

*Program*

# **ADVANCED MEMBRANE TECHNOLOGY V: Membranes for Sustainable Water, Energy and the Environment**

*An ECI Conference Series*

**October 14-19, 2012  
Singapore**

**Chair:**

**Tony Fane, Singapore Membrane Technology Centre**

**Co-Chair:**

**Rong Wang, Singapore Membrane Technology Centre**



**Engineering Conferences International**

32 Broadway, Suite 314 - New York, NY 10004, USA

Phone: 1 - 212 - 514 - 6760, Fax: 1 - 212 - 514 - 6030

www.engconfintl.org – [info@engconfintl.org](mailto:info@engconfintl.org)

## **Sunday, October 14, 2012**

16:00 – 18:00	Registration (Rendezvous Gallery – Courtyard)
18:00 – 19:00	Opening Reception (Rendezvous Gallery – Courtyard)
19:00 – 20:30	Dinner (Straits Café)

## **NOTES**

- Technical sessions on Monday, Tuesday and Thursday will be held in the Straits Ballroom 2 and 3 (Level 2). Technical sessions on Wednesday will be held at the PUB Water Hub.
- Buses are arranged for out-of-hotel activities including technical sessions, dinner and sightseeing on Wednesday, laboratory visit and sightseeing on Thursday.
- Poster sessions will be held in the Merevale 1 (Level 2). Posters may be hung on Monday prior to 5:00 pm and should be removed the same day after the session.
- Breakfasts, Sunday dinner and Thursday lunch will be at the Straits Café and are served buffet style. Lunches (except Thursday) and banquet dinner on Monday will be at the Straits Ballroom 1 (Level 2). Dinner on Tuesday is on your own arrangement and expenses. Dinners on Wednesday and Thursday will be at the Singapore Flyer and Singapore Membrane Technology Centre, respectively.
- Audiotaping, videotaping and photography of presentations are strictly 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 5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.

## Monday, October 15, 2012

07:00	Buffet Breakfast opens (Straits Café)  Session chairs: <b>Tony Fane</b> (SMTC, Singapore) & <b>Rong Wang</b> (SMTC, Singapore)
08:15 – 08:25	Conference Welcome/Overview – Conference chairs and ECI liaison
08:25 – 08:30	Introduction by session chairs
08:30 – 09:00	<b>Harry F. Ridgway</b> (King Abdullah University of Science and Technology, Saudi Arabia) <i>Simulation of polyamide membrane degradation by chloramination using a mixed quantum mechanics/molecular mechanics algorithm</i>
09:00 – 09:30	<b>William B. Krantz</b> (University of Colorado, USA) <i>Evaporimetry – a simple, inexpensive and accurate method for characterizing the pore-size distribution of membranes</i>
09:30 – 10:00	<b>Hans Coster</b> (University of Sydney, Australia) <i>Monitoring membrane fouling using electrical impedance spectroscopy</i>
10:00 – 10:30	Coffee break
10:30 – 11:00	<b>Jerry Y.S. Lin</b> (Arizona State University, USA) <i>High temperature membranes for carbon dioxide separation</i>
11:00 – 11:30	<b>Kuo-Lun (Allan) Tung</b> (Chung Yuan University, Taiwan) <i>Nature-inspired geomimetic membranes: a new route to develop novel inorganic membranes for water treatment</i>
11:30 – 12:00	<b>Kang Li</b> (Imperial College London, UK) <i>Ceramic hollow fibre membranes for energy applications</i>
12:00 – 12:30	<b>Shaomin Liu</b> (Curtin University, Australia) <i>Development of new oxygen selective ceramic membranes for oxygen production in enabling the clean energy delivery</i>
12:30 – 13:40	Buffet lunch  Session chairs: <b>William B. Krantz</b> (University of Colorado, USA) & <b>Hans Coster</b> (University of Sydney, Australia)
13:40 – 13:45	Introduction by session chairs
13:45 – 14:15	<b>Hideito Matsuyama</b> (Kobe University, Japan) <i>Attempts for fouling reduction in RO membrane</i>
14:15 – 14:45	<b>Harvey Winters</b> (King Abdullah University of Science and Technology, Saudi Arabia) <i>Characterization of Microbial Glycoproteins Involved in Fouling of RO Membranes</i>
14:45 – 15:15	<b>Chung-Hak Lee</b> (Seoul National University, Korea) <i>Paradigm shift in biofouling control in MBR: bacterial quorum quenching</i>
15:15 – 15:45	Coffee break
15:45 – 16:15	<b>Moshe Herzberg</b> (Ben-Gurion University of the Negev, Israel) <i>RO membrane fouling during tertiary wastewater desalination: early stages interactions between membrane surface and foulants</i>
16:15 – 16:45	<b>Chuyang Y. Tang</b> (Singapore Membrane Technology Centre, Nanyang Technological University, Singapore) <i>Towards understanding NF, RO, FO, and PRO fouling - similarities and differences</i>
16:45 – 17:05	Discussion

**Monday, October 15, 2012 (Continued)**

17:05 - 17:20      Short break

17:20 – 19:20      **Poster session**

19:20 – 22:00      Banquet dinner

## Tuesday, October 16, 2012

- 07:00 Buffet Breakfast opens (Straits Café)
- Session chairs: **Robert Field** (University of Oxford, UK) & **Kang Li** (Imperial College London, UK)
- 08:25 – 08:30 Introduction by session chairs
- 08:30 – 09:00 **D. Bhattacharyya** (University of Kentucky, USA)  
*Responsive nanostructured membranes for environmental applications: an overview*
- 09:00 – 09:30 **Zhanfeng Cui** (University of Oxford, UK)  
*Membrane applications in regenerative medicine*
- 09:30 – 10:00 **Vicki Chen** (University of New South Wales, Australia)  
*Nanocomposite membranes – opportunities for antifouling and biocatalytic functionalization*
- 10:00 – 10:30 Coffee break
- 10:30 – 11:00 **T. Matsuura** (University of Ottawa, Canada)  
*Control of membrane surface roughness by changing the nonsolvent (water) influx rate*
- 11:00 – 11:30 **Zhiping Lai** (King Abdullah University of Science and Technology, Saudi Arabia)  
*Novel metal-organic framework membranes for gas separations*
- 11:30 – 12:00 **Juha Nikkola** (VTT Technical Research Centre of Finland)  
*Low-fouling membrane surfaces by using thin coating technologies*
- 12:00 – 12:30 **Manish Kumar** (The Pennsylvania State University, USA)  
*Packing functional aquaporins in block copolymers*
- 12:30 – 13:40 Buffet lunch
- Session chairs: **Andrew Zydney** (The Pennsylvania State University, USA) & **Pierre Aimar** (CNRS & University of Toulouse, France)
- 13:40 – 13:45 Introduction by session chairs
- 13:45 – 14:15 **Malini Balakrishnan** (The Energy and Resources Institute University)  
*Composite membranes from bagasse fly ash*
- 14:15 – 14:45 **Rong Wang** (Singapore Membrane Technology Centre, Nanyang Technological University, Singapore)  
*Development of novel low-pressure water softening hollow fiber membranes*
- 14:45 – 15:15 **Tzahi Cath** (Colorado School of Mines, USA)  
*Forward osmosis and membrane distillation application for sustainable recovery of water and minerals from hypersaline brines*
- 15:15 – 15:45 Coffee break
- 15:45 – 16:15 **Bert Hamelers** (Wetsus, Netherlands)  
*Harnessing salinity gradient energy using ion selective membranes*
- 16:15 – 16:45 **Tao He** (Shanghai Advanced Research Institute, China)  
*Highly concentrated saline waste water treatment by FO processes*
- 16:45 – 17:15 **Sherub Phuntsho** (University of Technology Sydney)  
*Osmotic equilibrium –the main process limitations of forward osmosis process*
- 17:15 – 17:45 Discussion
- Free evening / Dinner on your own

## Wednesday, October 17, 2012

07:00 Buffet Breakfast opens (Straits Café)

**Technical sessions on Wednesday will be held at the PUB Water Hub – Bus transportation will be provided.**

Session chairs: **Norman Li** (NL Chemical Tech, Inc., USA) & **Enrico Drioli** (University of Calabria, Italy)

08:45 – 08:55 Opening address by Professor Ng Wun Jern, Executive Director of Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore

08:55 – 09:00 Introduction by session chairs

09:00 – 09:30 **Tony Fane** (Singapore Membrane Technology Centre, NTU, Singapore)  
*Improving the efficiency of reverse osmosis: understanding fouling and its control*

09:30 – 10:00 **Andrew Zydney** (The Pennsylvania State University, USA)  
*Virus filtration: fouling and retention issues*

10:00 – 10:30 **David Stuckey** (Imperial College London, UK)  
*Anaerobic membrane bioreactors: promise and problems*

10:30 – 11:00 Coffee break

11:00 – 11:30 **David LaMonica** (Rochem Membrane Systems, USA)  
*The use of membranes to treat landfill leachate*

11:30 – 12:00 **Claudia Staudt** (BASF SE Ludwigshafen, Germany)  
*Application potential of polysulfone based membranes*

12:00 – 12:30 **Adil M. Dhalla** (GE Power & Water)  
*The Future of Water – Challenges and Opportunities*

12:30 – 13:40 Buffet Lunch

Session chairs: **D. Bhattacharyya** (University of Kentucky, USA) & **T. Matsuura** (University of Ottawa, Canada)

13:40 – 13:45 Introduction by session chairs

13:45 – 14:15 **Enrico Drioli** (University of Calabria, Italy)  
*Membrane operations for blue energy production and water recovery*

14:15 – 14:45 **Masaru Kurihara** (Mega-ton Water System Funding Program for World Leading Innovation R&D on Science & Technology, Japan)  
*Membrane research for water treatment facing the age of global mega-competition & collaboration*

14:45 – 15:15 **Kamalesh K. Sirkar** (New Jersey Institute of Technology, USA)  
*Desalination studies in DCMD and AGMD: membranes, modules, operating conditions, pilot plant*

15:15 – 15:45 Coffee break

15:45 – 16:15 **Benjamin Feinberg** (University of California, Los Angeles, USA)  
*Structure-performance relationships for osmotic membranes: comparing theory to reality*

16:15 – 16:45 **Gilbert Galjaard** (PWN Technologies)  
*Ceramac®-19 demonstration plant ceramic microfiltration at Choa Chu Kang waterworks*

**Wednesday, October 17, 2012 (continued)**

- 16:45 – 17:15      **I G Wenten** (Institut Teknologi Bandung, Indonesia)  
*Non modular membrane: A Novel Approach in Designing Large Scale Membrane Plant*
- 17:15 - 17:35      Discussion
- 18:30 – 20:30      Dinner at Seafood Paradise Restaurant, Singapore Flyer  
Bus transportation will be provided.
- 21:00 – 22:00      Sightseeing 1: Flight Singapore Flyer

## Thursday, October 18, 2012

07:00	Buffet Breakfast opens (Straits Café)  Session chairs: <b>Yoram Cohen</b> (University of California, Los Angeles, USA) & <b>Chuyang Y. Tang</b> (SMTC, Singapore)
08:25 – 08:30	Introduction by session chairs
08:30 – 09:00	<b>Robert Field</b> (University of Oxford, UK) <i>Membrane distillation: optimal thickness and comprehensive pore flow model</i>
09:00 – 09:30	<b>Hassan A. Arafat</b> (Masdar Institute of Science and Technology, United Arab Emirates) <i>Fouling Behavior of PVDF and PTFE Membranes under Membrane Distillation Operations</i>
09:30 – 10:00	<b>Young Moo Lee</b> (Hanyang University, Korea) <i>Thermally rearranged polymer membranes for small molecular transport</i>
10:00 – 10:30	<b>Pierre Aimar</b> (CNRS & University of Toulouse, France) <i>Recent strategies to reduce membrane fouling</i>
10:30 – 11:00	Coffee break
11:00 – 11:30	<b>Michael D. Guiver</b> (National Research Council Canada) <i>'Polymers of intrinsic microporosity' as materials for membrane gas separation</i>
11:30 – 12:00	<b>Vladimir V. Teplyakov</b> (A.V.Topchiev Institute of Petrochemical Synthesis RAS) <i>Using of noble gases permeability data for empirical calculation of molecular-selective gas transfer through polymeric membranes</i>
12:00 – 12:30	<b>Yoram Cohen</b> (University of California, Los Angeles, USA) <i>Improving the efficiency of RO desalination through self-adaptive mitigation of membrane fouling and process optimization</i>
12:30 – 13:00	<b>Kean Wang</b> (The Petroleum Institute, Abu Dhabi, UAE) <i>Bridging the gap between gas permeation properties at the transient and steady states</i>
13:00 – 13:10	Conference closing speech
13:10 – 14:10	Buffet lunch
14:10 – 14:20	Short Break
15:00 – 17:00	Visit Singapore Membrane Technology Centre (SMTC) Laboratory Bus transportation will be provided
17:00 – 19:00	Cocktail reception (buffet) at SMTC
20:00 - 22:00	Sightseeing 2: Singapore Night Safari



**Friday, October 19, 2012**

07:00 Buffet Breakfast opens (Straits Café)  
Departures

### List of Posters

1. SHARE INDUCED ROTATIONAL UF-FILTER FOR WATER REUSE  
Hanna Kyllönen, VTT, Finland
2. LIQUID ENTRY PRESSURE OF PTFE MEMBRANES UNDER MEMBRANE DISTILLATION CONDITIONS: SURPRISING EFFECTS OF TEMPERATURE  
Hassan A. Arafat, Masdar Institute of Science and Technology, UAE
3. SURFACE MODIFICATION OF PP AND PES NON-WOVENS BY USING HYBRID COATINGS  
Juha Nikkola, VTT Technical Research Center of Finland, Finland
4. EVALUATING MEMBRANE PERFORMANCE IN OSMOTICALLY DRIVEN MEMBRANE PROCESSES: ENHANCED TESTING METHODS FOR NEW MEMBRANES AND TREATMENT APPLICATIONS  
Tzahi Y. Cath, Colorado School of Mines, USA
5. HIGH TEMPERATURE THERMALLY REARRANGED(TR) POLYMER MEMBRANES  
Young Moo Lee, Hanyang University, Korea
6. PUB WATER RESEARCH AND DEVELOPMENT IN SINGAPORE  
Charles Lim, PUB, Singapore
7. ENVIRONMENT AND WATER INDUSTRY PROGRAMME OFFICE (EWI)  
Eric Soh, PUB, Singapore
8. FOULING LIMITATION MECHANISMS DURING TRANSVERSE VIBRATION AIDED MEMBRANE FILTRATION FOR ANAEROBIC MEMBRANE BIOREACTORS  
Vicki Chen, University of New South Wales, Australia
9. AUTOMATED AND ONLINE METHOD FOR TESTING MEMBRANE INTEGRITY  
Adrian Yeo, Nanyang Technological University, Singapore
10. SCALING UP MEMBRANE DISTILLATION : FROM CONCEPT TO BENCH TO PILOT  
Gurdev Singh, Ngee Ann Polytechnic, Singapore
11. ENZYME-IMMOBILIZED MEMBRANES FOR BIOFOULING MITIGATION  
Gurdev Singh, Ngee Ann Polytechnic, Singapore
12. AQUAPORIN BASED BIOMIMETIC MEMBRANES (ABM) FOR WATER REUSE AND DESALINATION  
Chuyang Y. Tang, Singapore Membrane Technology Centre, Singapore
13. INTEGRATION OF NANOTECHNOLOGY AND TEMPERATURE- RESPONSIVE HYDROGEL MEMBRANES FOR WATER DETOXIFICATION  
D. Bhattacharyya (DB), University of Kentucky, USA
14. THE DEVELOPMENT OF IMPROVED STRATEGIES TO CONTROL BIOFOULING OF MEMBRANES IN THE WATER INDUSTRY  
Miles Edward Rzechowicz, Singapore Membrane Technology Centre, Singapore
15. CO<sub>2</sub>-TOLERANT CERAMIC MEMBRANE DRIVEN BY ELECTRICAL CURRENT FOR OXYGEN PRODUCTION AT INTERMEDIATE-LOW TEMPERATURES  
Shaomin Liu, Curtin University, Australia