

### The Group becomes a Centre

*As a Centre of Excellence we have decided to change our name to Åbo Akademi Process Chemistry Centre.*

The new name is a manifestation of the development of our group of four teams into a real centre during our previous five years of co-operation.

We still have challenges ahead of us, however! During this past year, we have finalised our strategy for 2003-2007. We still strongly believe in our founding concept of "Molecular Process Technology". We now need to develop the concept further and to strengthen our internal synergy.

Our **strategy** is built upon the following fundamental values:

- Deep knowledge and high quality in science
- Curiosity and creativity
- Respect for individuality
- Openness and transparency
- Sustainable development

The **key elements** for implementation of Molecular Process Technology in PCC are to:

- Develop analytical tools, advanced mathematical modelling and laboratory measuring systems to gain deeper insight into industrial and energy conversion processes.
- Develop novel chemical sensors, electroactive and catalytic materials, new types of ceramic materials for various applications and bioactive substances from natural raw materials.
- Optimize the synergy of joint projects within the PCC to support the development of novel solutions for the pulp and paper manufacturing, energy and combustion, and chemicals manufacturing industries.



Photo: Wood & Papermaking Chemistry Group

*Prof. Bjarne Holmbom is the leader of the Wood & Papermaking Chemistry group within PCC.*

- Improve our output of scientific articles towards the highest scientific quality.
- Continuously search and identify new research areas and challenges.
- Initiate new means to improve the career development of our research personnel.
- Improve our networking and collaboration with universities, research institutes and industry.
- Intensify our communication with society.

We have already started a series of PCC Distinguished Lectures given by invited researchers representing the world's top knowledge. We will formulate several new large joint projects which benefit greatly from our innovative synergy. During the coming years we will also develop the education of our young researchers focusing on the development of communication and organisational skills, including creative thinking and ethical considerations.

**Prof. Bjarne Holmbom**

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## Ionic liquids - a step towards green chemistry



Photo: Niclas Erlin

Docent Carita Kvarnström (left) and Dr. Pia Damlin are senior scientist within the Process Analytical Chemistry team.

Ionic liquids (IL) - also known as molten salts - are environmentally friendly solvents with very low vapor pressures. They consist of a mixture of positively and negatively charged ions. The size difference between the cations and anions in ILs precludes packing - instead the ions are disorganized and remain in liquid form at room temperature. ILs with varying properties can be designed for specific applications by choosing the right combination of anions and cations. Some examples of ILs are given in the figure below.

ILs provide an excellent matrix for catalysis and allow easy catalyst recovery. Furthermore, they can also facilitate certain chemical reactions and improve the ratio of products to byproducts.

The Process Analytical Chemistry team (PAC) has a long tradition in electrochemistry, including the electrosynthesis of conjugated polymers (CP) and molecules. Room temperature ILs are more convenient to handle than traditional organic solvents and electrolyte salts, which are normally used in the electropolymerisation of many CPs. ILs require less purification and don't have to be protected against air. ILs have therefore opened new possibilities for studying CPs and have expanded the CP research into new dimensions. More information concerning the application of ILs to electrosynthesis is available from Doc. Carita Kvarnström.

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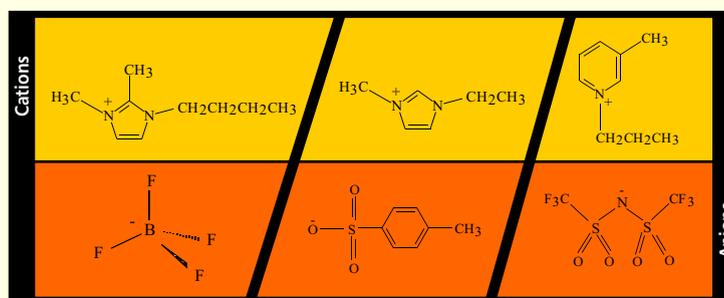


Photo: Tom Lindfors



Prof. Thomas Joyce discussing with doctoral student Jonas Konn.



Pia Damlin presenting ionic liquids.



Pleased coffee drinkers.



Passing Turku harbour on the way to the seminar dinner.

Photos: Tom Lindfors

## Distinguished Lecturer Series

The distinguished lecturer series within the PCC group started June 12th with the lecture of Prof. Jaromir Ruzicka, University of Washington, Seattle, USA (Flow injection as a versatile tool in chemical analysis). The series features lectures held by prominent scientists with connections to the Process Chemistry Centre. The following lecturers have been scheduled by PCC:

- 15.1. 2004 Prof. Jiri Janata, Georgia Tech, USA: Organic microelectronics  
 29.1. 2004 Prof. Kim Dam-Johansen, Danmarks Tekniske Universitet, Denmark  
 24.5. 2004 Prof. Lynn Gladden, University of Cambridge, England  
 Prof. Jean-Claude Charpentier, Université de Lyon, France  
 Prof. Douglas Reeve, University of Toronto, Canada  
 Prof. Alan MacDiarmid, University of Pennsylvania, USA  
 Prof. Roger Sheldon, TU Delft, The Netherlands  
 Prof. Gordon Wallace, University of Wollongong, Australia



Towards new challenges.

The distinguished lectures will take place at the Axelia building of the Faculty of Chemical Engineering, Åbo Akademi University, Biskopsgatan 8. Exact dates and times will be announced later on our web page: [www.abo.fi/instut/pcc](http://www.abo.fi/instut/pcc)



Photo from the web site of the Nobel Foundation.

### Prof. Alan G. MacDiarmid - Nobel Prize Winner in Chemistry 2000

The Royal Swedish Academy of Sciences awarded the Nobel Prize in Chemistry for 2000 jointly to **Alan G. MacDiarmid** (b. 1927), **Alan J. Heeger** and **Hideki Shirakawa** "for the discovery and development of conductive polymers". He has been professor at University of Pennsylvania since 1964.

The program at the *annual PCC seminar* included both oral and poster presentations given by the PCC teams about their research activities. 39 senior researchers and 45 doctoral theses workers are associated with PCC and 94 refereed articles were published 2002 in international journals. The scientific advisory board (SAB) pointed out that PCC has matured into a true centre of excellence (CE) during the first three-year period 2000-2002 and that PCC will truly be a source of pride for the Academy of Finland. PCC gets 8.5 % of its total funding from the Academy of Finland. The call for the next CE period 2006-11 will be opened in spring 2004 and PCC is already fine-tuning its strategies.

Representatives from Finnish industry agreed that the industry has to take responsibility for paying a part of the costs at the universities. Perhaps the companies with representatives on the PCC industrial advisory board (IAB) are forerunners in this respect? Director Kari Ebeling (IAB, UPM-Kymmene) stated that quarterly capitalism will dwarf long-term research in private companies, thus transferring more pressure onto university research. The PCC associates continued these interesting discussions at a very nice seminar dinner later in the evening in the Turku archipelago. Many thanks to the organizers!



Photo: Ari Ivaska

Finally, at the seminar dinner.

PCC applying for more financial support from the representative of Academy of Finland.



Photo: Ari Ivaska

Professional quartet entertaining at the conference dinner. From left: Patrik Ljungqvist, Max Lönngrén, Johan Werkelin (PCC) and Nici Bergroth (PCC).



Next annual seminar venue...



...with entertainment?

## Marie Curie Training Sites at PCC

The European Commission has appointed the ÅA PCC to be a Marie Curie Training Site with 8 fellowship positions for young researchers pursuing doctoral studies in EU Member states in 2002-2005.

[www.abo.fi/instut/pcc](http://www.abo.fi/instut/pcc) for information about applications and scientific topics.



Photo: Tom Lindfors

## Visitors

- M.Sc. Dana Căcaina, Babes Bolyai University, Cluj-Napoca, Romania, 1.8.03-31.12.04
- M.Sc. Martin Dittrich, Institute of Chemical Technology, Prague, Czech Republic, 18.8.03-15.6.04
- M.Sc. Anna Konopka, Warsaw University, Poland, 15.9-10.12.03
- Ph.D. Cecilia Lete, Institute of Physical Chemistry of Romanian Academy, Bucharest, Romania, 25.9-8.10.03
- M.Sc. Beata Pazcosa, AGH University of Science and Technology, Cracow, Poland, 15.8.03-14.2.04
- M.Sc. Anna Maria Wajs, Technical University of Lodz, Lodz, Poland, 15.8.03-15.6.04

## PCC Scientific and Industrial Advisory Boards

**SAB** Thomas W. Joyce, Western Michigan University  
Albert Renken, Swiss Federal Institute of Technology

J.W. Niemantsverdriet, Eindhoven University of Technology

## PCC Facts and Mission

The Åbo Akademi Process Chemistry Group (ÅA-PCC) studies physico-chemical processes at the molecular level in environments of industrial importance, in order to meet the needs of tomorrow's process and product development. Our particular focus on the understanding of complex process chemistry we call

### *Molecular Process Technology*

The Centre consists of four research groups at the Chemical Engineering Faculty of Åbo Akademi University: *Combustion & Materials Chemistry* (Prof. Hupa), *Kinetics & Catalysis* (Prof. Salmi), *Process Analytical Chemistry* (Prof. Ivaska) and *Wood & Papermaking Chemistry* (Prof. Holmbom). In the year 2002, about 170 people (including 40 senior researchers) took part in the PCC activities with a total funding of approximately 5.8 Million €.

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