

NanoMemPro - Expanding membrane macroscale applications by exploring nanoscale material properties

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Coordinator: Prof. Gilbert RIOS, CNRS


Tel: +33 (0) 4 67 14 91 40, Fax: -91 19

Email: Gilbert.Rios@iemm.univ-montp2.fr

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### “NoE Electronic Newsletter”

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<b>Organisation:</b>	UTwente	
<b>Author(s):</b>	Kitty Nijmeijer and Pınar Zeynep Çulfaz	
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<p><b>SUMMARY:</b>  This report corresponds to the 6<sup>th</sup> newsletter of the NanoMemPro Network of Excellence (. It informs NanoMemPro partners of progress of activities, last meetings and workshops, upcoming meetings, and also gives internal news from the partners' institutes.</p> <p><b>KEYWORDS:</b> e-newsletter, information.</p>		



The NanoMemCourse organizing committee announces that the EC-funded Marie Curie Training Course

## “EF2: Nanostructured materials and membrane modeling and simulation”

will take place from 18 to 27 June 2008 in Patras, Greece. The course is geared towards young researchers and engineers with either experimental or modeling inclination, and aims to offer them basic and advanced education on modeling and simulation in nanomaterials and their applications.



Following an introduction to statistical mechanics and basic simulation techniques, the course will cover

- a) simulation of the material structure at all scales
- b) determination of sorption, transport, and mechanical properties in nanomaterials
- c) applications of nanomaterials (separation, storage, fuel cells, environment, bio)
- d) linking to experimental methods



The lectures will be delivered by international experts in the field. In addition, hands-on training on the use of scientific software will be offered in the fields of atomistic simulations and process design.

Other parts of the course will provide an overview of the opportunities for collaborative research and commercial exploitation of scientific findings.



Visits to selected companies in the area of Western Greece are scheduled, during which the students will be guided through modern trends in membrane usage in the energy, chemicals, health, and food sectors.

Poster sessions will be available, where the participants can show their own research activities and explore the potential for collaborative work.

For further information, please, visit [www.nanomemcourse.eu](http://www.nanomemcourse.eu) or contact Dr. Vasilis Burganos at [vbur@iceht.forth.gr](mailto:vbur@iceht.forth.gr)



# Kick-off European Membrane House (EMH)

On January 29, 2008 the first meeting of the board of directors of the European Membrane House (EMH) was organized in Paris. The EMH facilitates and guarantees the continuation of the network after the formal end of NanoMemPro. The board of directors of the EMH consists of the following persons:

Gilbert Rios: Chairman and Executive director, Management & Procedures

Tor Ove Leiknes: Vice Chair, representative of the EMS, Congress & Education

Susanna Nunes: Research & Education

Kitty Nijmeijer: Technological Innovations & Development  
Inge Genné: Industrial Relations & Fairs

An important aspect of the EMH is its relation with the EMS. The EMS and the EMH will closely collaborate. The tasks of the EMS will be dedicated to the learning society (e.g. organization of conferences and summer schools), whereas the task of the EMH will be dedicated to technological development (services, lobbying, etc.). The exact format for the EMH and its activities need to be determined in the near future during the transition from NanoMemPro to European Membrane House.

## NanoMemPro third year review

As every year, also the 3rd year of NanoMemPro has been evaluated by the European Commission. A new reviewer was proposed by the EU: Kees Kees Kramer. The review meeting took place on October 29, 2007 in Brussels. The most important conclusions of the review are that NanoMemPro performs very well. It is evaluated as being a good to excellent project. The project has fully achieved its objectives and technical goals for the period and has even exceeded expectations. Recommendations for the future period are:

- Continue to promote integration within NanoMemPro to lower fragmentation
- Pay adequate attention to the development of the drafting of the Regulations and the Business Plan
- Evaluate the effects of the over/under spending of resources (man-months, budget) for the effect upon the activities in project year 4.

A more detailed summary of the review is as follows:

### Objectives:

After 3 years all objectives are still relevant and can be implemented in the time remaining in the project. All WPs should continue to focus on the overall objective to build a Network, a Virtual Institute, by integrating at a European level. There is urgent need for the development of a sound business plan, a task that shall not be underestimated. Also the Regulations for the European Membrane House need to be developed.

### Workplan and resources:

In year 3, NanoMemPro clearly made considerable progress to achieve the overall project objectives, including the implementation of the legal entity. Most work packages produced evidence of satisfactory progress. However, there are a number of tasks that need urgent attention. For few partners there have been noted serious deviations from the planned time scheme and budget.

### Work planned for the next 18 months:

The outline of further implementation is considered in support of further development of NanoMemPro into a better integrated network.

### Consortium / partnership:

The consortium in general worked well together and many tasks advanced according to plan.

### Management:

Management of the project performed well. Tools for an efficient operation seem in place and functioning.

### Use and dissemination of the knowledge:

During the third year, the project has clearly demonstrated activities that relate to dissemination of the knowledge towards various audiences.

### Impact:

The project develops towards further integration, even beyond the project/product, notably by seeking integration with other NoEs and projects, national and international (also outside Europe), and with industry (the main clients), thus strengthening the European Research Area.

# 2<sup>nd</sup> Scientific Council Meeting

28 September, 2007

Lisbon, Portugal

The Scientific Council of NanoMemPro has members, of which 4 (W.J. Bakker, J.C. Charpentier, N.S. Gaeta, H. Strathmann) were present at the second meeting of the Scientific Council of NanoMemPro on September 28, 2007. Prof. Vienken could not attend the meeting. The role of the SC is:

- To advise the Governing Board on the project orientations and implementation of the mission
- To evaluate the Description of the Work (DoW) within the frame of the project as well as the results obtained
- To consult the Governing Board on all scientific issues
- To make proposals and to transmit all information it deems useful to the Governing Board.

All members of the SC recognize the importance NanoMemPro has in organizing and structuring the field of membrane technology within Europe. They carried on verifying their commitment to monitor the progress of NanoMemPro and actively fulfil their role to support this NoE in achieving its goal to evolve in a self-sustaining and leading activity within the European Research Area (ERA), i.e.

European Membrane House (EMH). During the second meeting of the SC of NanoMemPro, the following topics were discussed and compared with the recommendations presented in the minutes of the 1st SC meeting (28-29 September 2006, Giardini Naxos, Sicily, Italy): Management of the project, Roadmap and SBRA, purchase of equipment, Master/PhD programmes, and European scope of the Network.

In 2006 the Scientific Council was positive about the start-up of NanoMemPro. However it pointed that significant improvements in communication, mind setting and focus had to be achieved to enhance the chances for a successful evolvement of NanoMemPro in a self-sustaining and leading entity in European membrane research and technology development.

In September 2007 we are in the 4<sup>th</sup> year of the project and it is clear that improvements have been done in mind settings and focus to enhance the chances for a successful evolvement of the NoE in a self-sustaining and leading entity in membrane with the creation of

the European Membrane House. It has to be underlined the huge work made by the co-ordinator which has endeavoured to integrate all comments and remarks received from the partners, as well as suggestions coming from the EMS. But significant improvements have still to be achieved in communication, the weak point being the contact with the industry companies in order to create this demanded community of membrane people between industry and academy. This requires an approach especially behaving in the sense of an entrepreneurial spirit, showing that the only experts in membranes and the people to solve the problem the industrialists meet are found in the NoE. This should be more emphasized in the roadmap. This needs also to reinforce the contacts with the CoI.

Finally, the Scientific Council has found many positive aspects and suggests keeping on this movement especially in proposing during the 4<sup>th</sup> year a good and clear business plan. The Scientific Council suggests also saving a large part of the rest of the budget of NanoMemPro for EMH.

## Activities

### WP11.2: NanoMemFood Workshop 20 March 2008, Paris

The Institute on Membrane Technology (ITM-CNR), as leader of the WP11.2, is organizing the NanoMemFood Workshop on "Membrane Processes in Food: safe and sustainable production methods" which will be held in Paris on 20 March 2008 at ENCPB - Ecole Nationale de Chimie, Physique et Biologie. Aim of the Workshop is to set the state of the art and perspectives of membranes and membrane processes in food industry. To this regard, members of the Club of Interest operating in the agro-food sector have been invited for discussing and identifying sustainable research strategies.

### Citizens' awareness through RAI International

A special report is now available online on various research activities carried out at ITM-CNR, with a special focus on water desalination by membrane operations. The report was produced by RAI International which broadcasts, throughout the world, the best of the programmes of Rai Radiotelevisione Italiana, as well as original programmes made for Italians who live abroad and for all those who have a family link with our country or want to know more about Italy. The TV troupe was hosted for two days and realized interviews with the Director, ITM-CNR researchers, guests and visitors within NanoMemPro which are downloadable at the ITM-CNR website: <http://www.itm.cnr.it>

### WP06.1: Membrane Technologies in FP6 meeting

NanoMemPro organised as a joint initiative with the European Membrane Society, the DGMT, the CFM, the NMG, the BMG, and in agreement of the European Commission a special event "Membranes Technologies in FP6" (Brussels, 6-7 December 2007) on the latest developments of research and education programmes supported in FP6. Because of a limited number of seats, the participation was on invitation. More of 60 participants attended the meeting with representatives from industrialists of different sectors, core partners of NanoMemPro, the universities and the European Commission.

The event intended to give an overview of Europe's landscape and tools in membrane science and technology, to present the latest developments of research and education projects supported in FP6, to introduce the European Membrane House (EMH) and the NanoMemPro's Strategic Business and Research Agenda, and to offer a privi-

leged place to discuss future projects and opportunities. The meeting was structured in four parties:

- Presentations by EC representatives (I. Anastasiou - DG RTD/G1, and C. Borel - French NCP-NMP) and consultants (K. Skarvelakis - Alma Consulting Group, and S. Brouwers - Efficient Technology) about the "European Union's Framework Programmes: FP6 and FP7: the objectives for research under FP7 and new instruments and features in FP7", and the "Key tools for the submission of a good project: working with a consultant and assessing a project's impacts".

- Presentations about projects supported by EC during FP6 in the sectors of Water Environment (Eurombra project and MBR Network by Prof. T. Leiknes - NTNU), Materials and process industries (Compose project by Dr. K.V. Peinemann - GKSS), Energy and Global warming (Nanoglowa

project by P. Raats - Kerma) and Biotechnology and Health (Live-biomat project by Dr. L. de Bartolo - ITM-CNR). Each sector session was followed by an overview of the new EC calls and open discussion moderated by members of NanoMemPro (Prof. P. Aimar, Prof. J. Crespo, Prof. M. Menendez and Dr. L. Giorno).

- Presentations of the three NoE NanoMemPro, InsidePores and Idecat as structuration example of the European Research Area.

- Speed dating session with bilateral or group conversations about the eight project proposals and four discussion topics or expertise request submitted by the participants before and during the meeting.

For more information about this event, do not hesitate to contact: [contact@nanomempro.com](mailto:contact@nanomempro.com).

### WP10: "Back design and mass production of membrane materials"

GKSS, UTwente, Imperial and ITM-CNR have prepared a preliminary report on the demonstration activities for WP10. This report is now available on Project Place.

In this context, GKSS, UTwente and Imperial, in collaboration with some other teams, are working on their multimedia or practical demonstrations on membranes for Fuel Cells, for Gas Separation and for Non-aqueous Separations, respectively.

Furthermore, ITM-CNR is preparing a two-day practical demonstration on the production and use of porous hydrophobic membranes for applica-

tion as membrane contactors. This two-day activity will take place in the ITM-CNR laboratories in Rende, Italy. The preliminary program is as follows:

23 June 2008:

Short general introduction on membrane preparation and membrane contactor technology.

Laboratory demonstration of the preparation of hydrophobic porous membranes by flat film casting (batch) and by continuous hollow fibre spinning.

Hollow fibre membrane module construction.

24 June 2008:

Membrane characterization (hydrophobicity, contact angle, morphology, permeability, pore size,...)

Utilization of porous hydrophobic membranes as membrane contactors for membrane crystallization, membrane distillation and gas sorption. Discussion on operational aspects (process requirements, operation costs).

Round table discussion and closing remarks.

The demonstration is open to all NanoMemPro members and to members of the club of interest, who will receive an invitation via e-mail or through Project Place.

## Workshop - Membranes for artificial organs (NanoMemPro WP 11.4)

On September 26, 2007 prior to the annual NanoMemPro meeting in Lisbon, a workshop on membranes for artificial organs was organized by the leader of WP11.4 (Life support and health) Dr D. Stamatialis in collaboration with Prof. J. Crespo and Prof M.N de Pinho. The event started with an introduction by Dr Stamatialis highlighting the main medical membrane applications (drug delivery, artificial kidney, artificial lung, artificial pancreas, artificial liver and tissue engineering). Afterwards various speakers (NanoMemPro partners and other experts) covered various important topics (see program below).

Speaker	Topic - title
Dr. D. Stamatialis (UTwente - The Netherlands)	Welcome - Medical membrane applications
Dr. P. Dejardin ( CNRS - France)	Artificial kidney: Polymer membranes and hemocompatibility
Dr. L. de Bartolo (ITM - Italy)	Membrane bioartificial systems for liver, neuronal and lymphocyte function reconstruction
Dr. N. Reis (BIOSURFIT, S. A - Portugal)	Biosensors for Point-of-Care diagnostics
Prof. C. Legallais (UTC - France)	Mass transfer in artificial organs
Open discussion	Future challenges - role of NanoMemPro

The program concluded with an open discussion (coordinated by Dr. D Hofmann-GKSS) on future challenges. The discussion highlighted the importance of better promotion of the competences of NanoMemPro to other “players” in the field. Suggestions included collaboration with other relevant European networks of excellence (e.g Network on tissue engineering) as well as organization of NanoMemPro promotion events at conferences on “Biomaterials”, “Artificial Organs” and “Tissue engineering”. The discussion continued well into the night at an excellent restaurant in the centre of Lisbon.

## First labels in Membrane Engineering at Master level delivered in September 2007

Marta Silva (Universidade Nova de Lisboa), Pierre-Alexandre Bourgeois (University of Montpellier) and Grégoiry Borgolotto (University of Toulouse) are the first students at Master level labelled by NanoMemPro-EMS.

The labels were granted during the first meeting of the committee created jointly by NanoMemPro and EMS, in charge of the education activities: the European Membrane Education Committee (Lisbon September 2007). The applications submitted in the first call officially launched on July 2007 were evaluated. The 3 submitted applications carrying out all the criteria were accepted, i.e.:

- validation with merit of a Master of Sciences performed in a European university,
- a Master curriculum including at least 60 hours (6 ECTS) of theoretical

courses directly related to membrane science and membrane technology,

- a mobility of at least one semester (30 ECTS) in a research laboratory or a company recognized in membrane engineering in another country than for the theoretical courses.

This label in Membrane Engineering at Master level has been established in the framework of NanoMemPro-WP12 as a first step prior to the setting-up of the European Master in Membrane Engineering. The label is issued by the European Membrane Education Committee and it is delivered in addition to the existing diplomas of the partner Universities to students completing a Master degree under the previously expressed conditions. It is open to all students from a European University.

Financial support to mobility costs is sought through the Erasmus programme. To this purpose, the Universities of the NanoMemPro partners are engaged by signature of Socrates Erasmus bilateral agreements, ensuring mobility grants to those Master students who are willing to take on an international education programme.

Currently, the second call is already open (deadline: 15th October 2008). You can find more information about it on <http://nanomempro.com> (Project/Education section) or by contacting the person in charge of NanoMemPro-WP12 in your institution.

*Patrice Bacchin and André Ayral (CNRS)  
in charge of NanoMemPro Master action*  
[bacchin@chimie.ups-tlse.fr](mailto:bacchin@chimie.ups-tlse.fr)  
[andre.ayral@iemm.univ-montp2.fr](mailto:andre.ayral@iemm.univ-montp2.fr)

# 9<sup>th</sup> Network Young Membrains meeting

26-28 September, 2008

Thessaloniki, Greece

The ninth annual "Network Young Membrains" meeting was held in Thessaloniki, Greece, from 26th to 28th September 2007. The Network of young people, who are currently researching membrane technology at University or in industry as researchers, PhD or Master students, also known as NYM, has grown up, reaching this year a number of 700 participants through the whole NYM history. This year, more than 70 young membrains working in 20 different countries, and originating from 25 different European, and not only, countries, participated in the 9th sequel of NYM meeting series, while 51 of the participants joined for the first time the network.

The NYM9 meeting was organized by 13 PhD students and researchers of the Aristotle University of Thessaloniki (A.U.Th.), the University of Western Macedonia (UOWM) and the Chemical Process Engineering Research Institute (CPERI). The meeting took place at the Centre for Research and Technology-Hellas (CERTH), under the auspices of the CPERI and the Chemical Engineering Department of A.U.Th. The financial funding was granted from 12 sponsors, originated from the membrane manufacturing section, technical companies, university and public authorities, research institutes, scientific societies, and mainly from the NanoMemPro Network of Excellence and the European Membrane Society.

The NYM9 meeting offered a program of interest founded upon research results as well as ideas exchange, making useful contacts, sharing and diffusing knowledge. The program included six workshops (first session) on Environment, Gas permeation and pervaporation, Modelling/transport, Synthesis and characterization of inorganic membranes, Synthesis and characterization of organic membranes, and Fouling and membrane bioreactors, offering the opportunity to present various fields of research and discuss general aspects of membrane technology. To reflect the content of their workshop, in the second session every group worked on a presentation, summarizing the main topics of their discussion. This presentation was compiled by the NYM9 organizing team, which prepared six different posters, one for each workshop. The posters were presented the second day of the meeting during the third session, giving the opportunity to the participants to interact with each other.

Furthermore, there was a keynote lecture by Prof. A.J.

Karabelas from CPERI, on "Membrane Desalination: Present and Future", the first day of the meeting, and on the second day, two plenary lectures given by Assoc. Prof. E.S. Kikkinides (UOWM) on "Selected topics on multiscale simulations in porous membrane", and Assoc. Researcher V. Nikolakis (FORTH/ICE-HT, Greece) on "Zeolite membranes for gas separations: Recent progress and future challenges". At the end of the NYM9 meeting, a visit at the research facilities of CERTH area was made, while NYM9 was accomplished with a field trip to the facilities of the Water Refinery of Aliakmonas River, the newly constructed drinking water treatment plant in the region of Thessaloniki.



Besides the scientific program, a pleasant social program was organized, which consisted of a welcome dinner in a cosy restaurant-bar (by the seaside), a tour in the old city of Thessaloniki, a visit to the old Byzantine church of Agios Dimitrios and finally a Greek Glenti (the Greek name for party) in Ladadika area, celebrating the NYM9 gathering.

Overall, the meeting has met the goal of providing the attendees the opportunities and information to improve their knowledge on membrane technology, to exchange ideas, and more important to create contacts and lasting synergies. The NYM9 organizing team would like to thank everybody who consolidated to the realization of this meeting, and to invite all young membrains to the 10th in series NYM meeting in 2008, in Berlin.

## Contact information

NYM9 Organizing team	NYM10 / Centre for Water in Urban Areas
Email: <a href="mailto:nym9@cheng.auth.gr">nym9@cheng.auth.gr</a>	Email: <a href="mailto:Fsp-wib@tu-berlin.de">Fsp-wib@tu-berlin.de</a>
Web: <a href="http://www.cperi.certh.gr/nym9">www.cperi.certh.gr/nym9</a>	Web: <a href="http://www.fsp-wib.tu-berlin.de">www.fsp-wib.tu-berlin.de</a>



# Heiner Strathmann awarded the Barrer Prize

Prof. Dr.-Ing. H. Strathmann is awarded the Richard Maling Barrer Prize of the European Membrane Society. The Barrer Prize was created by the European Membrane Society to be given in recognition of exceptional contributions to the membrane field. Prof. Strathmann is the first recipient of the prize, which comes with a medal and a cheque of €10,000.

Prof. Strathmann is a founding member and leader of a scientific and technological community that has made and continues to make significant contributions to the big societal issues of our time, such as health, safe and sufficient water, sustainable energy and sustainable chemical processes. His technical achievements, his commitment to the application of technology to solve real problems, and the energy and enthusiasm he has put into spreading the membrane word around the world have already inspired a whole generation of membrane scientists and engineers, and his work and attitude continue to set an example to today's young researchers.

## Academic achievements

Prof. Strathmann has been active in academia since 1962, and has been a prominent force in membrane research and development for much of that time. Even though retired in 1999 from the University of Twente, he remains an enthusiastic advisor and supporter of research groups world wide.

He has published ca. 200 scientific and reviewed papers and in 1979, he wrote the first scholarly book on membrane science and technology in Germany entitled "Trennung von molekularen Mischungen mit Hilfe synthetischer Membranen,

Steinkopff, Darmstadt 1979". 35 Ph.D. students graduated under his supervision. Prof. Strathmann is co-founder of the European Membrane Society. Has served to the community as the Editor of the journal Separation and Purification Technology, as well as a member of the Editorial Board of the J. Membrane Science, Desalination, Filtrieren & Separieren, and Gas Separation and Purification.



## Industrial achievements

Prof. Strathmann is an entrepreneur par excellence. He has been active in promoting the practical application of new scientific knowledge and new concepts on technical membranes from the beginning of his professional career.

He was founder and CEO of the Forschungsinstitut Berghof GmbH which grew over time to an SME of 200 employees. At the Fraunhofer Institute in Stuttgart, he headed the department for Membrane Technology and coordinated industrial development projects. Professor Strathmann is named inventor on 25 patents. His patents on bipolar membranes form the basis of the ion exchange and bipolar membrane products of FumaTech, Germany. Many of his students/collaborators

hold strategic positions in multi-national membrane companies or have started their own company. Many companies in his native Germany and around the world have benefited from his consultancy service.

In the organizations and groups that he heads, he creates a sense of freedom and respect that encourages the creativity of the groups and individual scientists working under him. His successful collaborations with many international organizations indicate that others also appreciate his ability to build creative, effective teams. In summary, Professor Strathmann is distinguished by a more than 40-year career of technical excellence, innovation, leadership and service.

Prof. Strathmann will be honoured formally at the 2008 ICOM meeting in Hawaii.

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## Opening of new building UTwente

On November 23, 2007, the president of Shell Nederland, Mr. P. de Wit, officially opened our new building Meander. Prior to the official opening, the participants could attend a symposium entitled 'the ideal energy mix for the next 100 years, were Prof. Niek Lopes Cardozo presented his vision for the future on nuclear fusion, Prof. Wim Sinke presented the future of Solar power and Prof. Wim van Swaaij discussed the possibilities for biomass. On November 24, people interested in the research performed at the University of Twente and family members of university employees got the opportunity to visit the new building and research labs and to attend many demonstrations in the field of catalysis, membrane technology, process technology and fluid dynamics.

# Honorary doctorate for Professor Ora Kedem

During the Dies Natalis (founding date) of the University of Twente on November 30, professor Ora Kedem (82) received an honorary doctorate of the University of Twente. Ora Kedem is Emeritus Professor on Desalination and Water Treatment Research at Ben Gurion University in Israel and at the Weizmann Institute of Science.

Her academic career started with her first paper in 1951 and still continues after 55 years. She is the most recognized scientist in two very different areas: technical membranes and natural membranes. She has published groundbreaking papers in both fields. Both scientific communities (for technical and natural membranes), which in fact have no organizational ties with each other, have recognized her leading role by publishing in 2005 a special issue of the Journal of Membrane Science to her honour and republish her paper from 1958 as one of the major scientific achievements in biophysics. She is a person with a strong sense of societal responsibility: she turned her fundamental knowledge on mass transport through biological membranes into the development of desalination membranes to address the problems of water shortage in the Mediterranean area. She has taken political responsibility and started tightening collaborative links between German and Israeli researchers. Her achievements on this matter were awarded with the German Bundesverdienstkreuz. She has been founder and technical director of a spin-off company from the Weizman Institute of Science: Membranes Products Weitzman. Her unique interest in fundamental science and technology valorization makes her a prime example of an entrepreneurial scientist.

During her long career, Ms. Kedem has been honoured with many international awards. She is one of the founders



of today's Ben Gurion University in Be'er Sheva. Ora Kedem. Her link with the University of Twente is long-standing. Prof. Kedem has been scientifically interacting with all three Membrane Technology Chair holders (Smolders, Strathmann and Wessling) over the last 3 decades. According to Professor Wessling, the 'promotor' of the honorary doctorate, Kedem's interest in fundamental research and technological valorization make her a perfect example of an entrepreneurial scientist.

Prior to the official ceremony, the Membrane Technology Group of the University of Twente organized a workshop to the honour of Prof. Ora Kedem. The workshop started with a word of welcome of Matthias Wessling and a dicti amicorum for Ora Kedem from Cees Smolders and Karl Boedekker. The scientific program started with a lecture from Joseph Kost on clinical applications of ultrasound enhanced transport through biological membranes. The program continued with two fascinating lectures on the simplicity of nature: Motomu Tanaka presented his work on transport through cell membranes, whereas Yechiel Shai explained how we could use the principles of nature in our struggle against bacteria and cancer. After lunch the program continued with two presentations on technical membranes and applications with a lecture from Shimon Tal on desalination as a viable resource and an inspiring presentation by Bernd Bauer on the advances of FumaTech on polymer electrolyte membranes for fuel cell applications. The workshop ended with a special word of Heiner Strathmann and Matthias Wessling to the honour of Prof. Ora Kedem.



## Exchange of people

### ICTP Prague (Czech Republic) --> ITM - CNR (Italy)

Since June 2007, Dr. Karel Friess, senior researcher and member of the permanent staff of the Laboratory of Membrane Separation Processes of the Institute of Chemical Technology in Prague (ICTP), is hosted by the Institute on Membrane Technology (ITM-CNR) in Rende (IT). The aim of this exchange is two-fold: first of all it is a first step to establish a long term cooperation between the two laboratories in the area of gas/vapour sorption and permeation in polymeric membranes. Secondly, the visit is aimed at an exchange of scientific expertise. Dr. Friess, expert in the sorption of gases and vapours in polymeric membranes will train students and young researchers in this discipline and will contribute to develop short and medium term research plans. At the same time Dr. Friess will have the possibility to perform gas permeation measurements at the time-lag setup available in the

ITM-CNR laboratories to establish standardized procedures. In particular, the attention is focussed on transport of gases and vapors through dense amorphous perfluoropolymer membranes. Perfluoropolymers have an extraordinary chemical and thermal stability and they are traditionally known as solvent-resistant. However, some amorphous glassy high-free-volume perfluoropolymers appear to be remarkably permeable to a select number of vapours, offering perspectives for certain gas/gas, gas/vapour and vapour/vapour separations under demanding conditions where traditional polymers may not resist due to chemical degradation, plasticization etc. Therefore this study is aimed at the determination of structure/permeability relationships and a detailed analysis of the transport parameters (sorption as well as diffusion coefficients) in these materials.

Such information is important for acquiring knowledge of fundamental transport phenomena in these remarkable materials, necessary for an evaluation of their future potential in industrial separation processes.

After the return of Dr. Friess at ICTP, the activities will be continued at both laboratories with sorption measurements (ICTP) and permeability measurements and free volume analysis (ITM-CNR). Developed procedures lead to results that will be in part presented at the Chisa conference and in scientific publications (in preparation). The benefit of this cultural and scientific exchange of Karel Friess not only consists in the above mentioned work, but also in reciprocal skill and knowledge transfer, and in planned future cooperation. The latter should then be consolidated in common research projects, for instance in the framework of FP7.

### PhD theses defended

14-02-2008 - Adele Brunetti Integrated membrane plant for hydro-gas production for PEM-FC

14-02-2008 - Francesco Scura, Engineering of membrane gas separation

14-02-2008 - Gianluca Di Profio, Advanced processes of molecular separation for chemical, environmental, agro-food, pharmaceutical and polymeric application: membrane contactors

14-02-2008 - Enrica Fontananova, Development of new polymeric and composite membranes for application in catalysis and fuel cell

### Publications

L. Giorno, E. Piacentini, R. Mazzei, E. Drioli, Membrane emulsification as a novel method to distribute phase-transfer biocatalysts at the oil/water interface in bioorganic reactions, *J. Membr. Sci.* (2007), doi:10.1016/j.memsci.2007.07.016

L. Giorno, E. D'Amore, E. Drioli, R. Cassano, N. Picci, Influence of -OR ester group length on the catalytic activity and enantioselectivity of free lipase and immobilized in membrane

used for the kinetic resolution of naproxen esters, *Journal of Catalysis* 247, 194-200, 2007

L. Giorno, E. D'Amore, R. Mazzei, E. Piacentini, J. Zhang, E. Drioli, R. Cassano, N. Picci, An innovative approach to improve the performance of a two separate phase enzyme membrane reactor by immobilizing lipase in presence of emulsion, *Journal of Membrane Science*, 295, 95-101, 2007

### News

The Newsletter for NanoMemPro III year Activity, edited by Imperial College, was published in the Membrane News, the European Membrane Society Newsletters, edited by ITM-CNR, and distributed to the members of the Club of Interest.

## Exchange of people

### Lappeenranta University (Finland) --> UTwente (The Netherlands)

I came from Lappeenranta University of Technology from the membrane group of professor Marianne Nyström as GSCE paid exchange PhD student.

I was at Twente University for about six months. It was a good chance for me to learn to know much closer one of the promoting groups in the membrane field.

The first decision about this trip was made when I met one student from Twente in Finland in May 2006. However, I started the formal procedure a few months later. The time I got my Visa to enter the Netherlands it was almost a year after my meeting.

Travelling in spring, staying in summer and autumn gave me this chance to see different views from the Netherlands, from rainy, cold, boring days to sunshine, hot and lovely days. Besides of this of course I enjoyed being in a group of young and talented researchers. I never forget the first Friday that all people gathered in a Seminar Hall for Friday presentation. I was impressed when I understood that more than 50 PhD students work in this group.

When I realised how many people work in this group I got worried about my work and how I can manage to do my research. I was afraid that it would be like a competition and every one could come earlier in the morning and take every thing that he /she wanted. But in the second week when I had a lab tour I understood that all things were well organised and this was the reason how so many people could work together. For example each chemical had a label which shows the owner and date of purchase, the labels of general and personal chemical or equipment was different. Chemicals were stored according to the newest EU safety rules, inside of a cabinet with a proper

vent. There was a data base on the computer in the lab so that one could easily find the place of everything. There was little space for everyone to do or put his/her experiment or set-up. Each set-up had a safety data sheet which showed what happened inside the set-up, how dangerous the chemical was and what should be done under none normal conditions. People had to wear glasses when they entered to the lab. Waste (liquid or solid) was disposed of properly.

The safety of work and environment was very important in this university. I remember that we had to evacuate the building a few times, whatever the problem, it was not very serious.

Another thing that was interesting for me was the weekly presentation on Friday. Each member of the research group had to give a presentation about the results and the progress of his/her work. It was not only a normal speech in fact it was more like an open discussion which everyone could interrupt and ask a question. I had the chance to be present for several presentations from different aspects of membrane and its application which I might never touch myself. I realised, however, the presenter was not talking about what I liked to hear but somehow the finding or experiment procedures or the mistakes could be useful for me. However, in the cluster meeting which was usually on Friday afternoon the chance to discuss in more detail about ideas was greater.

Daily discussions in "café time" and lunch break were very useful. The time was used for relaxing, exchanging ideas and experience and of course complains about weather!!

For me the membrane group in Twente looks like a big family. Like a family people went for outside activity in the weekend or after work, celebrated birthdays, weddings and success.

But why did I come to Twente?

Before I came to Twente I was asked to send my plan and the list of equipment which I thought would be needed. I planned to use SEM and do some characterisation tests for studying the fouling phenomena in oily water treatment, but when I got there, I found good equipment for dead-end filtration. After discussion with professor Marianne Nys-

*(continued on next page)*



## Exchange of people

### Lappeenranta University (Finland) --> UTwente (The Netherlands)

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tröm and Dr. Antoine Kemperman (my supervisors in Lappeenranta and Twente) I changed my plan and focused on the dead-end ultrafiltration.

The equipment was designed by Wilbert, one of the PhD students. He used this equipment to study the influence of different factors on the surface water treatment.

There was an acquisition data system attached to the filtration equipment which made it possible to collect data for imposed pressure, permeate flux, pH and even streaming potential besides that it was possible to run the filtration unit in different conditions (like different forward and backwash filtration time and pressure).

The results showed that with the model oil (cutting oil) the dead end filtration was working well and only with backwashing flux could be restored very well. However, for higher oil concentrations the flux was not very stable and fouling could be seen. The fouling and flux decline were more obvious when salt was added to the oily water. Restoring the flux was not possible by a normal backwash

and cleaning the membrane with chemicals was needed. The fouling and decline of flux depended on the salt (valence and amount of salt). For example KCl and CaCl<sub>2</sub> were tested in the filtration equipment. The results showed that CaCl<sub>2</sub> had more influence on flux reduction. This effect was more obvious at higher concentrations.

I did a part of tests with the Amicon cell, because of the pressure limit with the dead-end equipment (upper limit was 2 bar).

Besides of filtration tests I did some tests on the effect of different amounts and types of salt on the surface properties of membranes. The emphasis was more on the changes in the hydrophilicity of the membrane.

As a conclusion

I am very happy for having been in this group. I suggest to other students to spend some time outside of their group and even in another country to make new thoughts (wash eyes and look differently) about work and research.

## CNRS - IEM

### PhD theses defended

9 March 2007, Christophe CHARMETTE: "Poly(ethylene oxide-co-epichlorohydrin) membranes

for carbon dioxide separation. Structure – transfert properties relation".

11 June 2007, Francisco Gabino: "Impact of microbial presence on the osmotic evaporation process performance".

16 July 2007, Ludivine FRANCK-LACAZE: "Study of protonation and diffusion in anion-exchange membranes based on poly (4-vinylpyridinium)".

15 October 2007, Adinela-Nicoleta CAZACU: "Macrocyclic receptors fonctionalised as membrane transporters and analytic reactives".

26 October 2007, Mathieu MICHAU: "Hybrid membranes and self-organized systems: facilitated transport of ionic species, proton conduction and hierarchical materials".

6 December 2007, Suksawat SIRIJARUKUL: "Manufacture of poly(ethyleneterephthalate) membranes with a linear gradient of pore size and constant porosity".

13 December 2007, Mauricio SCHIEDA: "Manufacture by CVD plasma and characterisation of materials for alkaline fuel cells".

18 December 2007, Wilfried PUYRENIER: "Porosity characterisation of hybrid thin layers".

19 December 2007, Camelia BARBOIU : "Synthèse et caractérisation des membranes microporeuses en silice pour la purification de l'Hélium à haute température (HTR) ".

20 Décembre 2007, Gihane NASR : "Dynamic polymeric materials for adaptative membranes".

### Promotions

2007 - HDR, Sophie Tingry: "From molecular materials to bio-inspired membrane materials"

2007 - HDR, Marc ROLLAND.

(HDR: French accreditation to supervise research).



# Agenda

## 4th Semi annual meeting of NanoMemPro

19-20 March 2008, Paris

## NanoMemFood Workshop on Membrane Processes in

### Food: Safe and Sustainable Production Methods

20 March 2008, Paris

Organisation: Lidiatta Giorno (ITM-CNR)

## 10th World Filtration Congress

14 - 18 April 2008, Leipzig, Duitsland

Organisation: University of Karlsruhe, University of Wuppertal, VDI, Filtech Exhibitions

Website: [www.wfc10.com](http://www.wfc10.com)

## i-SUP2008 'Innovation for Sustainable Production 2008', incl. 'Separation Technology Conference'

22 - 25 April 2008, Brugge, Belgie

Organisation: VITO, MIP Vlaanderen

Website: [www.i-sup2008.org](http://www.i-sup2008.org)

## Engineering with Membranes 2008 "Membrane Processes: Development, Monitoring and Modelling -From the Nano to the Macro Scale"

25 -28 May 2008, Vale do Lobo, Algarve, Portugal

Organisation: University of Oviedo, U.N. Lisboa, IST Lisboa, U. Minho

Website: [www.uniovi.es/EWM2008](http://www.uniovi.es/EWM2008)

## IWA conference 'ECWATECH-2008'

2-4 June 2008, Crocus Expo Exhibition Center Moskou, Rusland

Organisation: IWA, IWA Specialist Group on Membrane Technology, SIBICO International Ltd, ECWATECH Ltd.

Website: [iwamembranes.ru](http://iwamembranes.ru)

## NanoMemCourse, module EF2: Nanostructured material and membrane modelling and simulation

18 - 27 June 2008, FORTH/ICE-HT, Patras, Griekenland

Organisation: NanoMemPro, FORTH/ICE-HT

Website: [www.nanomemcourse.eu/new/site/courses/EF2/index.htm](http://www.nanomemcourse.eu/new/site/courses/EF2/index.htm)

## TERMI-US 2008-02-04 NanoMemPro participation

18-27 June 2008, Porto, Portugal

Website: [www.termis.org/eu2008/index.php](http://www.termis.org/eu2008/index.php)

## 2008 International Conference on Membranes and Membrane Processes 'ICOM 2008'

12 - 18 July 2008, Honolulu, Hawaii, USA

Organisation: North American Membrane Society (EMS and AMS)

Website: [www.icom2008.org/](http://www.icom2008.org/)

## Gordon Research Conference "Membranes: Materials and Processes"

10 - 15 August 2008, New London, NH, USA

Organisation: GRC

Website: [www.grc.org/programs.aspx?year=2008&program=membranes](http://www.grc.org/programs.aspx?year=2008&program=membranes)

## International Conference on Inorganic Membranes 'ICIM10'

18 - 22 August 2008, Tokyo, Japan

Organisation: Waseda University

Website: [www.icim10.org/](http://www.icim10.org/)

## XXV EMS Summer School 'Solvent Resistant Membranes'

7 - 11 September 2008, Leuven, België

Organisation: Centre for Surface Chemistry and Catalysis, Katholieke Universiteit Leuven

Website: [www.biw.kuleuven.be/emsss2008/](http://www.biw.kuleuven.be/emsss2008/)

## 12th Aachener Membran Kolloquium

29 - 30 October 2008, Aken, Duitsland

Organisation: RWTH Aachen

Website: [www.amk.rwth-aachen.de/](http://www.amk.rwth-aachen.de/)

## Euromembrane 2009

6 - 10 September 2009, Montpellier, France

Organisation: Institut Européen des Membranes (Montpellier), University of Montpellier

Website: [www.enscm.fr/euromembrane2009.htm](http://www.enscm.fr/euromembrane2009.htm)