

Program
**Advanced Membrane
Technology II**

May 23-28, 2004

Kloster Irsee/Swabian Conference Center
Klosterring 4
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Conference Chair

Dr. Norman N. Li
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ECI

ENGINEERING CONFERENCES INTERNATIONAL, INC.

Successor Program to United Engineering Foundation Conferences
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The conference chairs and organizers would like to thank the following for their generous support of this conference:

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Program

	Morning	Afternoon 5:00-6:00 p.m. Registration	Evening 6:00 p.m. <i>Concert, Dinner & Reception</i>
Sunday			
Monday May 24	8:30 – 12:30 Opening Remarks Session 1: (6 papers) Membrane Applications in Water Treatment (Pellegrino, Hagmeyer, Miller)	Optional Excursion 1 Kaufbeuren	5:00 - 7:30 Session 2 (5) Membrane Manufacturing and System Design (Allegrezza, Blume)
Tuesday May 25	8:30 – 12:30 Session 3: (7) Solvent Resistant Membranes and Applications (Bhattacharyya, Peinemann, Sirkar)	Optional Excursion 2 Ottobeuren	5:00 – 7:30 Session 4: (5) Integrated Membrane Separation Processes (Eric Lee, Drioli, Aimar) ----- <i>Poster Paper Session A</i> <i>(Lipscomb, Wickramasinghe, Kuehne)</i> <i>(1 hour for presenters to present)</i>
Wed May 26	8:30 – 12:30 Session 5: (7) Membrane Applications for Gas Separations (Koros, M. Lee)	Open	5:00 – 7:30 Session 6: (5) Membrane for Fuel Cells and Energy-Related Applications (Kulprathipanja, Noble) ----- <i>Poster Paper Session B</i> <i>(Lipscomb, Wickramasinghe, Kuehne)</i> <i>(1 hour for presenters to present).</i> Attendees vote for top 3 papers
Thursday May 27	8:30 – 12:30 Session 7: (6) Membrane Applications in Food, Life Science and Pharmaceutical Industries (I) (Abhinava, Huang, Goto)	Ad hoc Session 2:00 --4:00 p.m. <i>“My World with Membranes”</i> (Li, Strathmann)	5:00 – 7:00 Session 8: (4) Membrane Applications in Food, Life Science and Pharmaceutical Industries (II) (Higuchi, Cui, Bhattacharyya) ----- Banquet
Friday May 28	8: 15 – 12:00 Session 9: Plenary(8) Future Directions and Strategic Issues (Koros, Cote, Li)	1:20 – 3:30 p.m. Session 9 (cont): Closing Remarks. Conference ends at 3:30 p.m.	

Sunday, 23 May 2004

17:00 – 18:00	Registration
18:00 – 19:30	Organ Concert
19:30 – 21:00	Dinner
21:00 – 22:00	Opening Reception (Bierstube)

NOTES

- **Please observe “No Smoking” at ECI technical sessions, meals and social hours.**
- **Speakers should allow time at the end of their presentation for questions and discussion.**
- **Please silence cell phones at all technical sessions.**
- **Poster sessions: Please be prepared to be by your poster for an hour for each of the poster sessions so that you can answer questions.**
- **On Tuesday afternoon we will have an optional excursion to Otto-beuren. We will provide boxed lunches for those going on the excursion.**

The star attraction of the Lower Allgäu is the small health resort of **OTTOBEUREN**, or more specifically the **Reichsabtei**, which stands on a gentle incline above the rest of the village. This still-functioning Benedictine abbey founded in 764 is one of the most imposing and grandiose monasteries north of the Alps. Its patron Charlemagne gave the abbot important rights, elevating him to the status of a prince of the Holy Roman Empire.

Architecturally the abbey has undergone many changes since its foundation. The present Baroque Basilica was created, after several false starts by other architects, by the Munich master Johann Michael Fischer in the eighteenth century. It is huge. Physical details such as the 90-metre nave and 60-metre transept hardly convey the bombastic impression you get on entering. The wealth of altars, frescoes, paintings and stuccoed embellishments needs time to be appreciated fully, and yet there's nothing busy about the whole effect. Among the many treasures, a twelfth-century Romanesque *Crucifixion* is the most precious, but also special are the elaborate choir stalls and the three organs, considered among the most beautiful instruments in the world.

Monday, 24 May 2004

- 07:30 – 08:30 Breakfast
- 08:30 – 09:00 Welcome
Norman Li, Conference Chair
Herman Bieber, ECI Technical Liaison
- 09:00 – 12:30 **Session I: Membrane Applications in Water Treatment**
Session Co-Chairs:
John Pellegrino, University of Colorado, USA;
Georg Hagemeyer, Zenon Environmental, Canada;
Mark C. Miller, Naval Facilities Engineering Command, USA
- 09:00 – 09:30 High Efficiency Seawater Separations Using Alternate Plant Designs and New High Performance Seawater Elements (EUWP Phase 1)
William Mickols, Dow/FilmTec , USA
- 09:30 – 10:00 Our Experience on the Effectiveness of Ultrafiltration as a Pretreatment to RO Desalination for Tropical Seawaters
G.Venkidachalam, Hyflux Ltd, Singapore
- 10:00 – 10:30 The Quest for Low Fouling Membranes – Surface Nano – Structuring with Polymers
Yoram Cohen, University of California, Los Angeles, CA, USA
- 10:30 – 11:00 Coffee Break
- 11:00 – 11:30 Novel Hollow Fiber Membrane and Device for Membrane Distillation of Saline Water
Kamalesh K. Sirkar, New Jersey Institute of Technology, USA
- 11:30 – 12:00 Sulfonamide Membranes for Acid Processing
CJ Kurth, GE Osmonics , USA
- 12:00 – 12:30 Dechlorination of Toxic Organics from Water by Membrane-Based Metal Nanoparticles
D. Bhattacharyya, University of Kentucky, USA
- 12:30 – 14:00 Lunch
- 14:00 – 16:30 *ad hoc* sessions/discussion/free time for those interested in visiting nearby town of Kaufbeuren
- 16:30 – 17:00 Afternoon Coffee

Monday, 24 May 2004

- 17:00 – 19:30 **Session II: Membrane Manufacturing and System Design**
Session Co-Chairs: Anthony Allegrezza, Millipore;
Ingo Blume, X-Flow B.V. The Netherlands
- 17:00 – 17:30 Industrial Production of Air-Cast Membranes
Volkmar Thom, Sartorius AG, Germany
- 17:30 – 18:00 Four Generations of Microporous Membranes - Challenges in
Design and Manufacturing Control to Deliver Enhanced
Performance
Gabriel Tkacik, Millipore Corporation, USA
- 18:00 – 18:30 Large Scale Production of Membranes for Medical Applications
Bernd Krause, Gambro Dialysatoren GmbH & Co. KG, Germany
- 18:30 – 19:00 Modern RO and NF Manufacturing as a Semi Continuous Process
William Mickols, Dow/FilmTec, USA
- 19:00 – 19:30 Microfabrication of Membranes, from Sheet to Hollow Fiber
G. H. Koops, University of Twente, The Netherlands
- 19:30 – 21:00 Dinner
- 21:00 – 22:00 Social Hour (Bierstube)

Tuesday, 25 May 2004

- 07:30 – 08:30 Breakfast
- 08:30 – 12:30 **Session III: Solvent Resistant Membranes and Applications**
Session Co-Chairs:
D. Bhattacharyya, University of Kentucky, USA;
K. V. Peinemann, GKSS, Germany;
Kamalesh K. Sirkar, New Jersey Inst. of Technology, USA
- 08:30 – 09:00 Organic Solvent Nanofiltration in Chemical and Pharmaceutical Manufacture: Fundamentals and Applications
Darrell A. Patterson, Department of Chemical Engineering and Chemical Technology, UK
- 09:00 – 09:30 Designing Solution-Diffusion Membranes for Solvent-Based Separations (Part A)
Neil Moe, GE Osmonics, USA
- 09:30 – 10:00 Solvent Resistant Membranes for Pharmaceutical Separations: Permeation, Rejection, and Modeling Results for Diverse Solvent Types and Membrane Materials (Part B)
Steve Kloos, GE Osmonics, USA
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:00 Solvent Resistant Nanofiltration: A Physico-Chemical Interpretation of the Transport Mechanism
Ivo F.J. Vankelecom, K.U.Leuven - F.L.T.B.W. - C.O.K, France.
- 11:00 – 11:30 Fundamental and Application Studies with Hydrophobic Solvent Resistant Membranes
Klaus Ohlrogge and Katrin Ebert, GKSS Research Centre Geesthacht GmbH, Germany
- 11:30 – 12:00 Separation by Pervaporation of Methanol from Tertiary Amyl Methyl Ether Using a Polymeric Membrane
Percy van der Gryp, Skool vir Chemiese en Mineraal Ingenieurswese, South Africa
- 12:00 – 12:30 Influence of Membrane Orientation on the Pervaporation Performance of Ceramic Membrane
Sanette Marx, North-West University, South Africa
- 12:30 – 14:00 Lunch
- 14:00 – 16:30 *ad hoc* sessions/discussion/free time/Optional excursion to Ottobeuren

Tuesday, 25 May 2004

- 16:30 – 17:00 Afternoon Coffee
- 17:00 – 19:30 **Session IV: Integrated Membrane Separation Processes**
Session Co-Chairs:
Eric Lee, Integrated Biosystems, USA;
Enrico Drioli, University of Calabria, Italy;
Pierre Aimar, Laboratoire de Genie Chimique, France
- 17:00 – 17:30 Highly Selective Gas Separation Membranes Derived from a Polymer of Intrinsic Microporosity (PIM) for Integrated Processes
Detlev Fritsch, GKSS Forschungszentrum GmbH, Neil BH., Germany, McKeown, Cardiff University, Peter M. Budd, and Kadhum J. Msayib, Manchester University, UK
- 17:30 – 18:00 NORIT Ultrafiltration as Pre-treatment to RO for Wastewater Reuse: The Sulaibiya Project
I. Blume, and S. C. J. M. van Hoof, NORIT X-Flow B.V. and NORIT Membrane Technology B.V. The Netherlands
- 18:00 – 18:30 A Membrane Photoreactor for the Decontamination of Turbid Effluents
Pierre Aimar, Laboratoire de Genie Chimique, France
- 18:30 – 19:00 Virus Capture by Adsorptive Membranes
Ranil Wickramasinghe, Colorado State University, USA
- 19:00 – 19:30 Ion Exchange and Affinity Chromatography on Sartobind Membrane Adsorbers
Wolfgang Demmer Ph. D., Sartorius AG, Germany
- 19:30 – 21:00 Dinner
- 21:00 – 22:00 Poster Session / Social Hour
Session Co-Chairs:
Glenn Lipscomb, University of Toledo, USA
Ranil Wickramasinghe, Colorado State University, USA
Mark A. Kuehne, NL Chemical Technology Inc. USA

Wednesday, 26 May 2004

- 07:30 – 08:30 Breakfast
- 08:30 – 12:30 **Session V: Membrane Applications for Gas Separations**
Session Co-Chairs:
William Koros, Georgia Institute of Technology, USA;
Young Moo Lee, Hanyang University, Korea
- 08:30 – 09:00 Sapo-34 Membranes for CO₂/CH₄ Separations
Richard D. Noble, University of Colorado, USA
- 09:00 – 09:30 Gas Separation by Hollow Fiber Ultrafiltration Membrane Module
with Permeation of Carrier Solution
Masaaki Teramoto, Kyoto Institute of Technology, Japan
- 09:30 – 10:00 Carbonized Membranes for High Performance Gas Separation
Young Moo Lee, Hanyang University, Korea
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:00 Dendrimer Induced Cross-Linking Modification of Polyimide
Membranes
Tai-Shung Chung, Department of Chemical & Biomolecular
Engineering, Singapore
- 11:00 – 11:30 Membrane Cascade Schemes for Olefin-Paraffin Separation
Sotiris P. Kaldis, Dept of Chemical Engineering, Aristotle University
of Thessaloniki, Greece
- 11:30 – 12:00 Gas Separation in Harsh Environments: Reflections on
Plasticization
G. H. Koops, University of Twente, The Netherlands
- 12:00 – 12:30 Silmethylene Homo-polymers and Random Copolymers: Novel
Materials for Separation of Hydrocarbons in Natural Gas
Yuri Yampolskii, Institute of Petrochemical Synthesis
- 12:30 – 14:00 Lunch

Wednesday, 26 May 2004

- 17:00 – 19:30 **Session VI: Membrane for Fuel Cells and Energy-Related Applications**
Session Co-Chairs:
Santi Kulprathipanja, UOP, USA;
Richard D. Noble, University of Colorado, USA
- 17:00 – 17:30 Acrylic Acid-Treated Bacterial Cellulose Cation-Exchange Membrane
Seung-Hyeon Moon, Yong-Jin Choi, Yeonghee Ahn, Kwangju Institute of Science and Technology, and Hong-Ki Jun, Pusan National University, Korea
- 17:30 – 18:00 High Proton Conductivity Sulfonated Polyarylenethioethersulfones as Pem for Fuel Cells
Zongwu Bai, University of Dayton Research Institute, Michael Durstock, and Thuy D. Dang, AFRL/MLBP, USA
- 18:00 – 18:30 New Composite Membranes for DMFC
V.M. Linkov, G. Vaivars, B. Bladergroen, Ji. Shang, South Africa Institute for Advanced Materials Chemistry, and G. Gericke, Eskom, TSA, South Africa
- 18:30 – 19:00 Development of Hydrothermally Stable Sol-Gel Derived Gamma-Al₂O₃ Based Composite Mesoporous Membrane
Md. Hasan Zahir, Japan Fine Ceramics Center, Hydrogen Separation Membrane Project Division, Japan
- 19:00 – 19:30 Highly Sulfonated Polyarylenethioethersulfones for Fuel Cells Applications
Thuy D. Dang, AFRL/MLBP, Zongwu Bai, University of Dayton Research Institute, Michael Durstock AFRL/MLBP, and Eric Fossum, Wright State University, USA
- 19:30 – 21:00 Dinner
- 21:00 – 22:00 Poster Session / Social Hour
Session Co-Chairs:
Glenn Lipscomb, University of Toledo, USA
Ranil Wickramasinghe, Colorado State University, USA
Mark A. Kuehne, NL Chemical Technology Inc. USA

Thursday, 27 May 2004

- 07:30 – 08:30 Breakfast
- 08:30 – 12:30 **Session VII: Membrane Applications in Food, Life Science
and Pharmaceutical Industries (I)**
Session Co-Chairs:
Kumar Abhinava, Eli Lilly & Co., USA
Pingyu Huang, Protein Design Labs, USA
Masahiro Goto, Kyushu University, Japan
- 08:30 – 09:00 Membrane Based Applications in Food and the Membranes
Needed for Further Development
Jamie A. Hestekin, Kraft Foods, USA
- 09:00 – 09:30 Membrane Applications in the Development of Humanized
Antibody Manufacturing Processes
Ping Yu Huang, Protein Design Labs, Inc. Process Sciences and
Engineering Department, USA
- 09:30 – 10:00 Enzyme-Facilitated Optical Resolution of (S)-Ibuprofen through a
Supported Liquid Membrane Based on Ionic Liquids
Masahiro Goto, Kyushu University, Japan
- 10:00 – 10:30 Coffee Break
- 10:30 – 11:00 Solvent-Resistant Nanofiltration with Filled PDMS Membranes
Lieven E.M. Gevers, K.U.Leuven - F.L.T.B.W. - C.O.K., Belgium
- 11:00 – 11:30 The Diversity of Microporous Membranes
Anthony Allegrezza, Millipore Corporation, USA
- 11:30 – 12:00 Experimental Observations of Nanofiltration with Binary Mixtures
of Water, Methanol and Ethanol
Carlo Vandecasteele, Jeroen Geens, Koen Peeters, and Bart Van
der Bruggen, Katholieke Universiteit Leuven, Belgium
- 12:00 – 12:30 Discussion
- 12:30 – 14:00 Lunch

Thursday, 27 May 2004

14:00 – 16:00

ad hoc session: “*My Life with Membranes*”

Session Co-Chairs:

Norman Li, NL Chemical Technology

Heiner Strathmann, University of Stuttgart, Germany

Speakers:

Heiner Strathmann

Tony Fane

Takeshi Matsuura

Georges Belfort

Sidney Loeb

Kamalesh Sirkar

16:00 – 16:30

Afternoon Coffee

Thursday, 27 May 2004

- 17:00-19:00 **Session VIII: Membrane Applications in Food, Life Science and Pharmaceutical Industries (II)**
Session Co-Chairs:
Akon Higuchi, Seikei University, Japan;
Z. F. Cui, Oxford University, UK;
D. Bhattacharyya, University of Kentucky, USA
- 17:00 – 17:30 Substrate-Induced Protein Unfolding at Synthetic Membrane Interfaces
Georges Belfort, Rensselaer Polytechnic Institute, USA
- 17:30 – 18:00 Cell Separation from Peripheral Blood through Surface-Modified Polyurethane Membranes
Akon Higuchi, Department of Applied Chemistry, Seikei University, Japan
- 18:00 – 18:30 Membrane Processes in Specialty and Pharmaceutical Industries – Applications and Challenges
Kumar Abhinava, Eli Lilly and Co., USA
- 18:30 – 19:00 Special paper
Advances of Commercial Membranes and Membrane Processes in Japan
Masaru Kurihara, Toray Co., Japan
- 20:00 – 22:00 Conference Banquet
- 22:00 – 23:00 Social Hour (Bierstube)

Friday, 28 May 2004

- 07:30 – 08: 15 Breakfast
- 08:15 –15:30 **Session IX: Plenary Talks – “Future Directions and Strategic Issues”**
- 08:15 – 08:20 Introduction
- Session IX-A Chair:
 Heiner Strathmann, University of Stuttgart, Germany
- 08:20 – 09:00 The Application of Six Sigma in Membrane Technology
 Norman N. Li, NL Chemical Technology, Inc. USA
- 09:00 – 09:40 Membranes for Fuel Cells and Batteries: Recent Developments
 and Future Outlook
 Peter N. Pintauro, Case Western Reserve University, USA
- Session IX-B Chair:
 William J. Koros, Georgia Institute of Technology, USA
- 09:40 – 10:20 Development of Membrane Gas Separation Processes
 Richard W. Baker, Membrane Technology and Research, Inc. USA
- 10:20 – 10: 40 Coffee Break
- 10:40 – 11:20 Membrane Applications in Tissue Engineering
 Z. F. Cui, Oxford University, UK
- Session IX-C: Chair:
 Pierre Cote, Zenon Environmental, Inc. Canada
- 11:20 – 12:00 Catalytic Membranes Reactors for Low Environmental Impact
 Processes
 Enrico Drioli, University of Calabria, Italy
- 12:00 – 13:20 Check out and Lunch
- 13:20 – 14:00 Membranes in the Water Cycle-Achievements and Challenges
 Tony Fane, Nanyang Technological University, Singapore
- Session IX-D Chair:
 Norman N. Li, NL Chemical Technology, Inc., USA
- 14:00 – 14:40 Anti-Fouling Membranes – Present Activities and Future Directions
 Takeshi Matsuura, University of Ottawa, Canada

Friday, 28 May 2004

- 14:40 – 15:20 What Will Take for Membranes to Replace Conventional
Wastewater Treatment Technologies?
Pierre Cote, Zenon Environmental, Inc. Canada
- 15:20 – 15:30 Conference Closing Remarks: Dr. Norman N. Li

Poster Presentations
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Poster Paper Session A & B:

Co-Chairs:

Glenn Lipscomb, University of Toledo, USA

Ranil Wickramasinghe, Colorado State University, USA

Mark A. Kuehne, NL Chemical Technology Inc. USA

Poster Session Papers

Underlined author is the presenting author

1. Volkmar Thom, Sartorius AG; Industrial Production of Air-Cast Membranes
2. Wolfgang Demmer; Sartorius AG; Ion Exchange and Affinity Chromatography on Sartobind Membrane Adsorbers
3. Ranil Wickramasinghe; Colorado State University; Adsorptive Membranes for Virus Clearance
4. Ranil Wickramasinghe; Colorado State University; Enveloped and Non-enveloped Virus Clearance by Flocculation Prior to Microfiltration
5. Jeong-Hoon Kim, In-Jun Park, and Soo-Bok Lee; Korea Research Institute of Chemical Technology; Polyethersulfone Hollow Fiber Membranes for Flue Gas Separation
6. Jeong-Pil Shin, Jeong-Hoon Kim, In-Jun Park, Soo-Bok Lee, and Dong-Hak Seo; Korea Research Institute of Chemical Technology and Hanyang University; Sulfonated Polystyrene-Divinyl benzene/PTFE Composite Membranes
7. Peter Budd, Neil McKeown, and Detlev Fritsch; Manchester University and GKSS; Polymers Of Intrinsic Microporosity: A New Type of Polymer for Membrane Separations
8. Peter Budd, Jalal Jafar, Nagila Ricardo, and Ron Hughes; Manchester University, Federal University of Ceara, and University of Salford; Zeolite/Polyelectrolyte Multilayer Pervaporation Membranes
9. Darrell A. Patterson, Shejiao Han, Ludmila Peeva, Emma Gibbins, and Andrew G. Livingston; Imperial College London; Organic Solvent Nanofiltration in Chemical and Pharmaceutical Manufacture: Fundamentals and Applications
10. Jamie Hestekin, Colin Crowley, and Erik Whalen-Pedersen; Kraft Foods; Membrane Based Applications in Food and the Membranes Needed for Further Development
11. Hanhui Zhan; Zhuzhou Institute of Technology; Experiment of Dean Vortex Intensified Mass Transfer for Woven Hollow Fiber Membrane Separating Clay Suspension
12. Pei Shi Tin, Tai-Shung Chung, Ying Dai, and Michael D. Guiver; National University of Singapore and Institute for Chemical Process and Environmental Technology (ICPET); New Approaches to Fabricate Carbon Molecular Sieve Membranes from Polyimides

13. Wei Fen Guo, Tai-Shung Chung, and Takeshi Matsuura; National University of Singapore and University of Ottawa; Pervaporation Study on the Dehydration of Aqueous Butanol Solutions: A Comparison of Flux vs. Permeance, Separation Factor vs. Selectivity
14. Catherine Charcosset and Jean-Claude Bernengo; LAGEP and Centre Commun de Quantimétrie; Characterization of Microporous Membranes by Confocal Microscopy
15. Catherine Charcosset, Imène Limayem, and Hatem Fessi; LAGEP; Purification of Nanoparticles for Drug Delivery Systems
16. Zongwu Bai, Michael Durstock, and Thuy D. Dang; University of Dayton Research Institute and AFRL/MLBP; High Proton Conductivity Sulfonated Polyarylenethioethersulfones as PEM for Fuel Cells
17. Neil Moe, Joe Keute, Steve Kloos, and Leonard Hodgins; GE Osmonics; Designing Solution-Diffusion Membranes for Solvent-Based Separations
18. A. G. Fane, J. H. Tay, and F. S. Wong; Nanyang Technological University; Membrane Technology for Sustainable Water - A Research Programme for Singapore
19. Masahiro Goto, Eijirou Miyako, and Tatsuo Maruyama; Kyushu University; Enzyme-Facilitated Optical Resolution of (S)-Ibuprofen Through a Supported Liquid Membrane Based on Ionic Liquids
20. Young Moo Lee; Hanyang University; ICOM 2005
21. Yong Zou, Yaqin Huang, Aihua He, and Yuzheng Xia; Beijing University of Chemical Technology and Chinese Academy of Sciences; Effect of Gelatin Molecular Weight on the Property of Gelatin-Chitosan Blend Membranes
22. Haiping Xia, Xumin He, Guomei He, Birong Zeng, and Weiguang Lan; Xiamen University; Advanced Landfill Leachate Treatment by an Integrated Membrane Processes
23. Xumin He, Haiping Xia, and Weiguang Lan; Xiamen University; Application of Membrane Separation in Purification of Hydrated Titanium Dioxide Nanoparticles
24. Sanette Marx, Hein Neomagus, and Ray Everson; North-West University; Influence of Membrane Orientation on the Pervaporation Performance of Ceramic Membranes
25. Sanette Marx, and Freek Kapteijn, Hein Neomagus, and Ray Everson; North-West University and TU Delft; Modeling of the Separation of Methanol from TAME Through a NaY Tubular Membrane
26. Kamalesh Sirkar and Meredith Feins; New Jersey Institute of Technology; Novel Composite Membranes for Protein Purification in Ultrafiltration
27. Mahesh Bordawekar, Glenn Lipscomb, and Isabel Escobar; University of Toledo; Use of a Temperature Sensitive Polymer Brush to Reduce Fouling
28. Norman N. Li, Mark A. Kuehne, Richard Song, Maxwell Tsia, Jane C. Li; NL Chemical Technology, Inc.; The Use of Six Sigma in Membrane Technology
29. Tai-Shung Chung, University of Singapore, Dendrimer Induced Cross-Linking Modification of Polyimide Membranes

30. Richard D. Noble, University of Colorado, Perspectives on Membrane Technology for Advanced Gas Separations
31. Ping Yu Huang, Protein Design Labs, Inc. Membrane Applications in the Development of Humanized Antibody Manufacturing Processes
32. Yuri Yampolskii, Institute of Petrochemical Synthesis, Membrane Assisted Water Ozonation: Problems and Advantages
33. Scott Husson, Clemson University, Surface Modification of Microporous Membranes by ATRP
34. T. Matsuura, University of Ottawa, Effect of Surface Modifying Macromolecules on Membrane Performance in Ultrafiltration, Pervaporation and Membrane Distillation
35. K. Abhinava, Eli Lilly and Co., Membrane Processes in Speciality and Pharmaceutical Industries – Applications and Challenges
36. Mark Miller, Paul Armistead, and Michelle Chapman; U.S. Army Tank-Automotive Research, U.S. Office of Naval Research, and U.S. Bureau of Reclamation; International Invitation: Advancing the Science and Technology of Water Purification
37. Abelaaziz El Amali, Salah Bouguecha, and Mohamed Maalej; Resing: Engineering Resources and National Institute of Scientific and Technical Research of Tunisia; Experimental Study of Air Gap and Direct Contact Membrane Distillation Configurations: Application to Geothermal and Sea Water Desalination
38. John Pellegrino; University of Colorado; Process Analysis of a Speculative, Hybrid Reverse-Osmosis/Electrodialysis Unit Operation
39. Yoram Cohen; Low Pressure RO Desalination – The Quest for High Product Water Recovery
40. Ivo E. J. Vankelecom; Solvent Resistant Nanofiltration: A Physico-Chemical Interpretation of the Transport Mechanism.
41. Lieven E. M. Gevers; Solvent-Resistant Nanofiltration with Filled PDMS Membranes