Program

Advanced Membrane Technology VI: Water, Energy, and New Frontiers

February 8 – 13, 2015
Sicily, Italy

Conference Chairs

Prof. D. Bhattacharyya (DB)
Department of Chemical and Materials Engineering
University of Kentucky, USA

Prof. Benny Freeman
Department of Chemical Engineering
University of Texas at Austin, USA

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Previous conferences in this series

Advanced Membrane Technology
October 14-19, 2001
Barga, Italy
Conference Chairs:
Dr. Norman N. Li, NL Chemical Technology, Inc., USA
Prof. Enrico Drioli, University of Calabria, Italy
Prof. William J. Koros, University of Texas, Austin, USA

Advanced Membrane Technology II
May 23-28, 2004
Irsee, Germany
Conference Chair:
Dr. Norman N. Li, NL Chemical Technology, Inc., USA

Advanced Membrane Technology III
June 11-15, 2006
Cetraro (Calabria), Italy
Conference Chairs:
Dr. Norman N. Li, NL Chemical Technology, Inc., USA
Prof. Enrico Drioli, University of Calabria, Italy

Advanced Membrane Technology IV
June 7-12, 2009
Trondheim, Norway
Conference Chair:
Prof. May-Britt Hagg Norwegian University of Science & Technology, Norway

Advanced Membrane Technology V
Singapore
Conference Chairs:
Dr. Tony Fane, Singapore Membrane Technology Centre
Dr. Rong Way, Singapore Membrane Technology Centre
Conference Sponsors

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The conference gratefully acknowledges support from the U.S. National Science Foundation and Kentucky's National Science Foundation Experimental Program to Stimulate Competitive Research.
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Shakespeare and Co. Café Restaurant, Patisserie, Chocolates and Catering

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Sunday, February 8, 2015

16:30 – 18:00  Conference check-in

18:00 – 18:30  Introductions
   Conference Chairs (D. Bhattacharyya and Benny Freeman)
   ECI Liaison (Norman Li)

18:30 – 19:30  Plenary Speaker
   **New developments in understanding ion transport in an electric field**
   Mathias Wessling, University of Aachen, Germany

20:00 – 21:30  Dinner

**Notes**

- All technical sessions will be in Archimedes Hall. Poster sessions will be in Archimedes and the foyer.
- All meals will be in the Nesos Restaurant.
- Audiotaping, videotaping and photography of presentations are prohibited.
- Speakers – Please have your presentation loaded onto the conference computer prior to the session start (preferably the day before).
- Speakers – Please leave at least 3-5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- Turn your mobile telephones to vibrate or off during technical sessions.
- Please write your name on your program so that it can be returned to you if lost or misplaced.
- After the conference, ECI will send an updated participant list to all participants. Please check your listing now and if it needs updating, you may correct it at any time by logging into your ECI account.
Session 1: Membranes for CO₂ Capture and Energy-Related Separations

Chairs: Ingo Pinnau, Advanced Membranes and Porous Materials Center, KAUST, Saudi Arabia
       Giulio C. Sarti, University of Bologna, Italy

08:30 – 08:55  CO₂ capture in H₂ production by polymeric membranes
Ikuo Taniguchi, Kyushu University, Japan

08:55 – 09:20  Novel membrane absorption-based processes for CO₂ capture
Kamalesh K. Sirkar, New Jersey Institute of Technology, USA

09:20 – 09:45  New membranes for CO₂ separation/capture and water purification
Winston Ho, The Ohio State University, USA

09:45 – 10:10  CO₂-induced plasticization effect in graphene oxide membranes
Ho Bum Park, Hanyang University, South Korea

10:10 – 10:40  Coffee Break

10:40 – 11:05  Sod-ZMOF/polyimide mixed-matrix membranes for CO₂/CH₄ separation
Ayse Kilic, Istanbul Technical University, Turkey

11:05 – 11:30  Carbon dioxide capture membranes for artificial photosynthesis
Daniel Miller, Lawrence Berkeley National Laboratory, USA

11:30 – 12:05  Challenges for the integration of membrane separations in energy production processes in Brazil
A. Claudio Habert, Universidade Federal do Rio de Janeiro, Brazil

12:05 – 12:30  The University of Kentucky NIEHS Superfund Research Center: Reducing health impacts of toxic chemicals through nutrition and membrane/capture-based remediation
Bradley Newsome, University of Kentucky, USA

12:30 – 14:00  Lunch

Session 2: Membrane Desalination and High Recovery

Chairs: Norman Li, NL Chemical Co, USA
       Isabel Escobar, The University of Toledo, USA

14:00 – 14:25  Membranes for power plant water reuse: High TDS and toxic metal issues
Dibakar Bhattacharyya, University of Kentucky, USA

14:25 – 14:50  Membrane desalination: Current status and advancements toward reducing energy consumption, mitigating fouling and mineral scaling and increasing recovery
Yoram Cohen, University of California, USA

14:50 – 15:15  Pilot-scale fertiliser driven forward osmosis desalination: Performance, limitations and life cycle assessment
Ho Kyong Shon, University of Technology, Australia

15:15 – 15:45  Coffee Break
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<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>15:45 – 16:10</td>
<td>Nanotechnological application in water desalination: NAWADES</td>
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<td></td>
<td>Alberto Figoli, ITM-CNR, Italy</td>
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<td>16:10 – 16:35</td>
<td>High recovery desalination – Overview of strategies</td>
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<td>Jack Gilron, Ben Gurion University, Israel</td>
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<td>16:35 – 17:00</td>
<td>Novel 2D carbon composites for next generation desalination membranes</td>
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<td>Khaled Mahmoud, Qatar Environment &amp; Energy Research Institute, Qatar</td>
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<td>17:00 – 19:00</td>
<td><em>ad hoc</em> sessions / Free time</td>
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<td>19:00 – 20:30</td>
<td>Dinner</td>
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<td>20:30 – 21:30</td>
<td>Social Hour / Poster Session</td>
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<td>Chairs: Benny Freeman, University of Texas at Austin, USA</td>
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<td>Lidietta Giorno, ITM-CNR, Italy</td>
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Tuesday, February 10, 2015

07:30 – 08:30  
**Breakfast**

**Session 3: Biomimetic, CNT, and Graphene-Based Membrane Advances and Applications**

Chairs: Rosemarie Wesson, National Science Foundation, USA  
A.G.(Tony) Fane, Nanyang Technological University, Singapore  
Uwe Beuscher, W.L. Gore & Associates, Inc., USA

08:30 – 08:55  
**From natural to bioassisted and biomimetic artificial water channel systems**  
Mihail Barboiu, Institut Européen des Membranes, France

08:55 – 09:20  
**A scalable method for producing graphene membranes with nanofiltration properties**  
Mainak Majumder, Monash University, Australia

09:20 – 09:45  
**Synthesis of membranes for artificial photosynthesis**  
Nathaniel A. Lynd, Lawrence Berkeley National Laboratory / UT-Austin, USA

09:45 – 10:10  
**Carbon nanofluidics of fast water transport under graphitic nanoconfinements**  
Hyung Gyu Park, ETH Zurich, Switzerland

10:10 – 10:40  
**Coffee Break**

10:40 – 11:05  
**DNA-based gating membranes and nanodevices**  
Thomas Schäfer, Polymat, University of the Basque Country, Spain

11:05 – 11:30  
**Voltage activated carbon nanotube membranes as biomimetic platforms**  
Bruce Hinds, University of Washington, USA

11:30 – 11:55  
**Mixed matrix membranes containing functionalized carbon nanotubes for water treatment**  
Enrica Fontananova, ITM-CNR, Italy

11:55 – 12:20  
**Nanocarbon–based membranes for high performance environmental applications**  
Timothy Tan, Nanyang Technological University, Singapore

12:30 – 14:00  
**Lunch**

**Session 4: FO, PRO, Membrane Distillation, and Reverse Electrodialysis Advances in Membranes and Systems**

Chairs: Suzana Nunes, King Abdullah University of Science and Technology (KAUST), Saudi Arabia  
Heather L. Jamieson, Arizona State University, USA  
Kamalesh K. Sirkar, New Jersey Institute of Technology, USA

14:00 – 14:25  
**High performance forward osmosis and pressure retarded osmosis membranes - Structures, performance, and future perspectives**  
Chuyang Tang, The University of Hong Kong, Hong Kong

14:25 – 14:50  
**Developing desired hollow fiber membrane for Forward Osmosis (FO), Pressure Retarded Osmosis (PRO) and low pressure Nanofiltration (NF)**  
Lei Shi, Nanyang Technological University, Singapore

14:50 – 15:15  
**Designer water by membranes**  
Torleiv Bilstad (speaker), Remya Nair, University of Stavanger, Norway
Tuesday, February 10, 2015 (continued)

15:15 – 15:40  Synthesis and characterization of high performance thin film composite flat sheet membranes for pressure retarded osmosis
Ye Li, Nanyang Technological University, Singapore

15:40 – 17:05  Coffee Break

17:05 – 17:30  Reverse electrodialysis: Sustainable energy from blue water
Jamie Hestekin, University of Arkansas, USA

17:30 – 17:55  Reverse electrodialysis in energy sustainability applications
Glenn Lipscomb, University of Toledo, USA

17:55 – 18:20  Salinity gradient power from brines through reverse electrodialysis: From laboratory experiments to the first operating prototype in the world
Andrea Cipollina, Università di Palermo, Italy

18:20 – 18:55  Alkaline sulfide solution regeneration utilizing EDU membrane systems
Corby G. Anderson, Colorado School of Mines, USA

19:00 – 20:30  Dinner

20:30 – 21:30  Social Hour / Poster Session
Chairs: Brad Newsome, University of Kentucky, USA
Thomas Schäfer, Polymat, University of the Basque Country, Spain
Wednesday, February 11, 2015

07:30 – 08:30 Breakfast

Session 5: Reduced Fouling Membrane Advances for UF to NF to RO
Chairs: Cristiana Boi, Università di Bologna, Italy
       João G. Crespo, FCT - Universidade Nova de Lisboa, Portugal

08:30 – 09:10 Plenary Speaker
A fifth fundamental rule for protein-repulsive surfaces or membranes
Georges Belfort, Rensselaer Polytechnic Institute, USA

09:10 – 09:35 Biofouling resistant membranes made of green silver nanoparticles
Isabel Escobar, The University of Toledo, USA

09:35 – 10:00 Non-invasive monitoring of membrane processes using fluorescence spectroscopy
João G. Crespo, FCT - Universidade Nova de Lisboa, Portugal

10:00 – 10:25 Self-assembled zwitterionic copolymers as selective layers for high flux, fouling-resistant, size-selective membranes
Ayse Asatekin, Tufts University, USA

10:25 – 10:55 Coffee Break

10:55 – 11:20 Advanced coating materials for fouling resistant water purification membranes
Young-Hye Na, IBM Almaden Research Center, USA

11:20 – 11:45 Surface modification of RO membranes with hydrogels for fouling reduction
Jochen Meier-Haack, Leibniz-Institut für Polymerforschung Dresden e.V., Germany

11:45 – 12:10 Threshold flux: A more useful concept than critical flux
Robert Field, Oxford University, UK

12:30 – 13:30 Lunch

13:45 Buses depart for optional excursion to Siracusa

Excursion Itinerary
15:00 Arrival at the archeological park of the Neapolis where we can see the monolithic Greek Theatre (its cavea is one of the largest ever built by the ancient Greeks and still in use today for classical representations), the sacrificial Altar of Hieron II, the Ear of Dionysius (an artificial limestone quarry named by the painter Caravaggio) and the Roman Amphitheatre.

16:30 Continue on to the island of Ortigia to see the temple of Apollo, the oldest Doric style temple built in Sicily, The tour ends at the fresh water spring of Aretusa where the papyrus still grows abundantly.

18:00 Optional coffee stop in the scenic Piazza Duomo of Ortigia

Leisure time, dinner on your own

21:00 Transfer back to the hotel – leave time to walk back to bus parking area
Thursday, February 12, 2015

07:30 – 08:30  Breakfast

Session 6: Responsive/Tunable to Engineered Membranes
Chairs: Ayse Asatekin, Tufts University, USA
       Mihail Barboiu, Institut Europeen des Membranes, France

08:30 – 08:55  Responsive membranes for tailored separations
Ranil Wickramasinghe, University of Arkansas, USA

08:55 – 09:20  Engineered membrane roughness: The potential of patterns
John Pellegrino, University of Colorado, USA

09:20 – 09:45  Supported thin-film hydrophilic nanocomposites for reverse osmosis membranes
Heather L. Jamieson, Arizona State University, USA

09:45 – 10:10  Synthesis of new semi-crystalline block co-polymer membranes for artificial photosynthesis
Christina G. Rodriguez, Lawrence Berkeley National Lab, USA

10:10 – 10:40  Coffee Break

10:40 – 11:05  Biofunctionalized responsive membranes
Lidietta Giorno, ITM-CNR, Italy

11:05 – 11:30  Super-hydro-tunable membranes for advanced separations and processing of biofuels
Michael Hu, Oak Ridge National Laboratory, USA

12:00 – 13:30  Lunch

Session 7: New Membrane Approaches to Challenging Applications and Industrial Perspectives
Chairs: Jamie Hestekin, University of Arkansas, USA
       Chuanfang Yang, Institute of Process Engineering, CAS, China

13:30 – 13:55  Taking advantage of N-Heterocyclic polymers for membrane application
Suzana Nunes, King Abdullah University of Science and Technology (KAUST), Saudi Arabia

13:55 – 14:20  Emerging markets: Small scale renewable energy powered membrane filtration for removal of dissolved contaminants from water
Andrea Schaefer, KIT, Germany

14:20 – 14:45  Better membrane chromatography requires more monodisperse pores
Chuanfang Yang, Institute of Process Engineering, CAS, China

14:45 – 15:10  Application of microporous fluoropolymeric membranes for challenging separations
Uwe Beuscher, W.L. Gore & Associates, Inc., USA

15:10 – 15:40  Coffee Break

15:40 – 16:05  New approach for scientific research on RO membrane
Masahiro Kimura, Toray Industries, Inc., Japan

16:05 – 16:30  Advanced nanofiltration and functionalized membranes for difficult to treat process separations
Ilan Wilf, Ultura Water Inc., USA
Thursday, February 12, 2015 (continued)

16:30 – 16:55  Preparation and purification of autologous plasmin with affinity membranes
Cristiana Boi, Università di Bologna, Italy

16:55 – 17:20  A new Membrane-Aerated Biofilm Reactor (MABR) for wastewater treatment
Geert Henk Koops, GE Water & Process Technologies, Canada

17:20 – 17:35  Stretch Break

Session 8: Membrane Simulations/Characterizations to Batteries and Fuel Cells
Chairs: Andrea Cipollina, Università di Palermo, Italy
       John Pellegrino, University of Colorado, USA

17:35 – 18:00  Investigating antifouling mechanisms of zwitterionic materials from molecular
               dynamics simulations
Xianghong Qian, University of Arkansas, USA

18:00 – 18:25  Polymeric membranes for water treatments: An atomistic simulation
Elena Tocci, Research Institute on Membrane Technology (ITM-CNR), Italy

18:25 – 18:50  Where are we in predicting gas solubility and permeability in glassy polymeric
               membranes?
Giulio C. Sarti, University of Bologna, Italy

18:50 – 19:15  An introduction to single ion conducting polymer electrolytes for Li-ion batteries
Bryan D. McCloskey, UC, Berkeley and LBNL, USA

20:00  Conference Banquet
Friday, February 13, 2015

07:30 – 08:30  Breakfast

Plenary Session
Chairs: D. Bhattacharyya, University of Kentucky, USA
      Benny Freeman, The University of Texas at Austin, USA

08:30 – 09:15  Bioinspired membrane engineering for water applications
A.G.(Tony) Fane, Nanyang Technological University, Singapore

09:15 – 10:00  Advanced membranes for molecular separations in organic solvents
Andrew Livingston, Imperial College, United Kingdom

10:00 – 10:45  Advances and research needs in graphene-based membrane science and engineering
Rosemarie Wesson, National Science Foundation, USA

10:45 – 11:15  Coffee Break

11:15 – 12:00  Ion sorption and transport in crosslinked polyelectrolyte membranes
Donald R. Paul/Benny Freeman, University of Texas at Austin, USA

12:00 – 12:45  New membrane operations for redesign of process engineering
Enrico Drioli, ITM–CNR, c/o University of Calabria, Rende, Italy

13:00  Lunch and Departure
Poster Presentations List

1. **Rubbery organic frameworks-ROFs-Tuning the gas-diffusion through dynameric membranes**  
   Mihail Barboiu, Institut Europeen des Membranes, France

2. **Metal-Organic Framework – based porous matrix membranes for improving mass transfer in forward osmosis membranes**  
   Jian-Yuan Lee, Nanyang Technological University, Singapore

3. **Performance study of pervaporation in a microfluidic system for the removal of acetone from water**  
   Yali Zhang, University of Twente, Netherlands

4. **Smart water from produced water using nanofiltration and ion exchange**  
   Torleiv Bilstad, University of Stavanger, Norway

5. **An alternative CO\textsubscript{2} capture by electrodialysis**  
   Ikuo Taniguchi, Kyushu University, Japan

6. **Development of Peek-WC/MWCNTS mixed matrix membranes**  
   Enrica Fontananova, ITM-CNR, Italy

7. **Spongy and responsive PVDF-based membranes for water related applications**  
   Douglas M. Davenport, University of Kentucky, USA

8. **Spongy and responsive PVDF-based membranes for water related applications**  
   Douglas M. Davenport, University of Kentucky, USA

9. **Preparation and characterization of functional polyamide RO membrane via spin assisted layer by layer assembly of polyelectrolytes**  
   Isam Aljundi, King Fahd University of Petroleum and Minerals, Saudi Arabia

10. **Microbial method of converting CO\textsubscript{2} into methane at low energy consumption using membranes for introducing hydrogen into a microbial reactor**  
    Gossaye Tirunehe, Southern Denmark University, Denmark

11. **Enhancement of syngas biomethanation by high cell loading in a reverse membrane bioreactor (RMBR)**  
    Konstantinos Chandolias, Borås University, Sweden

12. **Carbon nanotube blended nanofibers for forward osmosis membranes**  
    Evrim Celik, SDU, Turkey
13. An integrated membrane process for oily wastewater treatment, water reuse and valuable by-products recovery
   Renata Tomczak-Wandzel, Aquateam COWI AS, Norway

14. Evaluation of ferrate (K2FEO4) as a coagulant/coagulant aid to reduce ultrafiltration membrane fouling in drinking water treatment
   Wenzheng Yu, Imperial College London, United Kingdom

15. Polymer-in-ceramic lithium-ion-conducting membranes
   Diana Golodnitsky, Tel Aviv University, Israel

16. Acoustics and vibration analysis of carbon fiber reinforced membrane
   Taejin Shin, Inha University, South Korea

17. Development of solid polymer electrolyte composite hollow fiber membrane for olefin/paraffin gas separation
   Joohwan Lim, Airrane, South Korea

18. Model for predicting ion sorption and transport in ion-exchange membranes
   Jovan Kamcev, The University of Texas at Austin, USA

19.

20. Micropollutant removal by carbon nanotube membranes
   Hyung Gyu Park, ETH Zurich, Switzerland

21. Discovery of novel anti-fouling membranes via combinatorial chemistry and a unique high throughput system
   Joseph Imbrogno, Rensselaer Polytechnic Institute, USA

22. Synthesis of ion exchange membranes and their application to MCDI
   Ji Seon Kim, Hannam University, South Korea

23. Separation characteristics using multi-layer hollow fiber nanofiltration membranes for ultra-low pressure
   Su Yeon Kang, Hannam University, South Korea

24. Facilitated transport separation of CO2 using aminated polysulfone membranes
   Ka Young Kim, Hannam University, South Korea

25. Development of hollow fiber membrane with high power density for pressure retarded osmosis (PRO)
   Yunfeng Chen, Nanyang Technological University, Singapore

26. Nanofiltration membrane characterization for the separation of oligosaccharides mixtures: an experimental study
   Valentina Morelli, DICAM, University of Bologna, Italy

27. Modeling partitioning and transport phenomena in nanofiltration of oligosaccharides solutions: a critical assessment
   Valentina Morelli, DICAM, University of Bologna, Italy

28. Synthesis of new semi-crystalline block co-polymer membranes for artificial photosynthesis
   Christina G. Rodriguez, Lawrence Berkeley National Lab, USA
29. Molecular separation by nanometer-thick membranes  
Shigenori Fujikawa, Kyushu University, Japan

30. Preparation and purification of autologous plasmin with affinity membranes  
Cristiana Boi, Università di Bologna, Italy

31. Preparation of bi-polar membranes and their application to hypochlorite production  
Se Hwan Kwon, Hannam University, South Korea

32. Surface-aminated cnt mesh for efficient CO\textsubscript{2} capture  
Mengmeng Deng, ETH Zürich, Switzerland

33. Modeling antisolvent membrane crystallization  
Federico Milella, ETH Zürich, Switzerland

34. Multi-module membrane configurations for gas separation  
Paolo Gabrielli, ETH Zürich, Switzerland

35. Low-fouling hydrogel-coated UF membranes for wastewater treatment with MBR  
Eli Asa, Water Institute Midreshet Ben Gurion, Israel

36. Block copolymer membranes based on polymerized ionic liquids for artificial photosynthesis  
Gabriel E. Sanoja, University of California, Berkeley, USA

37. The University of Kentucky NIEHS Superfund Research Center: Reducing health impacts of toxic chemicals through nutrition and membrane/capture-based remediation  
Bradley Newsome, University of Kentucky, USA

38. Effect of intrinsic surface roughness on colloidal fouling of reverse osmosis membrane  
Zhiwei Jiang, Imperial College London, United Kingdom

39. Molecular simulations of carbon nanotube membranes for reverse osmosis application  
Elena Tocci, Institute on Membrane Technology (ITM-CNR), Italy