

# SYMPOSIUM SM7

Emerging Membrane Materials for Sustainable Separations  
April 18 - April 21, 2017

## Symposium Organizers

Mainak Majumder, Monash University  
Suzana Nunes, King Abdullah University of Science and  
Technology (KAUST)  
Kuo Lun (Allan) Tung, NTU Taiwan  
Ranil Wrickamasinghe, University of Arkansas

## Proceedings Statement

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\* Invited Paper

SESSION SM7.1: Biomimetic, Bioinspired Membranes and Bioseparations I  
Session Chairs: Joao Crespo and Suzana Nunes  
Tuesday Morning, April 18, 2017  
PCC North, 100 Level, Room 123

### 10:30 AM \*SM7.1.01

**Highly Selective Biomimetic Ion/Water Channels** [Mihail Barboiu](#)<sup>1,2</sup>; <sup>1</sup>Institut European des Membranes, France; <sup>2</sup>"Petru Poni" Institute of Macromolecular Chemistry, Romania.

### 11:00 AM \*SM7.1.02

**Artificial Water Channels—Bioinspired and Energy-Efficient Filtration Materials** [Yuxiao Shen](#); The Pennsylvania State University, United States.

### 11:30 AM \*SM7.1.03

**Biohybrid and Biomimetic Membranes for Sustainable Production and Separations** [Lidietta Giorno](#); Institute on Membrane Technology, National Research Council of Italy, ITM-CNR, Italy.

SESSION SM7.2: Biomimetic, Bioinspired Membranes and Bioseparations II  
Session Chairs: Mihail Barboiu and Lidietta Giorno  
Tuesday Afternoon, April 18, 2017  
PCC North, 100 Level, Room 123

### 1:30 PM \*SM7.2.01

**Novel Polytriazole Ion Exchange Membranes for Bioseparations** [Cristiana Boi](#); University of Bologna, Italy.

### 2:00 PM SM7.2.02

**Enhancing Oil-Water Separation with Designer Pores Using 3D Printed Membranes** [Darrell A. Patterson](#); University of Bath, United Kingdom.

### 2:15 PM SM7.2.03

**Synthesis of Multi-Functional Surfaces and Coatings Inspired from the Peristome of Carnivorous Nepenthes** [Zheng-Jun Shih](#); National Tsing Hua University, Taiwan.

### 2:30 PM \*SM7.2.04

**Ligand-Protein Interactions in New Affinity Membranes for IgG Purification** [Giulio C. Sarti](#); University of Bologna, Italy.

3:00 PM BREAK

### 3:30 PM \*SM7.2.05

**Membranes for Proteins Processing** [Joao Crespo](#); FCT-Universidade Nova de Lisboa, Portugal.

### 4:00 PM \*SM7.2.06

**Bio-Inspired Zwitterionic Membranes for Fouling Resistance** [Y. Chang](#); Chung Yuan Christian University, Taiwan.

### 4:30 PM SM7.2.07

**The Effect of Dynamic Three-Dimensional Micro-Crack Network Geometry on Water Permeability of the Prickly Pear Cacti Cuticle** [Konrad Rykaczewski](#); Arizona State University, United States.

SESSION SM7.3: Poster Session: Membrane Materials for Sustainable Separations

Session Chairs: Mainak Majumder, Suzana Nunes, Kuo Lun (Allan) Tung and Ranil Wrickamasinghe  
Tuesday Afternoon, April 18, 2017  
8:00 PM - 10:00 PM  
Sheraton, Third Level, Phoenix Ballroom

### SM7.3.01

**Surface Modification on Polymeric Separators Using Silica Coating and Poly(vinylidene fluoride-hexafluoropropylene) Layer for Lithium-Ion Batteries** [Ruey-Shin Juang](#)<sup>1,3</sup>; <sup>1</sup>Chang Gung University, Taiwan; <sup>3</sup>Chang Gung Memorial Hospital, Taiwan.

### SM7.3.02

**Janus Carbon Nanotube Membranes Generated by Surface Plasmoxidation and Their Application** [Guibin Ma](#)<sup>1,2</sup>; <sup>1</sup>Ingenuity Lab, University of Alberta, Canada; <sup>2</sup>University of Alberta, Canada.

### SM7.3.03

**In Situ Fe/Pd Nanoparticle Immobilized PVDF Membranes—Synthesis, Depth-Dependent Characterization and Application** [Hongyi Wan](#); University of Kentucky, United States.

### SM7.3.04

**Fabrication of Graphene Oxide-Supported Metal-Organic Framework Films** [Julius Choi](#); Texas A&M University, United States.

### SM7.3.05

**Design Motifs in Polyamide Selective Layer Membrane Materials for Improved Chlorine and Fouling Resistant Properties** [Logan Kearney](#); Purdue University, United States.

### SM7.3.06

**Facile Fabrication of Durable Superhydrophobic Polyurethane Sponge for Continuous Separation of Oil from Water** [Xia Zhang](#); Henan University, China.

### SM7.3.07

**Characteristics of the Ultrafiltration Membranes Assembled with Zinc Oxide Nanoparticles onto the Surface of Polyethersulfone and Aminated Polyethersulfone Blend** [Hyejin Park](#); Chung-Ang University, Korea (the Republic of).

### SM7.3.08

**Gel Electrolyte Based on Functionalized Bacterial Cellulose Membrane for Batteries** [Nazifah Islam](#); Texas Tech University, United States.

### SM7.3.09

**Oxygen Selective Membrane for Lithium Air Batteries** [Zhouguang Lu](#); South University of Science and Technology of China, China.

### SM7.3.10

**Advanced Separators for Alkaline Zinc-Manganese Oxide Batteries** [Jonathon Duay](#); Sandia National Laboratory, United States.

### SM7.3.11

**Surface Modification of Microfiltration Ceramic Membrane by Using Laser Induced Graphene (LIG)** [Mohamed Bayati](#); University of Missouri, United States.

**SM7.3.12**

**Characteristics of Ultrafiltration Membranes Fabricated from the Composites Polyethersulfone and Polyethersulfone Grafted with Multi-Walled Carbon Nanotube** So-Hyeon Hong; Chung-Ang University, Korea (the Republic of).

**SM7.3.13**

**Highly Porous Hierarchical Carbons by Activation of Organo-Nitridic Polymers for Carbon Dioxide and Methane Storage** Babak Ashourirad; Virginia Commonwealth University, United States.

SESSION SM7.4: Stimuli-Responsive Membranes

Session Chairs: Thomas Schafer and Ranil Wickramasinghe

Wednesday Morning, April 19, 2017

PCC North, 100 Level, Room 123

**8:00 AM \*SM7.4.01**

**A New Use for MOFs—Stopping Physical Aging in Glassy Polymers for Exceptional Separation Performance** Matthew Hill; CSIRO, Australia.

**8:30 AM \*SM7.4.02**

**High Performance or Stimuli-Responsive Polymer-Based Ultrafiltration Membranes by Phase Separation Processes Using Tailored Macromolecular or Nanoparticulate Additives** Mathias Ulbricht; University of Duisburg-Essen, Germany.

**9:00 AM \*SM7.4.03**

**Tunable Molecular Separation and *In Situ* Fouling Control Using Integrally Skinned Flat Sheet Conductive Polyaniline Membranes with Polymer Acid Dopants** Darrell A. Patterson; University of Bath, United Kingdom.

**9:30 AM \*SM7.4.04**

**DNA-Sandwich Gated Membranes** Thomas Schafer<sup>1,2</sup>; <sup>1</sup>Polymat University of the Basque Country, Spain; <sup>2</sup>Ikerbasque - Basque Foundation for Science, Spain.

**10:00 AM BREAK****10:30 AM SM7.4.05**

**Magnetically Responsive Membranes** Ranil Wickramasinghe; University of Arkansas, United States.

**10:45 AM SM7.4.06**

**Stimuli-Responsive Smart Gating Membranes** Liang-Yin Chu; Sichuan University, China.

**11:00 AM SM7.4.07**

**CO<sub>2</sub> Stimuli Responsive Polymer Membrane Materials** Jinying Yuan; Tsinghua University, China.

**11:15 AM SM7.4.08**

**Diazonium-Functionalized Nanoporous Membranes for Electrochemically Switchable Ionic Separations** Leo J. Small; Sandia National Laboratories, United States.

**11:30 AM \*SM7.4.09**

**Simulations of Responsive Polymers for Membrane Applications** Xianghong Qian; University of Arkansas, United States.

SESSION SM7.5: Nanostructured Polymeric Membranes

Session Chairs: Ayse Asatekin and Darrell Patterson

Wednesday Afternoon, April 19, 2017

PCC North, 100 Level, Room 123

**1:30 PM \*SM7.5.01**

**Manufacturing Functional Membranes from Nanostructured Polymers** William A. Phillip; University of Notre Dame, United States.

**2:00 PM SM7.5.02**

**Triblock Terpolymer Derived Isoporous Ultrafiltration Membranes** Yuk Mun Li; Cornell University, United States.

**2:15 PM SM7.5.03**

**Cyclodextrin Films with Fast Solvent Transport and Shape-Selective Rejection** Luis Francisco Villalobos; KAUST, Saudi Arabia.

**2:30 PM BREAK****3:30 PM \*SM7.5.04**

**Recent Advances in the Design of Nanoporous, Ionic Lyotropic Liquid Crystal Polymer Membranes for Molecular Size Separations in Water** Douglas L. Gin; University of Colorado, United States.

**4:00 PM \*SM7.5.05**

**Zwitterionic Copolymers for Next-Generation Membranes** Ayşe Asatekin; Tufts University, United States.

**4:30 PM SM7.5.06**

**A Stretchable, Permeable, Non-Swelling Composite Silicone/Hydrogel Membrane** Shelby B. Hutchens; University of Illinois at Urbana-Champaign, United States.

**4:45 PM SM7.5.07**

**Mass Production of Electrospun Polyimide Nanofiber Membranes for Application in Li-Ion Battery and Air and Liquid Fine Filtration** Haoqing Hou; Jiangxi Normal University, China.

SESSION SM7.6: Membranes for Sustainable Liquid Separations

Session Chairs: Dibakar Bhattacharyya and Mary Laura Lind

Thursday Morning, April 20, 2017

PCC North, 100 Level, Room 123

**8:00 AM SM7.6.01**

**Novel Activation Techniques of PVDF Flat Sheet Membranes** Hassan A. Arafat; Masdar Institute of Science and Technology, United Arab Emirates.

**8:15 AM \*SM7.6.02**

**Integration of Nanostructured Catalytic Materials and Functionalized Membranes for Water Applications** Dibakar Bhattacharyya; University of Kentucky, United States.

**8:45 AM SM7.6.03**

**Dealloying Metallic Films to Fabricate Reactive Layers in Metal-Polymer Composite Membranes** Michael J. Detisch; University of Kentucky, United States.

**9:00 AM SM7.6.04**

**Poly(Ethylene Glycol) and Poly(Zwitterion) Grafting for Anti-Fouling Ultrafiltration Membranes** Lieu N. Le; King Abdullah University of Science and Technology, Saudi Arabia.

**9:15 AM SM7.6.05**

**Radiation Grafted, Copolymerized Fabrics for the Extraction of Uranium from Seawater** Travis C. Dietz; University of Maryland, College Park, United States.

**9:30 AM BREAK****10:00 AM \*SM7.6.06**

**Novel Mixed Matrix Membranes for Water Purification** Mary Laura D. Lind; Arizona State University, United States.

**10:30 AM SM7.6.07**

**Mixed-Polyamide Thin-Film Composite Membranes with Enhanced Antifouling Properties** Phuoc H. Duong; King Abdullah University of Science and Technology (KAUST), Saudi Arabia.

**10:45 AM \*SM7.6.08**

**Towards a More Sustainable Membrane Preparation Using Non-Toxic Solvents** Alberto Figoli; Institute on Membrane Technology, Italy.

**11:15 AM SM7.6.09**

**Fabrication of Greener Membranes from Ionic Liquid Solutions** DooLi Kim; KAUST, Saudi Arabia.

11:30 AM \*SM7.6.10

**Organic Solvent Nanofiltration with Novel Perfluoropolymer Membranes** Kamalesh K. Sirkar; New Jersey Inst of Technology, United States.

SESSION SM7.7: Membranes for Gas Separations

Session Chair: Richard Noble

Thursday Afternoon, April 20, 2017

PCC North, 100 Level, Room 123

1:30 PM \*SM7.7.01

**Ionic Liquid Composite Membranes for CO<sub>2</sub>/Light Gas Separations** Richard Noble; University of Colorado, United States.

2:00 PM \*SM7.7.02

**Towards MOF Membrane Technology—High-Performance Separations via Mixed-Linker ZIFs and Membrane Processing on Polymeric Hollow Fibers** Sankar Nair; Georgia Institute of Technology, United States.

2:30 PM SM7.7.03

**CO<sub>2</sub>-Philic Polymer Membranes for High Flux CO<sub>2</sub> Separation** Tomonori Saito; Oak Ridge National Laboratory, United States.

2:45 PM SM7.7.04

**Heterocyclic Building Blocks Transformation to Nanoporous Carbons—Toward a Very High Surface Area and CO<sub>2</sub> Uptake** Babak Ashourirad; Virginia Commonwealth University, United States.

3:00 PM BREAK

3:30 PM SM7.7.05

**Computational Characterization of Highly Selective Separation Processes Using a Novel Covalent Organic Framework Woven Material** Yaset M. Acevedo; Cornell University, United States.

3:45 PM SM7.7.06

**Ambient-Temperature Synthesis of Two-Dimensional Metal-Organic Frameworks for Gas Separation** Xueyi Zhang; Pennsylvania State University, United States.

4:00 PM SM7.7.07

**Dynamic Gas Transport through Polymeric Membranes** Marielle Soniat<sup>1,2</sup>; <sup>1</sup>Lawrence Berkeley National Laboratory, United States; <sup>2</sup>University of California, Berkeley, United States.

4:15 PM SM7.7.08

**Metamaterial Membranes for Chemical Separations** Juan M. Restrepo-Florez; Georgia Institute of Technology, United States.

4:30 PM SM7.7.09

**Edge Charge Neutralization of Clay for Improved Oxygen Gas Barrier in Nanobrick Wall Thin Films** Shuang Qin; Texas A&M University, United States.

4:45 PM SM7.7.10

**Long-Term Flexibility-Based Structural and Chemical Evolution in Microporous Organosilica Membranes—A Problem and Solution** Petra Dral; MESA+ Institute for Nanotechnology, Netherlands.

SESSION SM7.8: Membranes from 1D and 2D Materials

Session Chairs: Wanqin Jin and Mainak Majumder

Friday Morning, April 21, 2017

PCC North, 100 Level, Room 123

8:15 AM \*SM7.8.01

**Membrane Distillation and Evaporation with Carbon Based Materials—Prospects and Advances** Ludovic Dumee; Deakin University, Australia.

8:45 AM \*SM7.8.02

**1D and 2D Boron Nitride Membranes for Water Separation** Davide Mattia; University of Bath, Chemical Engineering Department, United Kingdom.

9:15 AM \*SM7.8.03

**Voltage Activated Membrane Platforms for Drug Delivery and Bioseparation** Bruce J. Hinds; University of Washington, United States.

9:45 AM BREAK

10:15 AM \*SM7.8.04

**Enabling Graphene-Based Membranes for Molecular Separation** Wanqin Jin; Nanjing Tech University, China.

10:45 AM SM7.8.05

**Water Transport and Ion Selectivity in Sub-1-nm Diameter Carbon Nanotube Porins** Aleksandr Noy<sup>1,3</sup>; <sup>1</sup>Lawrence Livermore National Lab, United States; <sup>3</sup>University of California Merced, United States.

11:00 AM SM7.8.06

**Ultra-Breathable Carbon Nanotube Membranes** Francesco Fornasiero; Lawrence Livermore National Laboratory, United States.

11:15 AM SM7.8.07

**Controlling Water and Ion Transport in Modified Graphene Oxide Membranes for Water Purification** Kevin R. Zavadil; Sandia National Laboratories, United States.

11:30 AM SM7.8.08

**Electrocoagulation Driven Fabrication of Graphene Oxide Films for Membrane Applications** Clovis Weisbart; University of Arizona, United States.

11:45 AM SM7.8.09

**Ionomigratively Pumped Salt Micro/Nanolenses along a Cation-Specific 1D Nanochannel** Yun-Tae Kim; Ulsan National Institute of Science and Technology, Korea (the Republic of).

SESSION SM7.9: Membrane Surface Design

Session Chair: Ranil Wickramasinghe

Friday Afternoon, April 21, 2017

PCC North, 100 Level, Room 123

1:30 PM \*SM7.9.01

**In Situ Silver Nanoparticle Coating onto MF, UF and RO Membranes for Biofouling Control—A Bench and Testbed Water Permeability Study** Shahnawaz Sinha; Arizona State University, United States.

2:00 PM SM7.9.02

**Bioinspired Designing Superwetting Filtration Membranes for High-Efficient Oil/Water Separation** Jian Jin; Chinese Academy of Sciences, China.

2:15 PM SM7.9.03

**Hydrophilic Directional Slippery Rough Surfaces with Exceptional Droplet Nucleation and Mobility** Xianming Dai; The University of Texas at Dallas, United States.

2:30 PM SM7.9.04

**Water Capture from Ambient Air Using Metal-Organic Frameworks for Water Harvesting** Hyunho Kim; Massachusetts Institute of Technology, United States.