no. 4-5, pp. 719-732.
- Marjamaa, K, Kukkola, E, Lundell, T, Karhunen, P, Saranpää, P, Fagerstedt, KV, Fagerstedt, K **2006**, 'Monolignol oxidation by xylem peroxidase isoforms of Norway spruce (*Picea abies*) and silver birch (*Betula pendula*)', **Tree Physiology**, vol 26, pp. 605-611.
- Nakamura, F, Pudas, R, Heikkinen, O, Permi, P, Kilpeläinen, I, Munday, A, Hartwig, J, Stossel, T, Ylanne, J **2006**, 'The structure of the GPIb-filamin A complex', **Blood**, vol 107, no. 5, pp. 1925-1932.
- Nuopponen, MH, Wikberg, H, Birch, GM, Jääskeläinen, A, Maunu, SL, Vuorinen, T, Stewart, D **2006**, 'Characterization of 25 tropical hardwoods with Fourier transform infrared, ultraviolet resonance Raman, and C-13-NMR cross-polarization/magic-angle spinning spectroscopy', **Journal of Applied Polymer Science**, vol 102, no. 1, pp. 810-819.
- Pesonen, J, Virtanen, T, Beddoni, A, Halonen, L **2006**, 'Two-centre harmonic oscillator integrals', **Molecular Physics**, vol 104, no. 1, pp. 83-94.
- Peura, M, Grotkopp, I, Lemke, H, Vikkula, A, Laine, J, Muller, M, Serimaa, R **2006**, 'Negative Poisson ratio of crystalline cellulose in kraft cooked Norway spruce', **Biomacromolecules**, vol 7, pp. 1521-1528.
- Pencik, J, Arellano, JB, Ikonen, TP, Borrego, CM, Laurinmäki, PA, Butcher, SJ, Serimaa, R, Tuma, R **2006**, 'Internal structure of chlorosomes from brown-colored *Chlorobium* species and the role of carotenoids in their assembly', **Biophysical Journal**, vol 91, pp. 1433-1440.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

- 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.
- Pääkkönen, K, Tossavainen, H, Permi, P, Rakkolainen, H, Rauvala, H, Raulo, E, Kilpeläinen, I, Guntert, P **2006**, 'Solution structures of the first and fourth TSR domains of F-spondin', **Proteins : structure, function, and genetics**, vol 64, no. 3, pp. 665-672.
- Saren, M, Serimaa, R, Tolonen, Y **2006**, 'Determination of fiber orientation in Norway spruce using X-ray diffraction and laser scattering', **Holz als Roh- und Werkstoff**, vol 64, no. 3, pp. 183-188.
- 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.
- Strandman, S, Hietala, S, Aseyev, V, Koli, B, Butcher, SJ, Tenhu, H **2006**, 'Supramolecular assemblies of amphiphilic PMMA-block-PAA stars in aqueous solutions', **Polymer**, vol 47, no. 19, pp. 6524-6535.
- Tiitu, M, Laine, J, Serimaa, R, Ikkala, O **2006**, 'Ionically self-assembled carboxymethyl cellulose/surfactant complexes for antistatic paper coating', **Journal of Colloid and Interface Science**, vol 301, pp. 92-97.
- Tossavainen, H, Pihlajamaa, T, Huttunen, TK, Raulo, E, Rauvala, H, Permi, P, Kilpeläinen, I **2006**, 'The layered fold of the TSR domain of *P. falciparum* TRAP contains a heparin binding site', **Protein Science**, vol 15, no. 7, pp. 1760-1768.
- Tossavainen, H, Permi, P, Purhonen, SL, Sarvas, M, Kilpeläinen, I, Seppälä, R **2006**, 'NMR solution structure and characterization of substrate binding site of the PPLase domain of PrsA protein from *Bacillus subtilis*', **FEBS Letters**, vol 580, pp. 1822-1826.
- Vainio, U, Serimaa, R, Gravitis, J **2006**, 'X-ray scattering methods in the study of soft materials', **Latvian journal of physics and technical sciences**, vol 4, pp. 14-24.
- Väänänen, TT, Ikonen, T, Rokka, V, Kuronen, P, Serimaa, R, Ollilainen, V **2006**, 'Correction: Influence of Incorporated Wild Solanum Genomes on Potato Properties in Terms of Starch Nanostructure and Glycoalkaloid Content', **Journal of Agricultural and Food Chemistry**, vol 54, pp. 4496-4497.
- 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.
- 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.
- Elo, H, Matikainen, J, Pelttari, E **2007**, 'Potent activity of the lichen antibiotic (+)-using acid against clinical isolates of vancomycin-resistant enterococci and methicillin-resistant *Staphylococcus aureus*', **Naturwissenschaften**, vol 94, pp. 465-468.
- 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.
- Hietala, S, Mononen, P, Strandman, S, Järvi, P, Torkkeli, M, Jankova, K, Hvilsted, S, Tenhu, H **2007**, 'Synthesis and rheological properties of an associative star polymer in aqueous solutions', **Polymer**, vol 48, no. 14, pp. 4087-4096.
- Ikonen, TP, Li, H, Psencik, J, Laurinmäki, PA, Butcher, SJ, Frigaard, N, Serimaa, RE, Bryant, DA, Tuma, R **2007**, 'X-ray scattering and electron cryomicroscopy study on the effect of carotenoid biosynthesis to the structure of chlorobium tepidum chlorosomes', **Biophysical Journal**, vol 93, pp. 620-628.
- Johansson, L, Tuomainen, P, Anttila, H, Rita, H, Virkki, L **2007**, 'Effect of processing on the extractability of oat  $\beta$ -glucan', **Food Chemistry**, vol 105, no. 4, pp. 1439-1445.
- Kavakka, JS, Heikkinen, S, Kilpeläinen, I, Mattila, M, Lipsanen, H, Helaja, J **2007**, 'Noncovalent attachment of pyro-pheophorbide a to a carbon nanotube', **Chemical Communications**, no. 6, pp. 519-521.
- Kilpeläinen, I, Xie, H, King, A, Granstrom, M, Heikkinen, S, Argyropoulos, DS **2007**, 'Dissolution of wood in ionic liquids', **Journal of Agricultural and Food Chemistry**, vol 55, pp. 9142-9148.
- Kisko, K, Szilvay, GR, Vuorimaa, E, Lemmetyinen, H, Linder, MB, Torkkeli, M, Serimaa, R **2007**, 'Self-assembled films of hydrophobin protein HFBIII from *Trichoderma reesei*', **Journal of Applied Crystallography**, vol 40, pp. 355-360.
- 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.
- Koskela, H, Heikkinen, O, Kilpeläinen, I, Heikkinen, S **2007**, 'Rapid and accurate processing method for amide proton exchange rate measurement in proteins', **Journal of Biomolecular NMR**, vol 37, pp. 313-320.
- Koutaniemi, S, Warinowski, T, Kärkönen, A, Alatalo, E, Fossdal, CG, Saranpää, P, Laakso, T, Fagerstedt, K, Simola, LK, Paulin, L, Rudd, S, Teeri, T **2007**, 'Expression profiling of the lignin biosynthetic pathway in Norway spruce using EST sequencing and real-time RT-PCR', **Plant Molecular Biology**, vol 65, pp. 311-328.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

- Lahtinen, P, Ahmad, JU, Lankinen, E, Piikko, 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.
- Leppänen, V, Tossavainen, H, Permi, P, Lehtiö, L, Rönholm, G, Goldman, A, Kilpeläinen, I, Pihlajamaa, T **2007**, 'Crystal structure of the N-terminal NC4 domain of collagen IX, a zinc binding member of the laminin-neurexin-sex hormone binding globulin (LNS) domain family', **Journal of Biological Chemistry**, vol 282, no. 32, pp. 23219-23230.
- Lipponen, S, Pietikainen, P, Vainio, U, Serimaa, R, Seppälä, JV, Serimaa, R **2007**, 'Silane functionalized Ethylene/Diene copolymer modifiers in composites of heterophasic polypropylene and microsilica', **Polymers and Polymer Composites**, vol 15, no. 5, pp. 343-355.
- Mikkonen, K, Rita, H, Helen, H, Talja, RA, Hyvönen, L, Tenkanen, M **2007**, 'Effect of polysaccharide structure on mechanical and thermal properties of galactomannan-based films', **Biomacromolecules**, vol 8, no. 10, pp. 3198-3205.
- Peura, M, Kölln, K, Grotkopp, I, Saranpää, P, Muller, M, Serimaa, R **2007**, 'The effect of axial strain on crystalline cellulose in Norway spruce', **Wood Science and Technology**, vol 41, pp. 565-583.
- Pirkkalainen, K, Vainio, U, Kisko, K, Elbra, T, Kohout, T, Kotelnikova, NE, Serimaa, R **2007**, 'Structure of nickel nanoparticles in a microcrystalline cellulose matrix studied using anomalous small-angle X-ray scattering', **Journal of Applied Crystallography**, vol 40, pp. 489-494.
- Puchart, V, Vrsanska, M, Mastihubova, M, Topakas, E, Vafiadi, C, Faulds, CB, Tenkanen, M, Christakopoulos, P, Biely, P **2007**, 'Substrate and positional specificity of feruloyl esterases for monoferuloylated and monoacetylated 4-nitrophenyl glycosides', **Journal of Biotechnology**, vol 127, pp. 235-243.
- 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.
- Raisanen, MT, Elo, P, Kettunen, M, Klinga, M, Leskelä, M, Repo, T **2007**, 'Practical method for 2-hydroxyphenylketimine synthesis', **Synthetic Communications**, vol 37, no. 11, pp. 1765-1777.
- Rantane, H, Virkki, L, Tuomainen, P, Kabel, M, Schols, H, Tenkanen, M **2007**, 'Preparation of arabinoxylobiose from rye xylan using family 10 Aspergillus aculeatus endo-1,4-β-D-xylanase', **Carbohydrate Polymers**, vol 68, pp. 350-359.
- Ruotsalainen, T, Turku, J, Hiekkataipale, P, Vainio, U, Serimaa, R, Brinke, GT, Harlin, A, Ruokolainen, J, Ikkala, O **2007**, 'Tailoring of the hierarchical structure within electrospun fibers due to supramolecular comb-oil block copolymers: polystyrene-block-poly(4-vinyl pyridine) plasticized by hydrogen bonded pentadecylphenol', **Soft Matter**, vol 3, no. 8, pp. 978-985.
- 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**, '(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, Klinga, M, Leskelä, M, Repo, T **2007**, '2-Carboxyquinolinium chloride monohydrate', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. o1926-o1927.
- 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, 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, Leskelä, M, Repo, T **2007**, '5-Dodecyloxy-2-(phenethyliminomethyl)phenol', **Acta Crystallographica. Section E: Structure Reports Online**, vol 63, pp. o1816-o1817.
- Seppänen, S, Pasonen, H, Vauramo, S, Vahala, J, Toikka, M, Kilpeläinen, I, Setälä, H, Teeri, T, Timonen, S, Pappinen, A **2007**, 'Decomposition of the leaf litter and mycorrhiza forming ability of silver birch with a genetically modified lignin biosynthesis pathway', **Applied Soil Ecology**, vol 36, no. 2-3, pp. 100-106.
- 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.
- Szilvay, G, Kisko, K, Serimaa, R, Linder, M **2007**, 'The relation between solution association and surface activity of the hydrophobin HFBI from *Trichoderma reesei*', **FEBS Letters**, vol 581, no. 14, pp. 2721-2726.
- 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.
- Tarassova, E, Aseyev, V, Filippov, A, Tenhu, H **2007**, 'Structure of poly(vinyl pyrrolidone)-C70 complexes in aqueous solutions', **Polymer**, vol 48, no. 15, pp. 4503-4510.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

Vainio, U, Pirkkalainen, K, Kisko, K, Goerigk, G, Kotelnikova, NE, Serimaa, R **2007**, 'Copper and copper oxide nanoparticles in a cellulose support studied using anomalous small-angle x-ray scattering', **European Physical Journal D. Atomic, Molecular, Optical and Plasma Physics**, vol 42, no. 1, pp. 93-101.

Van Durme, K, Van Assche, G, Aseyev, V, Raula, J, Tenhu, H, Van Mele, B **2007**, 'Influence of Macromolecular Architecture on the Thermal Response Rate of Amphiphilic Copolymers, Based on Poly(N-isopropylacrylamide) and Poly(oxyethylene), in Water.', **Macromolecules**, vol 40, no. 10, pp. 3765-3772.

Viikari, L, Alapuranen, M, Puranen, T, Vehmaanperae, J, Siika-aho, M **2007**, 'Thermostable enzymes in lignocellulose hydrolysis', **Biotechnology for Biofuels**, vol 108, pp. 121-145.

Xie, H, King, A, Kilpeläinen, I, Granström, M, Argyropoulos, DS **2007**, 'Thorough chemical modification of wood-based lignocellulosic materials in ionic liquids', **Biomacromolecules**, vol 8, pp. 3740-3748.

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.

**2008**

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.

Andersson, T, Sumela, M, Khriachtchev, L, Räsänen, M, Aseyev, V, Tenhu, H **2008**, 'Solution properties of an aqueous poly(methacryl oxyethyl trimethylammonium chloride) and its poly(oxyethylene) grafted analog', **Journal of Polymer Science. Part B, Polymer Physics**, vol 46, no. 6, pp. 547-557.

Arellano, JB, Torkkeil, M, Tuma, R, Laurinmäki, P, Melø, TB, Ikonen, TP, Butcher, SJ, Serimaa, RE, Psencik, J **2008**, 'Hexanol-induced order-disorder transitions in lamellar self-assembling aggregates of bacteriochlorophyll c in Chlorobium tepidum chlorosomes', **Langmuir**, vol 24, no. 5, pp. 2035-2041.

Benko, Z, Siika-aho, M, Viikari, L, Reczey, K **2008**, 'Evaluation of the role of xyloglucanase in the enzymatic hydrolysis of lignocellulosic substrates', **Enzyme and Microbial Technology**, vol 43, no. 2, pp. 109-114.

Chong, S, Beng Ti, T, Mou, DG, Lim, SH **2008**, 'Cell growth, cell-cycle progress and antibody production in hybridoma cells cultivated under mild hypothermic conditions', **Hybridoma**.

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.

Granström, M, Kavakka, J, King, A, Majoinen, J, Mäkelä, V, Helaja, J, Hietala, S, Virtanen, T, Maunu, S, Argyropoulos, DS, Kilpeläinen, I **2008**, 'Tosylation and acylation of cellulose in 1-allyl-3-methylimidazolium chloride', **Cellulose**, vol 15, no. 3, pp. 481-488.

Höije, A, Sternemalm, E, Heikkinen, S, Tenkanen, M, Gatenholm, P **2008**, 'Material properties of films from enzymatically tailored arabinoxylans', **Biomacromolecules**, vol 9, no. 7, pp. 2042-2047.

Kaltia, J, Matikainen, J, Ala-Peijari, M, Hase, T, Kaltia, S **2008**, 'Synthesis of ethyl 5Z, 9Z, 12Z-octadecatrienoate (ethyl pinolenate) and methyl 12Z, 15Z-octadecadienoate', **Journal of the American Oil Chemists' Society**, vol 85, pp. 561-565.

Kavakka, JS, Heikkinen, S, Helaja, J **2008**, 'Zn pyrophosphorbide a: a  $\beta$ -face selective nicotine receptor', **European Journal of Organic Chemistry**, pp. 4932-4937.

Kisko, K, Szilvay, GR, Vainio, U, Linder, MB, Serimaa, R **2008**, 'Interactions of hydrophobin proteins in solution studied by small-angle X-ray scattering', **Biophysical Journal**, vol 94, pp. 198-206.

Kotelnikova, NE, Lysenko, EL, Serimaa, R, Pirkkalainen, K, Vainio, U, Lavrentev, VK, Medvedeva, DA, Shakhmin, AL, Saprykina, NN, Novolelov, NP, Vainio, U **2008**, 'Cellulose as a nanoreactor for the synthesis of nickel nanoparticles', **Polymer Science. Series A**, vol 50, no. 1, pp. 51-57.

Krasnou, I, Tarabukina, E, Melenevskaya, E, Filippov, A, Aseyev, V, Hietala, S, Tenhu, H **2008**, 'Rheological Behavior of Poly(vinylpyrrolidone)/Fullerene C60 Complexes in Aqueous Medium.', **Journal of Macromolecular Science: Part B - Physics**, vol 47, no. 3, pp. 500-510.

Kudaibergenov, SE, Tatykhanova, GS, Arinov, BZ, Kozhakhmetov, S, Aseyev, VO **2008**, 'Hybrid inorganic-organic nano- and microcomposites based on silica sols and synthetic polyelectrolytes', **Express Polymer Letters**, vol 2, no. 2, pp. 101-110.

Kudaibergenov, SE, Tatykhanova, GS, Khutoryanskiy, VV, Aseyev, V, Tenhu, H **2008**, 'Investigation of the physical and chemical properties of nanocomposites on the basis of nanoparts of earth silicon and cation polyelectrolytes', **Vestnik Akademii nauk Respubliki Kazahstan.**, vol 1 (2008), pp. 54-64.

Kylli, P, Nousiainen, P, Biely, P, Sipilä, J, Tenkanen, M, Heinonen, M **2008**, 'Antioxidant potential of hydroxycinnamic acid glycoside esters', **Journal of Agricultural and Food Chemistry**, vol 56, no. 12, pp. 4797-4805.

Latronico, M, Polini, F, Gallo, V, Mastroianni, 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.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

- Maina, HN, Tenkanen, M, Maaheimo, H, Juvonen, R, Virkki, L 2008, 'NMR spectroscopic analysis of exopolysaccharides produced by *Leuconostoc citreum* and *Weissella confusa*', **Carbohydrate Research**, vol 343, no. 9, pp. 1446-1455.
- 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.
- Matikainen, J, Elo, H 2008, 'Does yawning increase arousal through mechanical stimulation of the carotid body?', **Medical Hypotheses**, vol 70, pp. 488-492.
- Mikkonen, KS, Yadav, MP, Cooke, P, Willför, S, Hicks, KB, Tenkanen, M 2008, 'Films from spruce galactoglucomannan blended with poly(vinyl alcohol), corn arabinoxylan, and konjac glucomannan', **BioResources**, vol 3, no. 1, pp. 178-191.
- Nuopponen, M, Kalliomäki, K, Aseyev, V, Tenhu, H 2008, 'Spontaneous and thermally induced self-organization of A-B-A stereoblock polymers of N-isopropylacrylamide in aqueous solutions', **Macromolecules**, vol 41, no. 13, pp. 4881-4886.
- Parshintsev, J, Nurmi, J, Kilpeläinen, I, Hartonen, K, Kulmala, M, Riekkola, M 2008, 'Preparation of beta-caryophyllene oxidation products and their determination in ambient aerosol samples', **Analytical and Bioanalytical Chemistry**, vol 390, no. 3, pp. 913-919.
- Pastell, H, Tuomainen, P, Virkki, L, Tenkanen, M 2008, 'Step-wise enzymatic preparation and structural characterization of singly and doubly substituted arabinoxylo-oligosaccharides with non-reducing end terminal branches', **Carbohydrate Research**, vol 343, no. 18, pp. 3049-3057.
- Peura, M, Muller, M, Vainio, U, Saren, M, Saranpää, P, Serimaa, R 2008, 'X-ray microdiffraction reveals the orientation of cellulose microfibrils and the size of cellulose crystallites in single Norway spruce tracheids', **Trees : Structure and Function**, vol 22, pp. 49-61.
- Peura, M, Saren, M, Laukkanen, J, Nygård, K, Andersson, S, Saranpää, P, Paakkari, T, Hämäläinen, K, Serimaa, R 2008, 'The elemental composition, the microfibril angle distribution and the shape of the cell cross-section in Norway spruce xylem', **Trees : Structure and Function**, vol 22, pp. 499-510.
- Peura, M, Karpinen, T, Soovre, A, Salmi, A, Tenkanen, M, Haeggström, E, Serimaa, R 2008, 'Crystallization and shear modulus of a forming biopolymer film determined by in situ x-ray diffraction and ultrasound reflection methods', **Journal of Applied Physics**, vol 104, no. 2, pp. 023513.
- Pirkkalainen, K, Leppänen, K, Vainio, U, Webb, M, Elbra, T, Kohout, T, Nykänen, A, Ruokolainen, J, Kotelnikova, N, Serimaa, R 2008, 'Nanocomposites of magnetic cobalt nanoparticles and cellulose', **European Physical Journal D. Atomic, Molecular, Optical and Plasma Physics**, vol 49, no. 3, pp. 333-342.
- Pitkänen, L, Tuomainen, PMS, Virkki, L, Aseyev, V, Tenkanen, M 2008, 'Structural comparison of arabinoxylans from two barley side-stream fractions', **Journal of Agricultural and Food Chemistry**, vol 56, no. 13, pp. 5069-5077.
- Routasalo, T, Helaja, J, Kavakka, J, Koskinen, AMP 2008, 'Development of bis(2-picolyl)amine-zinc chelates for imidazole receptors', **European Journal of Organic Chemistry**, pp. 3190-3199.
- 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.
- Shan, J, Pulkkinen, P, Vainio, U, Majjala, J, Merta, J, Jiang, H, Serimaa, R, Kauppinen, E, Tenhu, H 2008, 'Synthesis and characterization of copper sulfide nanocrystallites with low sintering temperatures', **Journal of Materials Chemistry**, vol 18, pp. 3200-3208.
- Smolander, M, Boer, H, Valkiainen, M, Roozeman, R, Bergelin, M, Eriksson, J, Zhang, X, Koivula, A, Viikari, L 2008, 'Development of a printable laccase-based biocathode for fuel cell applications', **Enzyme and Microbial Technology**, vol 43, no. 2, pp. 93-102.
- 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.
- Szjarto, N, Siika-Aho, M, Tenkanen, M, Alapuranen, M, Vehmaanperä, J, Reczey, K, Viikari, L 2008, 'Hydrolysis of amorphous and crystalline cellulose by heterologously produced cellulases of *Melanocarpus albomyces*', **Journal of Biotechnology**, vol 136, no. 3/4, pp. 140-147.
- Talja, RA, Peura, M, Serimaa, R, Jouppila, K 2008, 'Effect of amylose content on physical and mechanical properties of potato-starch-based edible films', **Biomacromolecules**, vol 9, no. 2, pp. 658-663.
- Tarabukina, EB, Krasnov, IL, Tarasova, EV, Ratnikova, OV, Laukkanen, A, Aseyev, V, Tenhu, H 2008, 'Effect of the ultracentrifuge centrifugal force on the molecular characteristics of Poly(vinylcaprolactam) complexes with fullerene C60', **Vysokomolekuljarnye soedinenija**, vol 50, no. 2, pp. 315-323.
- Tarabukina, EB, Krasnov, IL, Tarasova, EV, Laukkanen, A, Aseyev, V, Tenhu, H 2008, 'Effect of the ultracentrifuge centrifugal force on the molecular characteristics of Poly(vinylcaprolactam) complexes with fullerene C60', **Polymer Science. Series A**, vol 50, no. 2, pp. 198-205.
- Uschanov, P, Heiskanen, N, Mononen, P, Maunu, S, Koskimies, S 2008, 'Synthesis and characterization of tall oil fatty acids-based alkyd resins and alkyd-acrylate copolymers', **Progress in Organic Coatings**, vol 63, pp. 92-99.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

- Vainio, U, Lauten, RA, Serimaa, R **2008**, 'Small-angle X-ray scattering and rheological characterization of aqueous lignosulfonate solutions', **Langmuir**, vol 24, pp. 7735-7743.
- Virkki, L, Maina, HN, Johansson, L, Tenkanen, M, Maina, H **2008**, 'New enzyme-based method for analysis of water-soluble wheat arabinoxylans', **Carbohydrate Research**, vol 343, no. 3, pp. 521-529.
- Virtanen, T, Maunu, S, Tamminen, T, Hortling, B, Liitiä, T **2008**, 'Changes in fiber ultrastructure during various kraft pulping conditions evaluated by <sup>13</sup>C CPMAS NMR spectroscopy', **Carbohydrate Polymers**, vol 73, pp. 156-163.
- Voutilainen, SP, Puranen, T, Siika-aho, M, Lappalainen, A, Alapuranen, M, Kallio, J, Hooman, S, Viikari, L, Vehmaanperä, J, Koivula, A **2008**, 'Cloning, expression, and characterization of novel thermostable family 7 cellobiohydrolases', **Biotechnology and Bioengineering (Print)**, vol 101, no. 3, pp. 515-528.
- Willför, S, Sundberg, K, Tenkanen, M, Holmbom, B **2008**, 'Spruce-derived mannans: a potential raw material for hydrocolloids and novel advanced natural materials', **Carbohydrate Polymers**, vol 72, no. 2, pp. 197-210.
- 2009**
- 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.
- Daniilovtseva, E, Aseyev, V, Karesoja, M, Annenkov, V **2009**, 'Sorption of silicic acid from non-saturated aqueous solution by a complex of zinc ions with poly(vinylamine)', **European Polymer Journal**, vol 45, pp. 1391-1396.
- 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, Sibauhi, 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-arylpiperidylcarbaldimino complexes', **Advanced Synthesis & Catalysis**, vol 351, no. 16, pp. 2625-2632.
- Granström, M, Olszewska, A, Mäkelä, V, Heikkinen, S, Kilpeläinen, I **2009**, 'A new protection group strategy for cellulose in an ionic liquid: simultaneous protection of two sites to yield 2,6-di-O-substituted mono-p-methoxytrityl cellulose', **Tetrahedron Letters**, vol 50, pp. 1744-1747.
- 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  $\pi$ -stacking to morphology and crystallinity on tritylated cellulose', **Materials Letters**, vol 63, no. 3-4, pp. 473-476.
- Heikkinen, OK, Ruskamo, S, Konarev, PV, Svegun, DI, Iivanainen, T, Heikkinen, SM, Permi, P, Koskela, H, Kilpeläinen, I, Yläne, J **2009**, 'Atomic structures of two novel immunoglobulin-like domain pairs in the actin cross-linking protein filamin', **Journal of Biological Chemistry**, vol 284, no. 37, pp. 25450-25458.
- Heikkinen, O, Permi, P, Koskela, H, Carpen, O, Yläne, J, Kilpeläinen, I **2009**, 'Solution structure of the first immunoglobulin domain of human myotilin', **Journal of Biomolecular NMR**, vol 44, pp. 107-112.
- Heikkinen, O, Permi, P, Koskela, H, Yläne, J, Kilpeläinen, I **2009**, '<sup>1</sup>H, <sup>13</sup>C and <sup>15</sup>N resonance assignments of the human filamin A tandem immunoglobulin-like domains 16-17 and 18-19', **Biomolecular NMR assignments**, vol 3, no. 1, pp. 53-56.
- Heikkinen, O, Seppala, R, Tossavainen, H, Heikkinen, S, Koskela, H, Permi, P, Kilpeläinen, I **2009**, 'Solution structure of the parvulin-type PPase domain of staphylococcus aureus PrsA-implications for the catalytic mechanism of parvulins', **BMC Structural Biology**, vol 9, pp. art. 17.
- Hietala, S, Strandman, S, Järvi, P, Torkkeli, M, Jankova, K, Hvilsted, S, Tenhu, H **2009**, 'Rheological properties of associative star polymers in aqueous solutions: effect of hydrophobe length and polymer topology', **Macromolecules**, vol 2009, no. 42, pp. 1726-1732.
- Hiltunen, M, Riihelä, S, Maunu, S **2009**, 'New associative EHEC-g-PAam copolymers: Their syntheses, characterization, and rheological behavior', **Journal of Polymer Science. Part B, Polymer Physics**, vol 47, pp. 1869-1879.
- Katina, K, Maina, N, Juvonen, R, Flander, L, Johansson, L, Virkki, L, Tenkanen, M, Laitila, A **2009**, 'In situ production and analysis of Weissella confusa dextran in wheat sourdough', **Food Microbiology**, vol 26, no. 7, pp. 734-743.
- Kavakka, JS, Kilpeläinen, I, Heikkinen, S **2009**, 'General Chromatographic NMR Method in Liquid State for Synthetic Chemistry: Polyvinylpyrrolidone Assisted DOSY Experiments', **Organic Letters**, vol 11, no. 6, pp. 1349-1352.
- Kavakka, JS, Heikkinen, S, Kilpeläinen, I, Tkachenko, NV, Helaja, J **2009**, 'Zn pyro-phosphoride a-fulleronicotone dyad; supramolecular self assembled donor-acceptor system for photoinduced charge separation', **Chemical Communications**, vol 2009, no. 7, pp. 758-760.
- King, AWT, Zoia, L, Filpponen, I, Olszewska, A, Xie, H, Kilpeläinen, I, Argyropoulos, D **2009**, 'In situ determination of lignin phenolics and wood solubility in imidazolium chlorides using <sup>31</sup>P NMR', **Journal of Agricultural and Food Chemistry**, vol 57, pp. 8236-8243.
- King, AWT, Kilpeläinen, I, Heikkinen, S, Järvi, P, Argyropoulos, D **2009**, 'Hydrophobic interactions determining functionalized lignocellulose solubility in dialkylimidazolium chlorides, as probed by <sup>31</sup>P NMR', **Biomacromolecules**, vol 10, no. 2, pp. 458-463.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

- Kisko, K, Szilvay, GR, Vuorimaa, E, Lemmetyinen, H, Linder, MB, Torkkeli, M, Serimaa, R **2009**, 'Self-assembled films of hydrophobin proteins HFBI and HFBI studied in situ at the air/water interface', **Langmuir**, vol 25, no. 3, pp. 1612-1619.
- Koschutnig, K, Heikkinen, S, Kemmo, S, Lampi, A, Piironen, V, Wagner, K **2009**, 'Cytotoxic and apoptotic effects of single and mixed oxides of  $\beta$ -sitosterol on HepG2-cells', **Toxicology in Vitro**, vol 23, no. 5, pp. 755-762.
- 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.
- Lampi, A, Kemmo, S, Mäkelä, A, Heikkinen, S, Piironen, V **2009**, 'Distribution of monomeric, dimeric and polymeric products of stigmaterol during thermo-oxidation', **European Journal of Lipid Science and Technology**, vol 111, no. 10, pp. 1027-1034.
- Leppänen, K, Andersson, S, Torkkeli, M, Knaapila, M, Kotelnikova, N, Serimaa, R **2009**, 'Structure of cellulose and microcrystalline cellulose from various wood species, cotton and flax studied by x-ray scattering', **Cellulose**, vol 16, no. 6.
- Matilainen, L, Maunu, SL, Pajander, J, Auriola, S, Jääskeläinen, I, Larsen, KL, Järvinen, T, Jarho, P **2009**, 'The stability and dissolution properties of solid glucagon/gamma-cyclodextrin powder', **European Journal of Pharmaceutical Sciences**, vol 36, no. 4-5, pp. 412-420.
- Mikkonen, KS, Heikkinen, S, Soovre, A, Peura, M, Serimaa, R, Talja, RA, Helen, H, Hyvönen, L, Tenkanen, M **2009**, 'Films from oat spelt arabinoxylan plasticized with glycerol and sorbitol', **Journal of Applied Polymer Science**, vol 114, no. 1, pp. 457-466.
- Mikkonen, KS, Tenkanen, M, Cooke, P, Xu, C, Rita, H, Willför, S, Holmbom, B, Hicks, KB, Yadav, MP **2009**, 'Mannans as stabilizers of oil-in-water beverage emulsions', **LWT-Food Science And Technology**, vol 42, no. 4, pp. 849-855.
- Nakamura, F, Heikkinen, O, Pentikäinen, OT, Osborn, TM, Kasza, KE, Weitz, DA, Kupiainen, O, Permi, P, Kilpeläinen, I, Yläne, J, Hartwig, JH, Stossel, TP **2009**, 'Molecular basis of filamin a-filGAP interaction and its impairment in congenital disorders associated with filamin a mutations', **PLoS One**, vol 4, no. 3, pp. e4928.
- Parikka, K, Tenkanen, M **2009**, 'Oxidation of methyl -d-galactopyranoside by galactose oxidase: products formed and optimization of reaction conditions for production of aldehyde', **Carbohydrate Research**, vol 344, no. 1, pp. 14-20.
- Pastell, H, Virkki, L, Harju, E, Tuomainen, P, Tenkanen, M **2009**, 'Presence of 13-linked 2-O- $\beta$ -D-xylopyranosyl-L-arabinofuranosyl side chains in cereal arabinoxylans', **Carbohydrate Research**, vol 344, no. 18, pp. 2480-2488.
- Pastell, H, Westermann, P, Meyer, AS, Tuomainen, P, Tenkanen, M **2009**, 'In vitro fermentation of arabinoxylan-derived carbohydrates by bifidobacteria and mixed fecal microbiota', **Journal of Agricultural and Food Chemistry**, vol 57, no. 18, pp. 8598-8606.
- Pirkkalainen, K, Serimaa, R **2009**, 'Coordination number in ideal spherical nanocrystals', **Journal of Applied Crystallography**, vol 42, pp. 442-447.
- Pitkänen, L, Virkki, L, Tenkanen, M, Tuomainen, P **2009**, 'Comprehensive multidetector HPSEC study on solution properties of cereal arabinoxylans in aqueous and DMSO solutions', **Biomacromolecules**, vol 10, no. 7, pp. 1962-1969.
- Plamper, FA, McKee, JR, Laukkanen, A, Nykänen, A, Walther, A, Ruokolainen, J, Aseyev, V, Tenhu, H **2009**, 'Miktoarm stars of poly(ethylene oxide) and poly(dimethylaminoethyl methacrylate): manipulation of micellization by temperature and light', **Soft Matter**, vol 5, no. 9, pp. 1812-1821.
- Pšencik, J, Collins, AM, Lijeroos, L, Torkkeli, HM, Laurinmäki, P, Ansink, HM, Ikonen, T, Serimaa, R, Blankenship, RE, Tuma, R, Butcher, SJ **2009**, 'Structure of chlorosomes from the green filamentous bacterium Chloroflexus aurantiacus', **Journal of Bacteriology**, vol 191, no. 21, pp. 6701-6708.
- Romanazzi, G, Marinelli, F, Mastrorilli, P, Torsi, L, Sibaoui, 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.
- 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.
- Sibaoui, A, Ryan, P, Leskelä, M, Rieger, B, Repo, T, Rieger, B **2009**, 'Facile synthesis of cyclic carbonates from CO<sub>2</sub> and epoxides with cobalt(II)/onium salt based catalysts', **Applied Catalysis A: General**, vol 365, pp. 194-198.
- Sibaoui, A, Ryan, P, Axenov, KV, Sundberg, MR, Leskelä, M, Repo, T **2009**, 'Efficient coupling of CO<sub>2</sub> and epoxides with bis(phenoxyminato) cobalt(III)/Lewis base catalysts', **Journal of Molecular Catalysis A: Chemical**, vol 312, no. 1-2, pp. 87-91.
- 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.
- Testova, L, Vilonen, K, Pynnönen, HR, Tenkanen, TM, Sixta, H **2009**, 'Isolation of hemicelluloses from birch wood: Distribution of wood components and preliminary trials in dehydration of hemicelluloses', **Lenzinger Berichte**, vol 87, pp. 58-65.
- 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.
- Xie, H, Järvi, P, Karesoja, M, King, A, Kilpeläinen, I, Argyropoulos, DS **2009**, 'Highly compatible wood thermoplastic composites from lignocellulosic material modified in ionic liquids: preparation and thermal properties', **Journal of Applied Polymer Science**, vol 111, pp. 2468-2476.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

**2010**

- Abu-Surrah, AS, Lappalainen, K, Leskelä, M, Repo, T **2010**, 'Alidime 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, Sibauhi, A, Pihko, 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.
- 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.
- Haavikko, R, Kavakka, JS, Helaja, J **2010**, 'β-Keto ester aminolysis of pheophorbide a methyl ester: a facile route for asymmetric chlorine ring substitution', **Tetrahedron Letters**, vol 51, no. 4, pp. 714-716.
- Hakola, M, Kalliainen, A, Kemell, M, Lahtinen, P, Lankinen, E, Leskelä, M, Repo, T, Riekkola, T, Siika-aho, M, Uusitalo, J, Vuorela, S, von Weymar, 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.
- Kavakka, J, Heikkinen, S, Kilpeläinen, I, Wähälä, K, Parviainen, V **2010**, 'Enhanced chromatographic NMR with polyethyleneglycol: A novel resolving agent for diffusion ordered spectroscopy', **Magnetic Resonance in Chemistry**, vol 48, no. 10, pp. 777-781.
- King, AWT, Jalomäki, JA, Granström, M, Argyropoulos, D, Heikkinen, S, Kilpeläinen, I **2010**, 'A new method for rapid degree of substitution and purity determination of chloroform-soluble cellulose esters, using <sup>31</sup>P NMR', **Analytical Methods**, vol 2, pp. 1499-1505.
- Kivelä, R, Pitkänen, LM, Laine, P, Aseyev, V, Sontag-Strohm, T **2010**, 'Influence of homogenisation on the solution properties of oat β-glucan', **Food Hydrocolloids**, vol 24, no. 6-7, pp. 611-618.
- Koskela, H, Heikkilä, O, Kilpeläinen, I, Heikkinen, S **2010**, 'Quantitative two-dimensional HSQC experiment for high magnetic field NMR spectrometers', **Journal of Magnetic Resonance**, vol 202, pp. 24-33.
- Kozlov, AS, Petrov, AK, Kulipanov, GN, Aseyev, V **2010**, 'A Novel Method of Probing the Fractional Composition of Nanosystems', **KONA: Powder and Particle Journal**, vol 28, pp. 219-226.
- 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.
- Kyburz, A, Raulinaitis, V, Koskela, OK, Kontinen, V, Permi, P, Kilpeläinen, I, Seppälä, R **2010**, 'H-1, C-13 and N-15 resonance assignments of the major extracytoplasmic domain of the cell shape-determining protein MreC from Bacillus subtilis', **Biomolecular NMR assignments**, vol 2010, no. 2, pp. 235-238.
- 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.
- Leppänen, A, Niittymäki, O, Parikka, K, Tenkanen, M, Eklund, P, Sjöholm, R, Willför, S **2010**, 'Metal-mediated allylation of enzymatically oxidized methyl α-d-galactopyranoside', **Carbohydrate Research**, vol 345, no. 18, pp. 2610-2615.
- Mikkonen, KS, Mathew, AP, Pirkkalainen, K, Serimaa, R, Xu, C, Willför, S, Oksman, K, Tenkanen, M **2010**, 'Glucosaminan composite films with cellulose nanowhiskers', **Cellulose**, vol 17, pp. 69-81.
- Mikkonen, KS, Heikkilä, MI, Helen, H, Hyvonen, L, Tenkanen, M **2010**, 'Spruce galactoglucomannan films show promising barrier properties', **Carbohydrate Polymers**, vol 79, pp. 1107-1112.
- Mäkelä, A, Kilpeläinen, I, Heikkinen, S **2010**, 'Quantitative <sup>13</sup>C NMR Spectroscopy using refocused constant-time INEPT, Q-INEPT-CT', **Journal of Magnetic Resonance**, vol 204, no. 1, pp. 124-130.
- Parikka, K, Leppänen, A, Pitkänen, L, Reunanen, M, Willför, S, Tenkanen, M **2010**, 'Oxidation of Polysaccharides by Galactose Oxidase', **Journal of Agricultural and Food Chemistry**, vol 58, pp. 262-271.
- Penttilä, P, Varnai, A, Leppänen, K, Peura, M, Kallonen, A, Jääskeläinen, P, Lucenius, J, Ruokolainen, J, Siika-aho, M, Viikari, L, Serimaa, R **2010**, 'Changes in Submicrometer Structure of Enzymatically Hydrolyzed Microcrystalline Cellulose', **Biomacromolecules**, vol 11, no. 4, pp. 1111-1117.
- Pšencik, J, Torkkeli, HM, Zupanova, A, Vacha, F, Serimaa, R, Tuma, R **2010**, 'The lamellar spacing in self-assembling bacteriochlorophyll aggregates is proportional to the length of the esterifying alcohol', **Photosynthesis Research**, vol 104, no. 2-3, pp. 211-219.
- 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 Salicylaldimine Derivatives', **European Journal of Inorganic Chemistry**, vol 2010, no. 2, pp. 266-274.



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

Roszol, L, Varnai, A, Lorántfy, B, Noszticzus, Z, Wittmann, M **2010**, 'Negative salt effect in an acid-base diode: Simulations and experiments', **Journal of Chemical Physics**, vol 132, no. 6.

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.

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(C<sub>6</sub>F<sub>5</sub>)<sub>3</sub>', **Dalton Transactions**, vol 39, no. 8, pp. 1920-1922.

Sipos, B, Benko, Z, Dienes, D, Reczey, K, Viikari, L, Siika-aho, M **2010**, 'Characterisation of Specific Activities and Hydrolytic Properties of Cell-Wall-Degrading Enzymes Produced by *Trichoderma reesei* Rut C30 on Different Carbon Sources', **Applied Biochemistry and Biotechnology**, vol 161, pp. 347-364.

Sundberg, MR, Uggla, 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.

Suurnakki, A, Oksanen, T, Orlandi, M, Zoia, L, Canevali, C, Viikari, L **2010**, 'Factors affecting the activation of pulps with laccase', **Enzyme and Microbial Technology**, vol 46, no. 3-4, pp. 153-158.

Tenkovtsev, AV, Dudkina, MM, Scherbinskaya, LI, Aseyev, V, Tenhu, H **2010**, 'Star-shaped macromolecules with calixarene core and neutral amphiphilic block copolymer arms: New hosts for ions.', **Polymer**, vol 51, no. 14, pp. 3108-3115.

Uschanov, P, Johansson, L, Maunu, SL, Laine, J **2010**, 'Heterogeneous modification of various celluloses with fatty acids', **Cellulose**, vol 18, no. 2, pp. 393-404.

Varnai, A, Siika-aho, M, Viikari, L **2010**, 'Restriction of enzymatic hydrolysis of pretreated spruce by lignin', **Enzyme and Microbial Technology**, vol 46, no. 3-4, pp. 185-193.

Virtanen, T, Maunu, SL **2010**, 'Quantitation of a polymorphic mixture of an active pharmaceutical ingredient with solid state C-13 CPMAS NMR spectroscopy', **International Journal of Pharmaceutics**, vol 394, no. 1-2, pp. 18-25.

Wrigstedt, P, Kylli, P, Pitkänen, LM, Nousiainen, P, Tenkanen, M, Sipilä, AJ **2010**, 'Synthesis and Antioxidant Activity of Hydroxycinnamic Acid Xylan Esters', **Journal of Agricultural and Food Chemistry**, vol 58, pp. 6937-6943.

Yohannes, G, Wiedmer, SK, Elomaa, M, Jussila, M, Aseyev, V, Riekkola, M **2010**, 'Thermal aggregation of bovine serum albumin studied by asymmetrical flow field-flow fractionation', **Analytica Chimica Acta**, vol 675, no. 2, pp. 191-198.

A2 Review in scientific journal

**2010**

Kärkönen, A, Koutaniemi, S **2010**, 'Lignin Biosynthesis Studies in Plant Tissue Cultures', **Journal of Integrative Plant Biology**, vol 52, no. 2, pp. 176-185.

A3 Contribution to book/other compilations (refereed)

**2005**

Maunu, SL, Wikberg, H, Hiltunen, M **2005**, 'Solid state NMR possibilities in the characterisation of cellulose and its derivatives', **Appita, Appita, Carlton**, pp. 349-352.

**2006**

Jouppila, K, Sundberg, S, Miettinen, S, Hyvönen, L **2006**, 'Release of encapsulated aroma compounds from amorphous maltodextrin matrices', in M del Pilar Buera, J Welti-Chanes, PJ Lillford, HR Corti (eds), **Water properties of food, pharmaceutical, and biological materials, Food preservation technology series, no. 9, Taylor & Francis, Boca Raton**, pp. 709-713.

**2008**

Maunu, S **2008**, '13C CPMAS NMR studies of wood, cellulose fibers, and derivatives', in TQ Thomas (ed.), **Characterization of lignocellulosic materials, Blackwell**, pp. 227-248.

Mikkonen, K, Yadav, MP, Cooke, P, Willför, S, Hicks, KB, Tenkanen, M **2008**, 'Films from spruce galactoglucomannan blended with poly(vinyl alcohol), corn arabinoxylan, and konjac glucomannan', in EAJN (ed.), **(Bio)degradable polymers from renewable resources, Conference Proceedings and Monographs, vol. vol. 8, Scientific Centre of the Polish Academy of Sciences, Vienna**, pp. 256-258.

**2009**

Peura, M, Andersson, SV, Salmi, AH, Karppinen, T, Torkkeli, HM, Haeggström, E, Serimaa, R **2009**, 'Changes in nanostructure of wood cell wall during deformation', **Advances in materials science of wood, Materials Science Forum, vol. 599**.



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

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

#### HUBI/Kilpeläinen

Viikari, L, Suurnäkki, A, Grönqvist, S, Raaska, L, Ragauskas, A 2009, 'Forest Products: Biotechnology in Pulp and Paper Processing', in M Schaechter (ed.), **Encyclopedia of Microbiology**, 3rd edn, Elsevier, pp. 80-94.

#### **2010**

Aseyev, V, Tenhu, H, Winnik, F 2010, 'Non-ionic Thermoresponsive Polymers in Water', **Self Organized Nanostructures of Amphiphilic Block Copolymers**, *Advances in Polymer Science*, Springer Berlin Heidelberg, pp. 1-61.

Xie, H, Kilpeläinen, I, King, AWT, Leskinen, T, Järvi, PK, Argyropoulos, D 2010, 'Opportunities with Wood Dissolved in Ionic Liquids: Chapter 19.', in TF Liebert, TJ Heinze, KJ Edgar (eds), **Cellulose Solvents: For Analysis, Shaping and Chemical Modification**, ACS Symposium Series, vol. 1033, American Chemical Society.

#### **A4 Article in conference publication (refereed)**

#### **2005**

Koponen, T, Hæggeström, E, Karppinen, T, Saranpää, P, Serimaa, R 2005, 'Ultrasonic study on modulus of elasticity and nonlinearity parameter (B/A) in Norway spruce as a function of year ring', in **Review of progress in quantitative nondestructive evaluation**, pp. 1493-1499.

Peura, M, Muller, M, Serimaa, R, Vainio, U, Saren, M, Saranpää, P, Burghammer, M 2005, 'Structural studies of single wood cell walls by synchrotron x-ray microdiffraction and polarised light microscopy', in **4th Conference on Synchrotron Radiation in Materials Science**, pp. 16-20.

#### **2006**

Hæggeström, E, Koponen, T, Karppinen, T, Saranpää, P, Serimaa, R 2006, 'Ultrasonic study on hysteresis in modulus of elasticity in Norway spruce as a function of year ring', in **Review of progress in quantitative nondestructive evaluation**, pp. 1366-1369.

Mikkonen, K, Helen, H, Talja, R, Willför, S, Holmbom, B, Hyvönen, L, Tenkanen, M 2006, 'Biodegradable films from mannans', in **9th European workshop on Lignocellulosics and Pulp**, pp. 130-133.

#### **2007**

Tenkanen, M, Soovre, A, Heikkinen, S, Talja, R, Helen, H, Hyvönen, L 2007, 'Cereal arabinoxylans as raw material for biodegradable films', in **Workshop on production, functionalization, and analysis of hemicelluloses for sustainable advanced products: proceeding, March 19-20, 2007 Hamburg, Germany**, pp. 25-26.

Tenkanen, M, Soovre, A, Heikkinen, S, Jouhtimäki, S, Talja, R, Helen, H, Hyvönen, L 2007, 'Production and properties of films from cereal arabinoxylans', in **Italic 4: Science & technology of biomasses: Advances and challenges : materials, chemicals & processes from agricultural and forest biomass, May 8-10, 2007, Villa Mondragone, Tor Vergata University, Monte Porzio Catone, Rome, Italy : proceedings book**, pp. 70-73.

Virtanen, T, Maunu, SL, Tamminen, T, Liitiä, T, Hortling, B 2007, 'Changes in fiber ultrastructure evaluated by solid state NMR spectroscopy', in **14th International Symposium for Wood, Fibre & Pulping Chemistry: 2007**.

Willför, S, Xu, C, Tenkanen, M, Sundberg, K, Holmbom, B 2007, 'Mannans in pulping waste waters: a remarkable source of hydrocolloids and new advanced materials', in **Italics 4 : Science & technology of biomass: Advances and challenges : materials, chemicals & processes from agricultural and forest biomass, May 8-10, 2007, Villa Mondragone, Tor Vergata University, Monte Porzio Catone, Rome, Italy : proceedings book**, pp. 121-124.

#### **2008**

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.

Laine, P, Lampi, A, Tenkanen, M, Jouppila, K 2008, 'Microencapsulation with gum arabic and spruce galactoglucomannan', in **XVI international conference on bioencapsulation: poster presentations : 4-6 September 2008 Dublin, Ireland**, pp. P82:1-4.

Mikkonen, KS, Yadav, MP, Mathew, A, Oksman, K, Willför, S, Tenkanen, M, Mikkonen, K 2008, 'Blend films and composites from spruce galactoglucomannan', in **10th European workshop on Lignocellulosics and Pulp, EWLP 2008, KTH, Royal Institute of Technology, Stockholm, Sweden, 25-28 August 2008: proceedings**, pp. 64-67.

Mikkonen, K, Tenkanen, M, Willför, S, Hicks, KB, Yadav, MP 2008, *Mannans and xylans as stabilizers of a model oil-in-water beverage system*, Paper presented at Conference on Gums and Stabilisers for the Food Industry, Cambridge..

#### **2009**

Kirjoranta, S, Hyvönen, L, Helen, H, Tenkanen, M, Jouppila, K 2009, 'The effect of whey protein isolate on the properties of barley snack products made by extrusion', in **Proceedings of 2nd International Conference of Biofoams, October 26-28, 2009, Niagara Falls, Canada**.



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

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

#### HUBI/Kilpeläinen

Leppänen, A, Parikka, K, Tenkanen, M, Eklund, P, Sjöholm, R, Willför, S 2009, 'Chemical modification of oxidized O-acetyl-galactoglucomannan', in **Proceedings of the 5. Science and Technology of Biomasses**, pp. 197-200.

Mikkonen, K, Laine, P, Parikka, K, Yadav, M, Jouppila, K, Xu, C, Willför, S, Tenkanen, M 2009, 'Spruce galactoglucomannans are potential new biopolymers for films, microcapsules and emulsions.', in **NWBC-2009. The 2nd Nordic Wood Biorefinery Conference. Finlandia Hall, Helsinki, Finland, September 2-4, 2009: poster proceedings, vol 2**, pp. 219-224.

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.

#### **2010**

Chong, S, Koutaniemi, S, Tuomainen, P, Virkki, L, Nissilä, T, Ketola, R, Guillon, F, Bouchet, B, Tranquet, O, Willats, W, Saulnier, L, Tenkanen, M 2010, 'New enzyme- and antibody-assisted analytical methods for characterization of native xylans', in **Proceedings of the 11th European workshop on lignocellulosics and pulp (EWLP)**, pp. 29-32.

Jääskeläinen, P, Engelhardt, P, Hynönen, U, Torkkeli, HM, Palva, A, Serimaa, R 2010, *Small angle X-ray scattering and transmission electron microscopy study of the Lactobacillus brevis S-layer protein.*, Journal of Physics : Conference Series 247 Institute of Physics Publishing .

Leppänen, K, Pirkkalainen, K, Penttilä, PA, Sievänen, J, Kotelnikova, N, Serimaa, R 2010, *Small-angle x-ray scattering study on the structure of microcrystalline and nanofibrillated cellulose.*, Journal of Physics : Conference Series 247 Institute of Physics Publishing .

Leppänen, A, Parikka, K, Eklund, P, Sjöholm, R, Tenkanen, M, Willför, S 2010, 'Targeted functionalization of spruce galactoglucomannans', in **Proceedings of the 11th European Workshop on Lignocellulosics and Pulp**, pp. 93-96.

Maina, N, Virkki, M, Juvonen, R, Katina, K, Tenkanen, M 2010, 'Structure elucidation, insitu analysis and application of dextrans in sourdough baking', in **Second End of Year Meeting of Shaping and Transformation in the Engineering of Polysaccharides (STEP) - Sep 28 - Oct 1, 2010, MINES ParisTech / Cemef, Sophia Antipolis France: Proceedings**, pp. 14.

Mikkonen, K, Stevanic, J, Joly, C, Pirkkalainen, K, Dole, P, Serimaa, R, Ankefors, M, Salmén, L, Tenkanen, M 2010, 'Microfibrillated cellulose reinforced spruce galactoglucomannan films', in **Proceedings of the 11th European Workshop on Lignocellulosics and Pulp**, pp. 397-400.

Stoddard, F, Kenedy Etone, E, Kymäläinen, M, Lizarazo Torres, C, Majjala, P, Mäkelä, P, Nykänen, A, Pakarinen, A, Santanen, A, Viikari, L, Zou, L 2010, 'Thinking outside the square: alternative crops for Finnish rotations', in **Proceedings of OF AGRO 2010, the XI ESA Congress**, pp. 777-778.

Testova, L, Pynnönen, H, Tenkanen, M, Sixta, H 2010, 'Detailed mass balance of birch autohydrolysis', in **Proceedings of the 11th European Workshop on Lignocellulosics and Pulp**, pp. 105-108.

#### **B3 Unrefereed article in conference proceedings**

#### **2005**

Haeggström, E, Koponen, TRJ, Karppinen, T, Serimaa, R 2005, 'Ultrasonic Study on Load-Induced Hysteresis in Modulus of Elasticity in Norway Spruce as a Function of Year Ring', in **Review of Progress in Quantitative NDE: Abstracts**.

Hiltunen, M, Maunu, SL, Tenhu, H 2005, 'Synthesis and characterizations of new cellulose derivatives with controlled chemical structure of grafts by using RAFT polymerization', in **59th Appita Annual Conference**, pp. 143-146 **Appita Annual Conference** , vol. 3.

#### **2007**

Hiltunen, M, Maunu, SL, Tenhu, H 2007, 'New cellulose copolymers with controlled chemical structure of grafts via RAFT polymerization', in **14th International Symposium for Wood, Fibre & Pulping Chemistry** .

Hiltunen, M, Maunu, SL 2007, 'New cellulose copolymers with controlled chemical structure of grafts via raft polymerisation', in **14th International Symposium for Wood, Fibre & Pulping Chemistry: 2007**.

Psencik, J, Laurinmaki, P, Butcher, S, Serimaa, R, Tuma, R 2007, 'Changes in the lamellar organization of bacteriochlorophyll aggregates in chlorosomes upon hexanol treatment', in **Abstracts: 14th International Congress of Photosynthesis, 22nd - 27th July 2007, Glasgow**, pp. 170-171.

#### **2008**

Järvi, PK, Olszewska, A, King, AWT, Granström, M, Hietala, SHO, Kilpeläinen, I, Argyropoulos, D 2008, 'Study of Rheological Behaviour of Microcrystalline Cellulose Dissolved in Two Different Ionic Liquids', in **10th European Workshop on Lignocellulosics and Pulp (Proceedings)**, pp. 177-180.

King, AWT, Kilpeläinen, I, Järvi, PK, Olszewska, A, Heikkinen, S, Argyropoulos, D 2008, 'Quantitative 31P NMR Analysis of Lignin Functionalities in Wood, Based On Ionic Liquid Pre-Treatment', in **10th European Workshop on Lignocellulosics and Pulp (Proceedings)**, pp. 32-35.



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

### RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

#### HUBI/Kilpeläinen

Olszewska, A, Järvi, PK, King, AWT, Kilpeläinen, I, Argyropoulos, D **2008**, 'Determination of the Molecular Weight Distribution of Intact Spruce Wood Acetylated in Ionic Liquid Media', in **10th European Workshop on Lignocellulosics and Pulp (Proceedings)**, pp. 222-225.

#### **2009**

Granström, M, Jalomäki, JA, Järvi, PK, Veistinen, AM, King, AWT, Kyllönen, L, Kilpeläinen, I **2009**, 'Homogeneous Synthesis of Novel Cellulose Derivatives in Ionic Reaction Media', in **2nd Nordic Wood Biorefinery Conference (Proceedings)**, pp. 232-239.

Hiltunen, M, Maunu, SL **2009**, 'Cellulose graft copolymer synthesized via controlled polymerization method in homogeneous media', in **The 4th Workshop on Cellulose, Regenerated Cellulose and Cellulose Derivatives, Karlstad University, Karlstad, Sweden, November 17-18, 2009**, pp. 21-27.

Hiltunen, M, Maunu, SL **2009**, 'Cellulose graft copolymers through RAFT polymerisation method', in **15th International Symposium on Wood, Fibre and Pulping Chemistry (ISWFPC)**, pp. P-073.

King, AWT, Jalomäki, JA, Järvi, PK, Granström, M, Heikkinen, S, Kilpeläinen, I **2009**, 'Rapid DS and Purity Determination of Organically Soluble Esters of Cellulose using <sup>31</sup>P NMR', in **2nd Nordic Wood Biorefinery Conference (Proceedings)**, pp. 225-231.

King, AWT, Järvi, PK, Olszewska, A, Kilpeläinen, I, Argyropoulos, D **2009**, 'Solubility and Reactivity of Wood Biopolymers in Ionic Liquids', in **2nd Nordic Wood Biorefinery Conference (Proceedings)**, pp. 113-118.

Maunu, SL **2009**, 'FuBio - Cellulose Theme', in **4th Workshop on Cellulose, Regenerated Cellulose and Cellulose Derivatives**.

Uschanov, P, Maunu, SL **2009**, 'Encapsulation of Cellulose', in **15th International Symposium on Wood, Fibre and Pulping Chemistry (ISWFPC)**, pp. P-036.

Uschanov, P, Maunu, SL **2009**, 'Heterogeneous Modification of Cellulose with Fatty Acids', in **The 4th Workshop on Cellulose, Regenerated Cellulose and Cellulose Derivatives, Karlstad University, Karlstad, Sweden, November 17-18, 2009**, pp. 34-37.

#### **2010**

Karhunen, P, Matikainen, J, King, AWT, Järvi, PK, Kyllönen, L, Kilpeläinen, I **2010**, 'Deconstruction of wood using ionic liquids', in **11th European Workshop on Lignocellulosics and Pulp (Proceedings)**, pp. 121-124.

King, AWT, Parviainen, A, Heikkinen, S, Kilpeläinen, I **2010**, 'The basis for chemical interaction of ionic liquids with lignocellulosic material', in **11th European Workshop on Lignocellulosics and Pulp (Proceedings)**, pp. 247-250.

Talia, R, Shan, J, Vähä-Nissi, M, King, AWT, Kilpeläinen, I, Poppius-Levlin, K **2010**, 'A new birch xylan derivative by aqueous benzylation', in **11th European Workshop on Lignocellulosics and Pulp Proceedings**, pp. 403-406.

#### C1 Published scientific monograph

#### **2008**

Helen, H, Heikkilä, M, Huhtanen, J, Isokangas, J, Jokinen, N, Kivelä, H, Poutanen, J, Koivisto, L, Solala, K **2008**, *Pakkausten valonsuojia elintarvikkeille: yhteenveto hankkeen tutkimuksista*, PTR:n raportti, no. 55, *Pakkausteknologia - PTR*, Helsinki.

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

#### **2007**

Salovaara, H, Gates, F, Tenkanen, M (eds) **2007**, *Dietary fibre components and functions*, Wageningen Academic Publ, Wageningen.

#### D1 Article in professional journal

#### **2009**

Leppänen, K, Pirkkalainen, K, Peura, M, Serimaa, R **2009**, 'Puu ja paperi röntgenfysiikan silmin', *Arkhimedes*, vol 2009, no. 3, pp. 10-14.

#### E1 Popular article, newspaper article

#### **2005**



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

RC-SPECIFIC TUHAT COMPILATIONS OF PUBLICATIONS DATA 2005-2010

HUBI/Kilpeläinen

Timonen, R, Matikainen, J **2005**, 'Kun uuni ei syty', **Tiede**, vol 2005, no. 3, pp. 30-32.

**2006**

Mikkonen, K **2006**, 'Mannaanikalvojen ominaisuuksiin voidaan vaikuttaa', **Kehittyvä elintarvike**, vol 17, no. 5, pp. 53.

**2008**

Santanen, A, Mäkelä, P, Seppänen, M, Viikari, L, Stoddard, F **2008**, 'Maissista vaihtoehto viljelyyn', **Maaseudun tiede**, vol 65, no. 3, pp. 11.

**2010**

Pakarinen, A, Majjala, P, Stoddard, F, Viikari, L, Kymäläinen, M **2010**, 'Hamppua tankkiin?', **Maaseudun tiede**, vol 67, no. 1, pp. 4.

**H1 Patents**

**2007**

Heiskanen, N, Willberg, P, Koskimies, S, Hulkko, J, Uschanov, P, Maunu, S Nov. 14 2008, *Luonnonrasvahappopohjainen akrylaattihybridipolymeeri ja menetelmä sen valmistamiseksi*, F1119431.

Heiskanen, N, Koskimies, S, Hulkko, J, Maunu, SL, Uschanov, P, Willberg, P Jan. 29 2010, *Luonnonrasvahappopohjaista akrylaattihybridihartsia sisältävät komposiitit*, F1120695.

Koivusalmi, E, Matikainen, J, Kilpeläinen, I, Karhunen, P Jun. 14 2007, *Process for producing a saturated hydrocarbon component*, US 20070131579.

Koivusalmi, E, Kilpeläinen, I, Karhunen, P, Matikainen, J Jul. 14 2007, *Process for producing a branched hydrocarbon component*, US20070135316.

**2010**

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



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

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

HUBI/Kilpeläinen

**1 Analysis of activities 2005-2010**

- Associated person is one of Ilkka Kilpeläinen ,  
Sara Rahim Labafzadeh , Pirkko Karhunen , Jarno Antero Jalomäki , Lasse Kyllönen , Jari Kavakka , Joma Matikainen , Tuomas Kulomaa ,  
Annastiina Maaria Veistinen , Seppo V Andersson , Ritva Serimaa , Ulla Vainio, Matti-Paavo Saren, Sirkka Liisa Maunu , Paavo Alekski Penttilä ,  
Vladimir Aseyev , Miia Hiltunen , Helena Parviainen , Tommi Antti Petteri Virtanen , Maija Tenkanen ,  
Pirita Rämänen , Päivi Tuomainen , Kirsi Mikkonen , Sun-Li Chong , Pauli Wrigstedt , Nora Szijarto , Mari Heikkilä , Tina Riekkola , Aniko Varnai ,  
Asikkala , Liisa Viikari ,

Activity type	Count
Supervisor or co-supervisor of doctoral thesis	38
Prizes and awards	2
Editor of research journal	39
Peer review of manuscripts	45
Membership or other role in review committee	8
Membership or other role in research network	15
Membership or other role in national/international committee, council, board	33
Membership or other role in public Finnish or international organization	13
Membership or other role of body in private company/organisation	3
Participation in interview for written media	9
Participation in radio programme	3
Participation in TV programme	2
Participation in interview for web based media	1



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

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

HUBI/Kilpeläinen

## 2 Listing of activities 2005-2010

### Supervisor or co-supervisor of doctoral thesis

#### **Ilkka Kilpeläinen ,**

NMR spectroscopy of proteins, Ilkka Kilpeläinen, 01.01.2000 → 14.12.2007, Finland  
organic synthesis, lignin structure & biosynthesis, Ilkka Kilpeläinen, 01.01.2000 → 28.09.2008, Finland  
NMR spectroscopy of proteins, Ilkka Kilpeläinen, 01.08.2004 → 18.10.2009, Finland  
Organic synthesis, Ilkka Kilpeläinen, 01.08.2005 → 06.08.2010, Finland  
Protein structure & enzyme catalysis, Ilkka Kilpeläinen, 28.01.2005 → 11.12.2009, Finland  
synthesis of cellulose derivatives, Ilkka Kilpeläinen, 01.03.2005 → 26.05.2009, Finland  
synthesis & rheological properties of cellulose derivatives, Ilkka Kilpeläinen, 01.01.2007 → ..., Finland  
synthesis of cellulose derivatives, Ilkka Kilpeläinen, 11.10.2009 → ..., Finland  
synthesis of cellulose derivatives, Ilkka Kilpeläinen, 26.02.2010 → ..., Finland

#### **Ritva Serimaa ,**

PhD thesis supervision, Ritva Serimaa, 2006  
PhD thesis supervision, Ritva Serimaa, 2007 → ...  
PhD thesis supervision, Ritva Serimaa, 2007  
PhD thesis supervision, Ritva Serimaa, 2007  
PhD thesis supervision, Ritva Serimaa, 2007 → ..., Finland  
PhD thesis supervision, Ritva Serimaa, 2008  
PhD thesis supervision, Ritva Serimaa, 2008  
PhD thesis supervision, Ritva Serimaa, 2008

#### **Sirkka Liisa Maunu ,**

Miia Hiltunen - Cellulose based graft copolymers prepared via controlled radical polymerization, Sirkka Liisa Maunu, 2004 → ...  
Mirja Andersson (ent. Kivelä) - Microgels, Sirkka Liisa Maunu, 2004 → 2006  
Hanne Wikberg - Advanced Solid State NMR Spectroscopic Techniques in the Study of Thermally Modified Wood, Sirkka Liisa Maunu, 2005  
Pirita Rämänen (ent. Uschanov) - Modification and characterization of TOFA based alkyd resins, Sirkka Liisa Maunu, 2005 → ...  
Tommi Virtanen - NMR studies on complex cellulosic materials, Sirkka Liisa Maunu, 2005 → ...  
Mikko Mänttari - Cellulose graft copolymers: materials with novel structures and properties, Sirkka Liisa Maunu, 01.06.2009 → 31.03.2011

#### **Maija Tenkanen ,**

Supervision of PhD thesis, Hanna Kontkanen, Maija Tenkanen, 2000 → 2006, Finland  
Supervision of PhD thesis, Sanna Askolin, Maija Tenkanen, 2000 → 2006, Finland  
Supervision of PhD thesis, Helena Pastell, Maija Tenkanen, 2004 → 2010, Finland  
Supervision of PhD thesis, Kirsi Mikkonen, Maija Tenkanen, 2005 → 2009, Finland  
Supervision of PhD thesis, Ndegwa Maina, Maija Tenkanen, 2006 → ..., Finland  
Supervision on PhD thesis, Leena M. Pitkanen, Maija Tenkanen, 2006 → ..., Finland  
Supervision of PhD thesis, Sun-Li Chong, Maija Tenkanen, 2008 → ..., Finland  
Co-supervision of PhD thesis, Satu Kirjoranta, Maija Tenkanen, 2009 → ...  
Supervision of PhD thesis, Susanna Heikkinen, Maija Tenkanen, 2009 → ..., Finland



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

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

#### HUBI/Kilpeläinen

##### **Päivi Tuomainen ,**

Supervision of PhD thesis, Helena Pastell, Päivi Tuomainen, 2004 → 2010, Finland

Supervision of PhD thesis of Leena Pitkänen, Päivi Tuomainen, 2006

Supervision of PhD thesis of Sun-Li Chong, Päivi Tuomainen, 2008, Finland

##### **Liisa Viikari ,**

Supervisor of the thesis of Aniko Varnai, Liisa Viikari, 01.01.2008 → ...

Supervisor of the thesis of Annukka Pakarinen, Liisa Viikari, 01.01.2008 → ...

co-supervisor of the thesis of Ulla Moilanen, Liisa Viikari, 01.01.2010 → ...

#### **Prizes and awards**

##### **Ilkka Kilpeläinen ,**

Best teacher, Ilkka Kilpeläinen, 13.04.2005

##### **Ritva Serimaa ,**

Finnish Academy of Science and letters, membership, Ritva Serimaa, 2010 → ..., Finland

#### **Editor of research journal**

##### **Ritva Serimaa ,**

Biomacromolecules, Ritva Serimaa, 01.01.2005 → 31.12.2005, United States

J. of Polymer Science Part B Polymer Physics, Ritva Serimaa, 01.01.2005 → 31.12.2005, United States

Macromolecules, Ritva Serimaa, 01.01.2005 → 31.12.2005, United States

Trees, Ritva Serimaa, 01.01.2005 → 31.12.2005, United States

Biomacromolecules, Ritva Serimaa, 01.01.2006 → 31.12.2006, United States

Holzforshung, Ritva Serimaa, 01.01.2006 → 31.12.2006, Germany

J. Phys.: Condens. Matter, Ritva Serimaa, 01.01.2006 → 31.12.2006, United States

Nanotechnology, Ritva Serimaa, 01.01.2006 → 31.12.2006, United States

Physics in Medicine and Biology, Ritva Serimaa, 01.01.2006 → 31.12.2006, United Kingdom

Planta, Ritva Serimaa, 01.01.2006 → 31.12.2006, Germany

The Canadian Journal of Chemical Engineering, Ritva Serimaa, 01.01.2006 → 31.12.2006, Canada

Biomacromolecules, Ritva Serimaa, 01.01.2007 → 31.12.2007, United States

J. Phys.: Condens. Matter, Ritva Serimaa, 01.01.2007 → 31.12.2007, United States

Journal of Biomaterials and Bioenergy, Ritva Serimaa, 01.01.2007 → 31.12.2007, United States

Nanotechnology, Ritva Serimaa, 01.01.2007 → 31.12.2007, United States

Physics in Medicine and Biology, Ritva Serimaa, 01.01.2007 → 31.12.2007, United Kingdom

Biointerphases, Ritva Serimaa, 01.01.2008 → 31.12.2008

Holzforshung, Ritva Serimaa, 01.01.2008 → 31.12.2008

Journal of Biomaterials and Bioenergy, Ritva Serimaa, 01.01.2008 → 31.12.2008

Journal of Physics: Condensed Matter, Ritva Serimaa, 01.01.2008 → 31.12.2008

Langmuir, Ritva Serimaa, 01.01.2008 → 31.12.2008

PLOS one, Ritva Serimaa, 01.01.2008 → 31.12.2008

Planta, Ritva Serimaa, 01.01.2008 → 31.12.2008

##### **Sirkka Liisa Maunu ,**

Energy & Fuels, Sirkka Liisa Maunu, 01.01.2005 → 31.12.2005



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

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

#### HUBI/Kilpeläinen

Holzforschung, Sirkka Liisa Maunu, 01.01.2005 → 31.12.2005

#### **Liisa Viikari ,**

Carbohydrate Polymers, Liisa Viikari, 01.01.2007 → 31.12.2007, United Kingdom

Cellulose, Liisa Viikari, 01.01.2007 → 31.12.2007, United States

Journal of Biotechnology, Liisa Viikari, 01.01.2007 → 31.12.2007, Netherlands

Journal of Wood Science, Liisa Viikari, 01.01.2007 → 31.12.2007, Germany

Carbohydrate Polymers, Liisa Viikari, 01.01.2008 → 31.12.2008, United Kingdom

Cellulose, Liisa Viikari, 01.01.2008 → 31.12.2008, United States

Cellulose, Liisa Viikari, 01.01.2008 → 31.12.2008

Journal of Biotechnology, Liisa Viikari, 01.01.2008 → 31.12.2008, Netherlands

Journal of Biotechnology, Liisa Viikari, 01.01.2008 → 31.12.2008, Netherlands

Journal of Wood Science, Liisa Viikari, 01.01.2008 → 31.12.2008, Germany

Editorial board member Journal of Biotechnology, Liisa Viikari, 01.01.2010 → ...

Editorial board member of Biotechnology for Biofuels, Liisa Viikari, 01.01.2010 → ...

Editorial board member of Holzforschung, Liisa Viikari, 01.01.2010 → ...

Member of editorial board Journal of Wood Science, Liisa Viikari, 01.01.2010 → ...

#### **Peer review of manuscripts**

#### **Ritva Serimaa ,**

Biomacromolecules, Ritva Serimaa, 2010 → ...

Holzforschung, Ritva Serimaa, 2010 → ...

Journal of Physics, Conference series, Ritva Serimaa, 2010 → ...

Materials chemistry and physics, Ritva Serimaa, 2010 → ...

New Journal of Physics, Ritva Serimaa, 2010 → ...

The Open Natural Products Journal, Ritva Serimaa, 2010 → ...

#### **Maija Tenkanen ,**

Applied and Environmental Microbiology, Maija Tenkanen, 2002 → 2010, United States

Biochemical Journal, Maija Tenkanen, 2002 → 2007, United Kingdom

Cellulose, Maija Tenkanen, 2002 → 2011, United States

Biochimica et Biophysica Acta, Maija Tenkanen, 2003 → 2010, United States

Analytica Chimica Acta, Maija Tenkanen, 2005, Netherlands

Biomacromolecules, Maija Tenkanen, 2005 → 2011, United States

Carbohydrate Polymers, Maija Tenkanen, 2005 → 2011, United Kingdom

Journal of Agricultural and Food Chemistry, Maija Tenkanen, 2005 → 2011, United States

Macromolecular Symposia, Maija Tenkanen, 2005, Germany

Nordic Pulp & Paper Research Journal, Maija Tenkanen, 2005, Sweden

Enzyme and Microbial Technology, Maija Tenkanen, 2006 → 2011, United States

Journal of Pulp and Paper Science, Maija Tenkanen, 2006, Canada

Holzforschung, Maija Tenkanen, 2007 → 2011, Germany

International Journal of Biological Macromolecules, Maija Tenkanen, 2007, United Kingdom

Macromolecular Bioscience, Maija Tenkanen, 2007, United States

Molecules, Maija Tenkanen, 2007, Switzerland



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

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

#### HUBI/Kilpeläinen

Applied Biochemistry and Biotechnology, Maija Tenkanen, 2008, Germany  
Journal of Basic Microbiology, Maija Tenkanen, 2008, Germany  
LWT-Food Science and Technology, Maija Tenkanen, 2008 → 2011, United Kingdom  
Bioresource Technology, Maija Tenkanen, 2009 → 2011  
Cereal Chemistry, Maija Tenkanen, 2009  
Journal of Molecular Catalysis B: Enzymatic, Maija Tenkanen, 2009  
Biotechnology and Bioengineering, Maija Tenkanen, 2010  
Journal of Applied Polymer Science, Maija Tenkanen, 2010 → 2011  
Journal of Biotechnology, Maija Tenkanen, 2010  
Journal of Cereal Science, Maija Tenkanen, 2010

#### **Päivi Tuomainen ,**

Reviewer, Dietary Fibre, Päivi Tuomainen, 2006 → ...

#### **Kirsti Parikka ,**

Reviewer, Carbohydrate Research, Kirsti Parikka, 01.01.2008 → ...  
Reviewer, Enzyme and Microbial Technology, Kirsti Parikka, 01.12.2010 → ...

#### **Sanna Koutaniemi ,**

Reviewer (J Plant Physiol), Sanna Koutaniemi, 2006  
Reviewer (Phytochemistry), Sanna Koutaniemi, 2007  
Reviewer (J Integ Plant Biol), Sanna Koutaniemi, 2009  
Reviewer (J Basic Microbiol), Sanna Koutaniemi, 2010  
Reviewer (Physiol Plantarum), Sanna Koutaniemi, 2010

#### **Kirsi Mikkonen ,**

Reviewer - Carbohydrate Research, Kirsi Mikkonen, 2009 → ...  
Reviewer - Journal of Applied Polymer Science, Kirsi Mikkonen, 2009 → ...  
Reviewer - Journal of Applied Polymer Science, Kirsi Mikkonen, 2010 → ...

#### **Leena Pitkänen ,**

Reviewer, Analytical and Bioanalytical Chemistry, Leena Pitkänen, 2010 → ...  
Reviewer, Carbohydrate Research, Leena Pitkänen, 2010 → ...

#### **Membership or other role in review committee**

##### **Ilkka Kilpeläinen ,**

evaluation of natural sciences of estonia, Ilkka Kilpeläinen, 05.2006

##### **Ritva Serimaa ,**

tutkimushankkeen arvioija, The Vienna University of Technology, Ritva Serimaa, 2010

##### **Maija Tenkanen ,**

Evaluation of the research proposals, Bioenergy Programme, Metla, Maija Tenkanen, 2006, Finland  
Evaluation of the research proposals, Programme of Development of Industrial Biotechnology, Lithuanian State Science and Studies Foundation, Maija Tenkanen, 2007, Lithuania  
Evaluation of the reserach proposal, Odysseus Programme, Research Foundation Flanders, Maija Tenkanen, 2007, Belgium  
Evaluation of high school research projects, Tutki - Kehitä - Kokeile, Maija Tenkanen, 2008 → 2011, Finland  
Evaluation of the Vinnova Competence Centre BiMac Innovation, Maija Tenkanen, 2009, Sweden  
Evaluation of the research proposal, Danish Agency for Science, Technology and Innovation, Maija Tenkanen, 2010, Denmark



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

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

HUBI/Kilpeläinen

#### **Membership or other role in research network**

**Ilkka Kilpeläinen ,**

COST action E41 "Analytical tools with applications for wood and pulping chemistry", Ilkka Kilpeläinen, 2004 → 2007, Finland

**Ritva Serimaa ,**

Cost FP0802 network Experimental and Computational Micro-Characterisation Techniques in Wood Mechanics, Ritva Serimaa, 2009 → 2012

Nordic network of soft matter physics, Ritva Serimaa, 2009 → 2013, Norway

**Maija Tenkanen ,**

Member, COST E23, Maija Tenkanen, 2000 → 2005

Supervisor, ABS Graduate School, Maija Tenkanen, 2002 → ..., Finland

Member of the management committee, COST D29, Maija Tenkanen, 01.01.2004 → 20.06.2007

Member, COST E41, Maija Tenkanen, 2004 → 2008

Coordinator, researcher training network at the University of Helsinki: Natural Polymers, Maija Tenkanen, 2005 → ..., Finland

Member of the management committee, COST 928, Maija Tenkanen, 2006 → 2010

Member of the management committee, NordForsk network: Food and Bioresource Enzyme Technology, Maija Tenkanen, 2006 → 2010

Supervisor and member of the management team, Glycoscience Graduate School, Maija Tenkanen, 2006 → ..., Finland

Member, COST FP0602, Maija Tenkanen, 2007 → ...

Member of the management committee, COST FP0901, Maija Tenkanen, 2009 → ...

Coordinator, NordForsk network: Refining Lignocellulosics to Advanced Polymers and Fibers, Maija Tenkanen, 2010 → 2013

Supervisor and vice-member of the management team, Graduate School of Biomass Refining, Maija Tenkanen, 2010 → ..., Finland

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

**Ritva Serimaa ,**

EMBL Priority Committee, Ritva Serimaa, 2003 → 2009, Germany

EMBL Priority committee, Ritva Serimaa, 01.01.2005 → 31.12.2005, Germany

Estonian Science Foundation, Ritva Serimaa, 01.01.2005 → 31.12.2005, Estonia

Representative of Cost E35 (Fracture Mechanics and Micromechanics of Wood and Wood Composites with Regard to Wood Machining) working group 1 (Microstructure and Micromechanics), board member, Ritva Serimaa, 01.01.2005 → 31.12.2005

COST E50 (Cell wall macromolecules and reaction wood) network, Ritva Serimaa, 01.01.2006 → 31.12.2006

Physics Days 2007 (41. Annual Meeting of the Finnish Physical Society), Tallinn 15.-17.3.2007, program committee, Ritva Serimaa, 01.01.2006 → 31.12.2006, Finland

Representative of Cost E35 (Fracture Mechanics and Micromechanics of Wood and Wood Composites with Regard to Wood Machining) working group 1 (Microstructure and Micromechanics), board member, Ritva Serimaa, 01.01.2006 → 31.12.2006

3rd Workshop of Nordic Network for Women in Physics, member of the International Advisory Committee, Ritva Serimaa, 01.01.2007 → 31.12.2007, Denmark

EMBL Priority Committee, Ritva Serimaa, 01.01.2007 → 31.12.2007, Germany

European Science Foundation ESF, Ritva Serimaa, 01.01.2007 → 31.12.2007

Physics Days 2007 (41. Annual Meeting of the Finnish Physical Society), Tallinn 15.-17.3.2007, program committee, Ritva Serimaa, 01.01.2007 → 31.12.2007, Finland

Research Council of Norway, Ritva Serimaa, 01.01.2007 → 31.12.2007, Norway

Application for a Center of Excellence, Ritva Serimaa, 01.01.2008 → 31.12.2008, Denmark

Cost Action FP0802 Experimental and Computational Micro-Characterisation Techniques in Wood Mechanics, Ritva Serimaa, 01.01.2008 → 31.12.2008

ESF European Science Foundation. Research Networking Programme application, Ritva Serimaa, 01.01.2008 → 31.12.2008



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

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

#### HUBI/Kilpeläinen

Member of the EMBL Priority Committee (Synchrotron radiation research of biological systems, Hamburg Outstation), Ritva Serimaa, 01.01.2008 → 31.12.2008, Germany

National Science foundation, Ritva Serimaa, 01.01.2008 → 31.12.2008, United States

Nordic Network for Women in Physics, Ritva Serimaa, 01.01.2008 → 31.12.2008

Suomen fyysikkoseura, Ritva Serimaa, 2008 → 2012

Tasa-arvohankkeen seminaarisarja Physicumissa 22.9.-15.12.2008, vastuuhenkilö, Ritva Serimaa, 01.01.2008 → 31.12.2008, Finland

Commission for small angle scattering, Ritva Serimaa, 2009 → ...

Suomen synkrotronisäteilyn käyttäjien yhdistys, Ritva Serimaa, 2009 → 2012

#### **Maija Tenkanen ,**

Member of the management committee, Division of Biotechnology (Association of Finnish Chemical Societies), Maija Tenkanen, 2001 → ..., Finland

European Federation of Biotechnology, Maija Tenkanen, 01.01.2002 → 30.04.2005

Member, American Chemical Society (ACS), Maija Tenkanen, 2003 → 2005, United States

Member of the board, Foundation for Research of Natural Resources in Finland, Maija Tenkanen, 2009 → ..., Finland

Member of the scientific advisory board, Food Research Foundation, Maija Tenkanen, 2009 → ..., Finland

#### **Liisa Viikari ,**

COST Action FP0602, Liisa Viikari, 01.01.2008 → 31.12.2008

Chair person of COST FP0602, Liisa Viikari, 01.01.2008 → ..., Finland

The Danish Council for Strategic Research, Liisa Viikari, 01.01.2008 → 31.12.2008, Denmark

USA DOE, Liisa Viikari, 01.01.2008 → 31.12.2008, United States

Danish Council for Strategic Research Board member, Liisa Viikari, 01.01.2010 → ..., Denmark

International Academy of Wood Science Member, Liisa Viikari, 01.01.2010 → ...

#### **Membership or other role in public Finnish or international organization**

##### **Sirkka Liisa Maunu ,**

Deputy Member of the Council of the Faculty of Science, Sirkka Liisa Maunu, 2004 → 2006

Member of the Board of the Finnish Society of Wood and Polymer Chemistry, Sirkka Liisa Maunu, 2006 → 2009

Deputy Member of the Steering Group of the Department of Chemistry, Sirkka Liisa Maunu, 2007 → 2009

Member of the Council the Department of Chemistry, Sirkka Liisa Maunu, 2010 → ...

##### **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

##### **Liisa Viikari ,**

Advisory Group for Energy of the European Union (AGE), Liisa Viikari, 01.01.2008 → 31.12.2008

Metsäklusteri, Liisa Viikari, 01.01.2008 → 31.12.2008

Wallenberg Foundation, Liisa Viikari, 01.01.2008 → 31.12.2008, Sweden

Director of the Bioregs Graduate school, Liisa Viikari, 01.01.2010 → ..., Finland

#### **Membership or other role of body in private company/organisation**

**Ritva Serimaa ,**



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

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

HUBI/Kilpeläinen

Nordic Network for Women in Physics, Ritva Serimaa, 01.01.2006 → 31.12.2006

Nordic Network for Women in Physics, Ritva Serimaa, 01.01.2007 → 31.12.2007

**Liisa Viikari ,**

Advisory Group for Energy of the European Union (AGE), Liisa Viikari, 01.01.2007 → 31.12.2007

**Participation in interview for written media**

**Ritva Serimaa ,**

LERU Kids University, Ritva Serimaa, 10.11.2005 → 31.12.2011, Finland

Second Workshop of the Nordic Network for Women in Physics, Ritva Serimaa, 29.11.2006 → 31.12.2011, Finland

Third Workshop of the Nordic Network for Women in Physics, Technical University of Denmark, Ritva Serimaa, 16.08.2007 → 31.12.2011, Finland

Third Workshop of the Nordic Network for Women in Physics, Technical University of Denmark, Ritva Serimaa, 17.08.2007 → 31.12.2011, Finland

Fysiikan täydennyskoulutuskurssi, Helsingin yliopisto, Physicum, Ritva Serimaa, 05.06.2008 → 31.12.2011, Finland

**Sirkka Liisa Maunu ,**

Virkaanastujaisesityelmä, Helsingin yliopisto, Sirkka Liisa Maunu, 10.12.2003 → 31.12.2011, Finland

**Liisa Viikari ,**

ChemBio tapahtuma, Messukeskus Helsinki, Liisa Viikari, 27.03.2007 → 31.12.2011, Sweden

TEKES vuosiseminaari, Liisa Viikari, 07.03.2007 → 31.12.2011, Sweden

Talouselämä, Liisa Viikari, 21.11.2007 → 31.12.2011, Sweden

**Participation in radio programme**

**Timo Repo ,**

Radiohaastattelu, Timo Repo, 2010, Finland

**Liisa Viikari ,**

Radio, Radioattori/YLE 1, Liisa Viikari, 18.04.2007 → 31.12.2011, Sweden

Ruotsin radio/Ruotsin radion suomenkieliset ohjelmat, Liisa Viikari, 22.11.2007 → 31.12.2011, Sweden

**Participation in TV programme**

**Ilkka Kilpeläinen ,**

Commenting on future development on biodegradable materials, Ilkka Kilpeläinen, 2009 → ..., Finland

**Jorma Matikainen ,**

Taitaja-Tuomas, Aamu-TV, Jorma Matikainen, 20.02.2006, Finland

**Participation in interview for web based media**

**Timo Repo ,**

Haastattelu, Timo Repo, 09.10.2007, Finland



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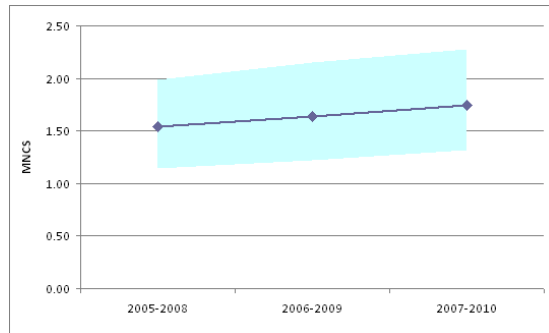
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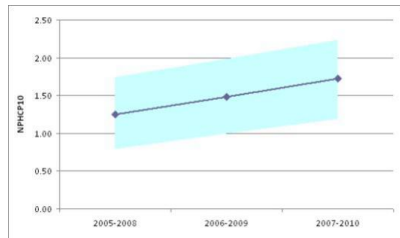
*Basic statistics*

Number of publications (P)	226
Number of citations (TCS)	1,331
Number of citations per publication (MCS)	5.91
Percentage of uncited publications	19%
Field-normalized number of citations per publication (MNCS)	1.57
Field-normalized average journal impact (MNJS)	1.33
Field-normalized proportion highly cited publications (top 10%)	1.45
Internal coverage	.82

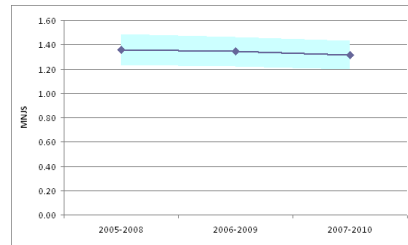
*Trend analyses*



MNCS

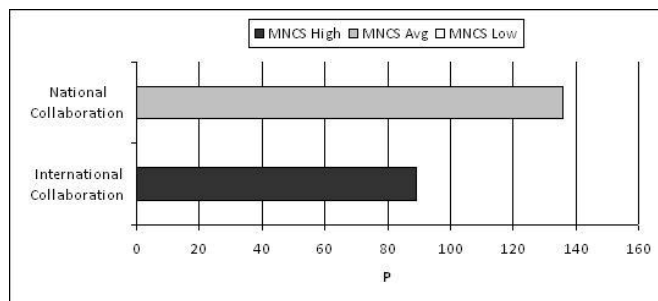


THCP10



MNJS

*Collaboration*



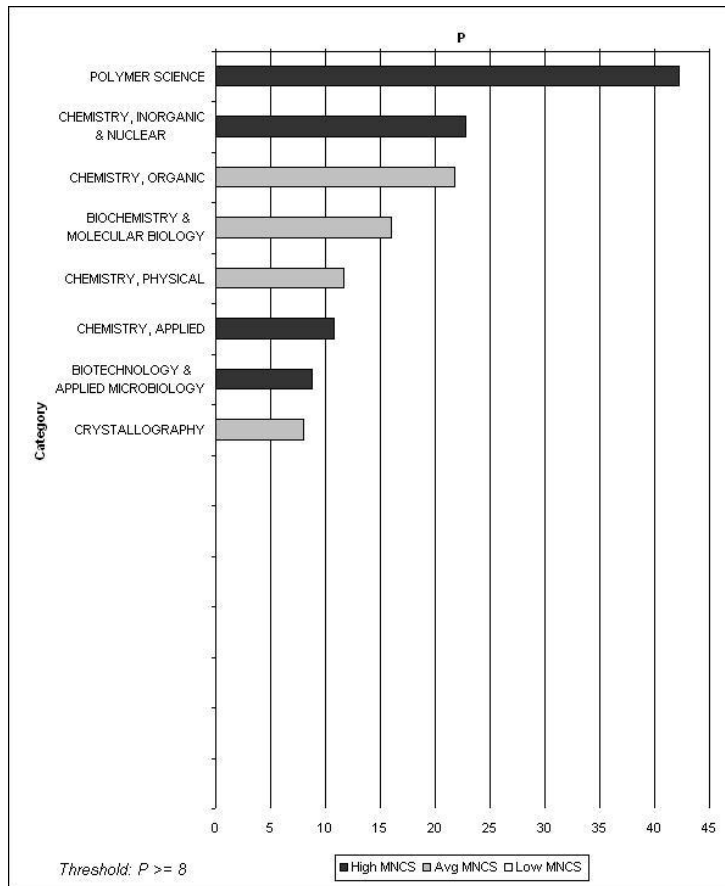
Performance (MNCS) by collaboration type



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## Research profile



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