



NMG Posterday 2005

On Thursday, October 27th 2005, the 11th Posterday Membrane Technology was organized by the Dutch Membrane Society ('NMG') in Ede, the Netherlands. The day was sponsored by the EU Network of Excellence NanoMemPro, and SenterNovem, the Dutch government agency for innovation and sustainable development.

117 Participants attended the day and presented 60 posters in which the latest scientific developments on membrane technology in the Netherlands and Belgium were shown. The participants were originating from universities (57), research institutes (22), membrane producing companies (9), contractors (7), end users (14), and consultants (8). The majority of the participants was Dutch (103), from Flemish Belgium 14 people attended the day.

During the Posterday, three lectures were given on membrane research at the Technical University of Delft (Prof. F. Kapteijn), the K.U. Leuven (Prof. I. Vankelecom), and the University of Twente (Prof. M. Wessling). In two sessions, the participants could have

a look at the posters and discuss with the authors.

The posters showed that membrane technology is a very energy friendly and versatile technology. One poster (from Wetsus, centre for sustainable water technology) even showed that membranes can be used to generate energy via techniques like Pressure Retarded Osmosis ('PRO') and Reverse Electrodialysis ('RED'). Other eye-catching posters were based on the application of techniques from other scientific fields in the preparation, testing and optimization of membranes, like combinatorial strategies (K.U. Leuven), microfabrication, and microfluidics (both University of Twente). More conventional themes like membrane preparation, waste water treatment,

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gas separation, pervaporation, and the reuse of process streams were very well represented.

A new item on this Posterday were two prizes, one for the best scientific poster and one for the best industrial membrane application. The scientific prize was won by ir. Bernke Papenburg (Ph.D. student at the University of Twente, group M. Wessling) for her poster 'Tissue Engineering Scaffolds Prepared by Phase Separation Micro-molding'.

Ir. Jeroen Willemsen (manager business development at Wageningen University Research/ Agrotechnology and Food Innovations BV) received the prize for the best membrane application for his poster entitled 'The next step in natural aroma isolation by organophilic pervaporation: industrialization'.

All the posters are collected in a book. More information on how to obtain a copy of the book can be obtained from Antoine Kemperman (a.j.b.kemperman@tnw.utwente.nl).



First annual meeting NanoMemPro Montpellier, 11th-14th October 2005

In October 2005, the first annual meeting of NanoMemPro was organized at CNRS-IEM in Montpellier (France). During the meeting there were separate meetings of the Integrative Management Team (IMT), the Executive Committee (ExC) and the Governing Board (GB). Furthermore, separate meetings and workshops regarding the activities 1, 2, 10, 11, 13 and 15 were organized. More information with respect to these meetings can be found in Project Place (document archive/WP18/meetings). Below you will find a short summary.

Members of the management bodies

During the meeting it was decided that Bernard Jollans, the regional delegate of CNRS will be the head of the GB, whereas Gilbert Rios will continue heading the ExC. The Scientific Council will be headed by Jean-Claude Charpentier and Heiner Strathmann, Paul Pex and another person will participate in the Council.

NanoMemPro commitment

It was decided that the partners of NanoMemPro should always mention, in e.g. presentations, posters that they belong to NanoMemPro.

Project status after the first year

During the first year a tremendous amount of work was performed. Most of the activities are in accordance with the original planning and contribute to the integration of the different institutes of NanoMemPro. On time delivery of milestones and deliverables remains a point of concern.

Future meetings

20th to 22th March 2005 Leuven

Semi-annual meeting (including IMT, ExC and GB + WPs meetings)

11th to 14th June 2005

workshop on WP 15.2 (LUT)

29th June to 30th June 2005

Lillehamer: possibility for a quarterly management meeting

28th September to 29th September 2006

Euromembrane Congress 2006 (Italy): 2nd annual management meeting

Scattering and X-ray spectroscopy characterisation techniques for membranes and porous materials

The European Network of Excellence on Nanoscale-based Membrane Technologies (NanoMemPro) organises on June 25th, 2006, a first workshop on characterisation tools in the field of membrane science and porous materials. The Lillehammer workshop is dedicated to the use of scattering and X-ray spectroscopy characterisation techniques for unravelling the structure of membranes and porous materials on a scale that goes from the atomic to the micron level.

The basics of six techniques, i.e. X-ray diffraction, X-ray reflectometry, X-ray Small Angle Scattering, Light Scattering, X-ray Photo-electron Spectroscopy, and X-ray Fluorescence, will be presented in relation with their possible applications in membrane science. Since the workshop is at the eve of the ICIM9 conference, the applications are focussed mainly on inorganic and hybrid organic-inorganic materials.

This workshop is an outstanding opportunity for everyone inside and outside the NanoMemPro network to refresh her or his knowledge on the basic techniques and to get insights how they can be applied to structural problems in membrane science.

Preliminary program

Quantitative X-ray diffraction for porous materials

Heinz Amenitsch, ELETTRA synchrotron, Trieste, Italy
 Combinations of SAXS/SANS with other in-situ and ex-situ for the characterization of porous materials Nick Kanellopoulos, Materials & Membranes for Environmental Applications Laboratory, Athens, Greece

X-ray Reflectometry Analysis of Porous Materials

Arie van der Lee, Institut Européen des Membranes, Université de Montpellier II, France

X-Ray Fluorescence: Fundamentals and Applications

Christos Kontoyannis, Department of Pharmacy, University of Patras, Greece

X-ray Photo-Electron Spectroscopy and Membranes

Silvia Irusta, Catalysis and Reactor Engineering Group, University of Zaragoza, Spain

Dynamic Light Scattering

Bente G. Tilset, SINTEF Materials and Chemistry, Oslo, Norway

New Description of Work

The updated description of work for the period 1st September 2005-28th February 2007 is available at Project Place (Document archive/reference documents/Technical annex of the contract/Annex_I_DoW_t12_ed3.pdf).

High School students working on a Scientific Project: «Objective Sciences»

In the frame of the « Scientific and Technologic Workshop » (Atelier Scientifique et Technologique) of the Rectorate, the high school "Toulouse-Lautrec" in Toulouse (France) opens a new Project named "Objective Sciences".

The objectives of this new workshop are to initiate high school students to a scientific activity and to point out the impact of research in the daily life. The idea proposed to satisfy these objectives is to allow students to experience a mini career of a researcher or an engineer during one academic year.

The different partners involved in this project are the Rectorate, the high school "Toulouse-Lautrec", the National Centre of Scientific Research (CNRS) and the University Paul Sabatier.

This project is proposed to the high school students in the final year (of age 17 to 18). The students have to form working parties of 2 or 3. They are managed by two of their teachers (physics-chemistry and English) and a scientific advisor (a member of staff in our University or CNRS).

Each group selects a topic amongst those proposed by the advisors and then the scientific activity of the students consists of:

- Literature survey in the field of their topic (this will address scientific but also "English issues")
- To carry out experiments in our labs (advisor)
- To interpret their results (Physics teacher and advisor)
- To write a report under the form of a written communication (all)
- To diffuse their scientific work

To do this project, the high-school students will spend two hours per week over the academic year and 5 full days will be devoted to a laboratory training period during holidays. During the training period in the laboratory, the

students will also have the opportunity to endure the daily life of a researcher, a lecturer, an engineer, or a laboratory technician.

To conclude this programme, each group will have to address an oral communication to present the work in a theatre, as in a conference, to an audience made of the final years (their mates), the teachers, the advisors and their families. We expect about 500 people attending this mini event, scheduled on Saturday, April the 8th.

For the first year twelve scientific topics have been proposed, including two in the field of membrane and membrane applications:

- Sea water demineralisation by electro dialysis
- Nanofiltration of coloured waste waters

Sylvain Galier, and Jean François Lahitte

NanoMemPro Exchange

ITM-CNR ⇔ CNRS-IEM

(10-31 October 2005)

Rosalinda MAZZEI visited CNRS-IEM to work on chemical immobilization of (bio)molecules on membranes or textile. This subject is part of the research strategy "functionalised membranes (for immobilization of biomolecules, e.g. for the development of membrane reactors, affinity UF and MF)" identified during the 1st workshop held by WP11.2.

Both Institutions carry out research on immobilization methodologies for the development of biocatalytic membrane reactors and affinity membrane separation.

The group of Prof. P. Seta (CNRS-IEM) has expertise in the chemical immobilization methods (chemical grafting and molecular recognition).

The group of Dr. L. Giorno (ITM-CNR) has expertise in the physical immobilization of biomolecules.

Exchanges between the two groups al-



NanoFlux, a nanofiltration simulation program

A new software providing a way of modelling and simulating nanofiltration membrane transfer. Developed by Dr J. Palmeri and co-workers at the European Membrane Institute (IEM-France).

Conferences at CNRS-IEM

1st December 2005

Eugene SKOURAS (FORTH/ICE-HT)
 "Simulation of porous inorganic membrane structure and transport across molecular and mesoscopic scales".

12 December 2005

Arie van der Lee, CNRS-IEM
 Workshop: "X-ray reflectometry: physics and chemistry applications."

low a better understanding of the effect of immobilization conditions on the structural and functional properties of immobilized biomolecules.

FORTH/ICE-HT ⇔ CNRS-IEM

(28 november - 3 December 2005)

Eugene Skouras visited the CNRS-IEM to discuss molecular modelling techniques applied to membrane transfer. Structure and Transport Modeling (WPO8) with Dr. John Palmeri.

Remi Caraballo, who spent 3 months in the Adaptive Supramolecular Nanosystems team in 2005, has accepted a doctoral position in Sweden.

NanoMemPro Arrivals

Tania GUMI, Post-doc student at CNRS-IEM. She is involved in WPO3 and WP13.1.

Anca MEFFRE, Post-doc student at CNRS-IEM. She is involved in WPO9, WP10 and WP11.4.

People



New Ph.D. Students

Jean-Christophe COIFFIC

“Study of thin films made of carbon nanotubes” - 1/10/2005

Nicolas HENGL - Supervisors: J. Sanchez et M.P. Belleville

“Design and study of a membrane evaporator” - November 2005,

Wassim KAFROUNI - Supervisors: Dr. A. Julbe and Dr. V. Rouessac

“Coupling sol-gel and PECVD techniques for H₂ separative membranes”
15/10/2005

Mehdi Metaiche - Supervisors: John Palmeri, A. Deratani

“Optimisation of Reverse Osmosis Desalination Systems: Conception, Operating Parameters and Numerical Simulation” - 12/2005

Hafedh SAIDINI - Supervisor: Dr. A. Deratani

“Influence of operating parameters on nanofiltration performance: experimental study and predictive modelling” - 10/2005

Mauricio SCHIEDA, Supervisors : Jean Durand and S. Roualdes (IEM)

“PECVD synthesis and material characterization for alkaline fuel cells”
10/2005

Ionut TOPALA - Supervisors : J. Durand and Gheorghe Popa

“PECVD membranes for biomedical applications” - 1/11/05 - 03/04/06

Aurelia TAR - Supervisor: Dr. M. Barboiu

“Dynamic macrocyclic receptors ” - 30/09/2005 -28/032006

Livia NASZALYI - Supervisors : A. Ayral (IEM) and Zoltán Hórvölgyi (USTEB)

“Preparation and characterization of functionalised nanostructured layers composed of ZnO nanoparticles” - 12/09/2005 - 28/02/2006

PhD thesis defended

Sébastien BALME - Supervisors: P. Dejardin and J. M. Janot.

“Confocal dynamic fluorescence spectroscopy : devising an optical device and study of protein adsorption (solid/liquid interface)”
05/11/2005

Emilie MAGNAN - Supervisor: Marie Pierre Belleville

“Study of an enzymatic membrane engine and application to butyl laurate synthesis”
13/12/2005

Jean-Michel CONDRE Supervisor: Patrick Seta

“Study of the colloidal interactions precursors in the formation of A type zeolite membranes”
13/12/2005

New Post-doc Students

Florence BOSC

01/10/2005 - 31/08/2006

“Multifunctional membranes and membranes with hierarchical structures”

Background

PhD: “Synthesis and characterization of TiO₂ anatase-based mesostructured thin layers and membranes with photocatalytic properties”
(European Membrane Institute - Montpellier – September 2004).

Post-doc: “New photocatalytic materials for visible light applications”
(European Laboratory for Catalysis and Surface Science (ELCASS) – Strasbourg October 2004 - September 2005)

UNIVERSIDAD DE ZARAGOZA

4th International Zeolite Membrane Meeting

From July 22-25, 2007, the University of Zaragoza organizes the 4th International Zeolite Membrane Meeting. More information can be found at: <http://www.che.utoledo.edu/izmm4/home.htm> or you can contact Joaquin Coronas (coronas@unizar.es).

WP3.0 – Mobility

Two main actions are going on within mobility workpackage WP3.0. The NanoMemPro website will have a new job, training and education offers section. Furthermore, we are interested in submitting a Conferences and Training Courses proposal.

NanoMemPro Website

A new section will substitute the actual job, training and education offers section on the NanoMemPro website. Main possibilities will be:

- Each partner will be able to publish any offer (job, education or training) in the website filling specific forms.
- Visitors will be able to search for offers. Application may be done either by mail either by a third website (a link must be provided in the form describing the offer) if this possibility is available.
- Visitors will also be able to subscribe a mailing list to be informed of all

new or modified offers. They could upload a CV and a cover letter in the website.

- A miscellaneous section has been included. Several documents and links have been placed in, like the “European Charter for Researchers”, NanoMemPro Quality Chapter.

Please, don't forget that we're also registered in “the European Researcher's Mobility Portal”. This website is a stated reference in researchers' mobility in Europe. So we're interested in publishing job offers in it. If you've got job offers that you would like to publish in it, please don't hesitate to contact us (aimar@chimie.ups-tlse.fr or escudero@chimie.ups-tlse.fr).

Conferences and Training Courses proposal

This is the last opportunity to get funding on Marie Curie programme (deadline for project submission is 17 May 2006). Moreover, the 7th FP is get-

ting delayed and People programme first call won't probably be published before September 2007. This type of programme funds the organisation of summer schools and/or high level scientific workshops and proposal should be presented as a “Series of Events”.

The idea is to organise workshops in the different topics of NanoMemPro Joint Research Activities (JRA) to promote discussions and collaborations within the network and hence mobility, but also to increase NanoMemPro international visibility. Special support for this kind of workshops will be given to young researchers (i.e. having up to 10 years of experience). These meetings must create links and long lasting collaborations projects between young and experienced researches from inside the network, but also researchers external to NanoMemPro.

Pierre Aimar and F. Javier Escudero

New equipment at IBET

The Group of Membrane and Membrane Separations and Processes from Instituto Superior Técnico has recently acquired the following equipments under the re-equipment project “Network of laboratories of functional materials for reactions, membrane processes and fuel cells”, Foundation for Science and Technology:

- 1) Micro Particle Image Velocimetry (MPIV) system
- 2) Micro Holographic Interferometer (MHI)
- 3) Electro Kinetic Analyzer (EKA)

The MPIV system involves lasers, optics, radiation and image processing and can be used for the visualization of a fluid flow and quantification of the velocity fields of a fluid flow at the level of its local and global struc-

tures. It is a well established technology for this purpose and it is recognized to be the most flexible technique – almost a client designed equipment. Its applications range from fundamental studies of Fluid Mechanics to engineering problems where fluid management is the key issue.

On the other hand, the MHI makes use of the same technologies as MPIV and produces an interferogram, which is analysed by a software to yield a 2D concentration distribution. In the case of fluid and mass transport at the fluid/solid interface (e.g., the concentration polarization in membrane separation processes) the simultaneous existence of MPIV and MHI is crucial to quantify and comprehend in detail and at a fundamental level the flow field and the solute concentration profiles in

specific planes (e.g., close to the solid/fluid interface). Besides, the databases built by MPIV and MHI systems are crucial for the validation of physical and mathematical models in CFD.

The Electro Kinetic Analyser (EKA, Anton Paar) is used for membrane surface characterization (determination of membrane surface charge density). It comprises a Rectangular Cell for the determination of the zeta potential of flat materials (e.g. foils and plates), a Cylindrical Cell for the determination of the zeta potential of fibres and filters, a Powder Cell for the determination of the zeta potential of powders (> 25µm) and granules, and a Remote Controlled Titration Unit with two pumps for the automated variation of pH or additive concentration throughout zeta potential measurements.



INSTITUTO SUPERIOR TÉCNICO
 Universidade Técnica de Lisboa

Young Scientists in Twente

In December, 60 children (10-11 years) from a secondary school in Enschede, The Netherlands (ESV) visited our group and the group of Prof. Detlef Lohse (Physics of Fluids) to experience the exciting world of chemistry and physics. The event was very successful for both the young scientists and the organizers.



Symposium for technical assistants

In November the Faculty of Science and Technology of the University of Twente organized a symposium for 200 technical assistants from secondary schools.

These technical assistants support the 12-18 year old high school students with their technical assignments and take care of the practical trainings given in secondary schools. The symposium was organized to inform these assistants about new and exiting research areas.

Our group was asked to give a plenary lecture about the developments in membrane science and technology. In the afternoon several parallel sessions, in which the assistants could experience membrane technology in practice, were organized.

Honory meeting Kees Smolders

On the 28th of December 2005, Kees Smolders, the founding father of membrane science and technology at the University of Twente, reached the honorable age of 75 years.

Kees Smolders has inspired generations of young researchers. The Membrane Technology Group of the University celebrated this event with a one-day symposium together with old colleagues and membrane friends.

The program knew a variety of technical lectures from academia to industry, but there was also time for exchanging professional and private thoughts. The meeting was very interesting and inspiring.



Events

Upcoming events

Ph.D. defence Guillo Schrader - March 31, 2005

Nanofiltration of municipal wastewater treatment plant effluent

34th edition of the Batavierenrace - April 22, 2006

The batavierenrace is a relay race over 185 km from Nijmegen to Enschede, divided into 25 stages varying from 3.4 km to 11.9 km. More than 300 teams participate in this race, and also the Membrane Technology Group will contribute to this event with a team of 25 membrane runners.

People

New Group members

Matías Bikel (Argentina)

Ph.D. student

In his Ph.D project, that started on the 1st of October, Matías will further explore the fundamentals and potential of PSM (phase separation micro-moulding).

Sandra Bruinenberg

(The Netherlands), Ph.D. student

In her research project, Sandra will study the influence of operational parameters on the nature and extend of biofouling.

Bettahalli Srivatsa (India)

Ph.D. student

Srivatsa will work in the field of tissue engineering. He aims to build 3D polymeric scaffolds to culture cells and to supply nutrients and oxygen to the growing cells.

Wika Wiratha

(Indonesia/The Netherlands)

Researcher EMI Twente

Since September 1, 2005, Wika is working as a full-time researcher at the European Membrane Institute Twente, where she contributes to confidential projects with industrial partners. Before she joined the EMI Twente she worked at the Inorganic

Material Science Group of the University of Twente, where she was involved in the preparation and characterization of porous and dense ceramic membranes.

Bachelors and Masters

Bachelor

Wilma de Groot

October 10, 2005

Characterizing block copolymer orientation by birefringence

Master

Sumbharaju Raghavendra

August 19, 2005

Asymmetric bipolar membranes for reduced salt leakages

Koray Uelger

September 12, 2005

Preparation of thin film multi-layer membranes for gas separation

Nayelli Masetto

September 13, 2005

Cellulose acetate symmetric membranes for gas separation

Christina Leinweber

October 17, 2005

Droplet formation in microstructured porous polymeric materials

New Equipment

Flow field flow fractionation (FFFF): FFFF can be used to determine the particle size distribution of complex mixtures, e.g. proteins, pharmaceuticals, organic compounds in the range from approximately 10^3 - 10^8 g/mol or 10-400 nm. For more information, please contact Wilbert van de Ven (w.j.c.vandeven@utwente.nl).

Ph.D. Defence

Míriam Gironès i Nogué

December 9, 2005

"Inorganic and polymeric microsieves. Strategies to reduce fouling"

Menno Gierman

October 21, 2005

Confidential

Fuat Uyar

November 11, 2005

New membrane material for flue gas dehydration; sulfonation of SPEEK

Edwin Berends

February 9, 2006

Confidential

Koen van 't Sant

February 15, 2006

Confidential