

# Joint workshops by MEMSIS and KDS/KDPA/KORAE IDW2018: 11<sup>th</sup> International Desalination Workshop MEMSIS Workshop: Membranes and Membrane Processes for Water Applications

In conjunction with the Singapore International Water Week (SIWW) 2018, the Membrane Society in Singapore (MEMSIS) and Korean Desalination Society (KDS) are proud to co-organise the 11<sup>th</sup> International Desalination Workshop (IDW2018) on 12 July 2018 and MEMSIS workshop on *Membranes and Membrane Processes for Water Applications* on 13 July 2018.

Water is essential for life. However, water scarcity is becoming the largest global risk and is affecting every continent and billions of people in the world. Membrane technology plays a crucial role for long-term sustainable solution to water shortage issues. Both workshops will highlight the recent advancements in membrane science and technology for water production and desalination, wastewater treatment and reclamation. The workshops will provide a forum for exchange of ideas and thoughts, and discussion for the global membrane community.

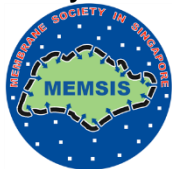
## About MEMSIS

Membrane Society in Singapore (MEMSIS) is a non-profit organization registered with the Registry of Societies, Government of Singapore and is governed by a Board of Directors. The purposes of MEMSIS are i) to promote the interaction and exchange of ideas between researchers and practitioners in academia, government agencies or laboratories, and industry in Singapore in the area of membrane science and technology; ii) to promote regional and international cooperation and collaboration in the area of membrane science and technology; iii) to sponsor and host technical meetings, workshops and short courses in the area of membrane science and technology; iv) to recognize exceptional achievement in research and development in the area of membrane science and technology.

## About IDW

The IDW was initiated by the Center for Seawater Desalination Plant (presently Global Desalination Research Center: GDRC) and European Desalination Society in the year of 2007. During 11 years, it achieved an international reputation and became one of the most premier events in and out of Korea. The common focus is water desalination, water treatment and reuse. Currently, when lack of utilizable water is continuously becoming a reality, it is the area whose value is rising. This event brings together research scientist, engineers from industries to academic areas around the world.

## Organised by:



## Supported by:



**Date: 12 – 13 July 2018**

**Time: 8.30 am – 5.30 pm**

**Venue: Nanyang Executive Centre, Nanyang Technological University**

## Registration Fee \*

MEMSIS Member: S\$125

Public: S\$175

Conference Dinner on 12 July 2018 (Optional): S\$75

\* The registration fee is for admission to both workshops on 12 and 13 July 2018. Coffee breaks and lunches will be provided except for Conference Dinner.

For more information and registration, please visit <https://memsis.org>

## Program

### Thursday, July 12 (Morning Session)

| Time          | Venue: NEC Auditorium  |   |
|---------------|--|---|
| 08:00 ~ 9:15  | Morning Reception and Registration   |   |
| 9:15 ~ 9:30   | <p style="text-align: center;"><b>Welcoming remark: Prof. Seungkwan Hong</b><br/>Chairman of IDW2018</p> <p style="text-align: center;"><b>Congratulatory remark: Prof. Rong Wang</b><br/>President of Membrane Society in Singapore (MEMSIS)</p> <p style="text-align: center;"><b>Opening remark</b><br/>Ministry of Environment, Korea<br/>Korean Environmental Industry &amp; Technology Institute (KEITI)</p> |   |
| 9:30 ~ 10:30  | <p style="text-align: center;"><b>Plenary Talk 1: Prof. In S. Kim</b><br/>Gwangju Institute of Science and Technology, Korea<br/><i>Beyond 10 years of IDW</i></p> <p style="text-align: center;"><b>Plenary Talk 2: Prof. Rong Wang</b><br/>Singapore Membrane Technology Centre (SMTTC), Singapore<br/><i>Recent Developments in Desalination Related Technology</i></p>   |   |
| 10:30 ~ 10:40 | Photo Time   |   |
| 10:40 ~ 11:00 | Coffee Break   |   |
| Session       | Venue: Lecture Room 1<br>Session A<br>Expanding FO Applications  | Venue: Lecture Room 2<br>Session B<br>Management and Utilization of RO Brine  |
| 11:00 ~ 11:30 | <p><b>Keynote (A)</b><br/><b>Osmotically driven processes for current and potential niche applications</b><br/><i>Hokyong Shon</i><br/>(University of Technology Sydney, Australia)</p>  | <p><b>Keynote (B)</b><br/><b>Brine solution in seawater desalination</b><br/><i>Seunghyun Kim</i><br/>(Kyungnam Univeristy, Korea)</p>  |
| 11:30 ~ 11:50 | <p><b>(A-1)</b><br/><b>Pilot-scale feasibility study of seawater desalination based on FO-RO hybrid system</b><br/><i>Sunkyu Kim, Marc Petry, Sanghyun Kim</i><br/>(Hyundai Engineering &amp; Construction)</p>  | <p><b>(B-1)</b><br/><b>Electro-membrane processes for reverse osmosis concentrate recovery</b><br/><i>Vishal Vipin Wagholikar</i><br/>(National University of Singapore, Singapore)</p> |
| 11:50 ~ 12:10 | <p><b>(A-2)</b><br/><b>Desalination of high salinity water using osmotically enhanced dewatering (OED): experimental and theoretical analysis</b><br/><i>Jungwon Kim, Inhyuk David Kim, Jungbin Kim, Junghyun Kim</i><br/>(Korea University, Korea)</p>  | <p><b>(B-2)</b><br/><b>Electrochemical lithium recovery in RO-MD brine</b><br/><i>Jeyong Yoon, Seoni Kim, Hwajoo Joo</i><br/>(Seoul National University, Korea)</p>                     |
| 12:10 ~ 12:30 | <p><b>(A-3)</b><br/><b>Forward osmosis module arrangement to enhance recovery rate</b><br/><i>Suhan Kim, Jongmin Jeon, Jaehak Jung, Jonnyoung Choi</i><br/>(Pukyong National University, Korea)</p>  | <p><b>(B-3)</b><br/><b>SWRO-PRO hybrid desalination for water &amp; energy production</b><br/><i>Yonggyun Park, Inho Yeo, Wonil Lee, Taeshin Park</i><br/>(GS E&amp;C, Korea)</p>       |
| 12:30 ~ 14:00 | Lunch break and Poster Session (Lobby)   |   |

**Thursday, July 12 (Afternoon Session)**

| Session       | Venue: Lecture Room 1<br>Session C<br>SWRO Optimization & Advancement   | Venue: Lecture Room 2<br>Session D<br>Scaling-up New Desalination Technology  |
|---------------|---|---|
| 14:00 ~ 14:30 | <p><b>Keynote (C)</b><br/> <b>Improved recovery of seawater desalination by energy-efficient reverse osmosis (EERO) process</b><br/> <i>Tzzy Haur Chong, Seonki Lee, Kwanho Jeong, Shuwen Goh, S.R. Suwarno, W.B Krantz</i><br/>           (Nanyang Technological University, Singapore)</p>                                      | <p><b>Keynote (D)</b><br/> <b>Design and operation of hollow fiber membrane distillation process</b><br/> <i>Sangho Lee, Yongjun Choi, Younghyun Shin, Jihyeok Choi, Junseok Choi</i><br/>           (Kookmin University)</p>                                   |
| 14:30 ~ 14:50 | <p><b>(C-1)</b><br/> <b>K-water's efficient operation strategy for desalination plant</b><br/> <i>Jihye Kim, Boungsu Kwon, Chunghwan Kim, Kyunghyuk Lee, Jaelim Lim</i><br/>           (Kwater Institute of Water &amp; Environment, Korea)</p>   | <p><b>(D-1)</b><br/> <b>Novel modification method for membranes used in membrane distillation</b><br/> <i>Nick Guan Pin Chew, Shanshan Zhao, Chandresh Malde, Rong Wang</i><br/>           (Nanyang Technological University, Singapore)</p>                    |
| 14:50 ~ 15:10 | <p><b>(C-2)</b><br/> <b>Improvements of 10MIGD Busan SWRO plant by low energy consumption and O&amp;M simulation tools</b><br/> <i>Seokho Choi, Jungwon Park, Jungjune Lee, Younggeun Lee, Kwanghee Shin, Hyungkeun Roh</i><br/>           (Corporate R&amp;D Institute in Doosan Heavy Industries &amp; Construction, Korea)</p> | <p><b>(D-2)</b><br/> <b>Understanding possible underlying mechanism in declining efficiency of UV-LED reactor</b><br/> <i>Hyunkyung Lee, Yongxun Jin, Seungkwan Hong</i><br/>           (Korea university, Korea)</p>   |
| 15:10 ~ 15:30 | <p><b>(C-3)</b><br/> <b>Desalination by Resilient Energy-Efficient, and Advanced Mobile Systems (DREAMS): A Step toward Sustainability</b><br/> <i>Joon Seok Choi, Sangho Lee, Moonhyun Hwang</i><br/>           (Korean Institute of Construction Technology)</p>  | <p><b>(D-3)</b><br/> <b>Development of low energy consumption CDI system and its applications</b><br/> <i>Namsoo Park, Kyungseok Kang, Hyunwoo Yoo</i><br/>           (SIONTECH Co. Ltd, Korea)</p>   |
| 15:30 ~ 15:50 | <p><b>(C-4)</b><br/> <b>Cost analysis of small scale SWRO plants</b><br/> <i>Seongpil Jeong, Hien Thi Nguyen, Jooyoung Park</i><br/>           (Korea Institute of Science and Technology)</p>  | <p><b>(D-4)</b><br/> <b>Theoretical and experimental approaches of liquid entry pressure determination in membrane distillation processes</b><br/> <i>Changkyu Lee, Chansoo Park, Dongsoo Shin, Junseok Choi, Jongoh Kim</i><br/>           (R.E.D., Korea)</p> |
| 15:50 ~ 16:10 | Coffee break  |   |

**Thursday, July 12 (Afternoon Session): Continued**

| Session       | <b>Venue: Lecture Room 1</b><br><b>Session E</b><br><b>Fouling Characterization and Control</b>  | <b>Venue: Lecture Room 2</b><br><b>Session F</b><br><b>Emerging Technology (Integrating with Water Reuse)</b>   |
|---------------|--|---|
| 16:10 ~ 16:30 | <b>(E-1)</b><br><b>Immobilization of antimicrobial chemicals on RO membrane surfaces for in-situ biofouling control</b><br><i>Taek-Seung Kim Seok Tae Kang</i><br>(Korea Advanced Institute of Science and Technology, Korea)  | <b>(F-1)</b><br><b>Hydrogen production and water purification using photoelectrocatalytic desalination process</b><br><i>Dong suk Han, Seunghyun Kim, Guangxiao Piao, Ho Kyung Shon, Hyunwoong Park</i><br>(Texas A&M at Qatar)   |
| 16:30 ~ 16:50 | <b>(E-2)</b><br><b>Novel biofouling control and detection using Electrical Impedance Spectroscopy (EIS)</b><br><i>Jia Shin Ho, Lee Nuang Sim, Tzyy Haur Chong, H.G.L. Coster, Hideyuki Komori, Akihiro Fujii, Kunihiro Hayakawa</i><br>(Nanyang Technological University, Singapore)       | <b>(F-2)</b><br><b>Improving energy efficiency of pretreatment against algal bloom for seawater desalination by novel meshed tube filtration</b><br><i>Gyuhyon Cha, Soohoon Choi, Hyunkyung Lee, Kwangse Kim, Sangjun Ahn, Seungkwan Hong</i><br>(Korea University, Korea)  |
| 16:50 ~ 17:10 | <b>(E-3)</b><br><b>Evaluating membrane fouling potentials of dissolved organic matter in brackish water</b><br><i>Jongkwan Park, Sanghun Park, Jeongyeop You, Kyung Hwa Cho</i><br>(Ulsan National Institute of Science and Technology, Korea)   | <b>(F-3)</b><br><b>Application of novel outer selective thin film composite hollow fiber forward osmosis membrane in osmotic membrane bioreactor treating municipal wastewater</b><br><i>Van Huy Tran<sup>1</sup>, Sungil Lim<sup>1</sup>, Nirenkumar Pathak<sup>1</sup>, Nawshad Akther<sup>1</sup>, Sherub Phuntsho<sup>1</sup>, Dong Suk Han<sup>2</sup> and Hokyoung Shon</i><br>(University of Technology Sydney, Australia) |
| 17:10 ~ 17:30 | <b>(E-4)</b><br><b>Novel membranebased spectrophotometric method for quantifying of transparent exopolymer particles (TEP)</b><br><i>Lee Nuang Sim, Stanislaus Raditya Suwarno, Tzyy Haur Chong, Emile R. Cornelissen Anthony G. Fane</i><br>(Nanyang Technological University, Singapore) | <b>(F-4)</b><br><b>Nanowire versus Nanosheets: Effect of Nanostructures on Membrane Filterability and Fouling Potential</b><br><i>Tze Chiang Albert Ng How Yong NG</i><br>(National University of Singapore)  |
| 17:30 ~ 17:50 | <b>(E-5)</b><br><b>Performance evaluation and fouling characterization of element-scale FO process</b><br><i>Sanghyun Jeong, Am Jang</i><br>(Sungkyunkwan University, Korea)   | <b>(F-5)</b><br><b>Fabrication of ultra-permeable TFC FO membrane without a support layer based on nanofibers and graphene oxide</b><br><i>In S. Kim, M. Obaid, Yesol Kang</i><br>(Gwangju Institute of Science and Technology, Korea)  |
| 18:30 ~ 20:30 | <b>Banquet Dinner</b><br>Peach Garden Chinese Restaurant, NTU campus   |   |

## Program

**Friday, July 13**

| Time          | Venue: NEC Auditorium  |
|---------------|--|
| 08:00 ~ 08:45 | <b>Registration</b>  |
| 08:45 ~ 09:00 | <p><b>Welcome and Opening: Prof. Rong WANG</b><br/> President of Membrane Society in Singapore (MEMSIS)<br/> Director of Singapore Membrane Technology Centre (SMTC)</p>                                       |
| 09:00 ~ 09:40 | <p><b>Lecture 1: Prof. Anthony G. FANE</b><br/> Singapore Membrane Technology Centre (SMTC), Singapore<br/> <i>Membrane Fouling: Observation and Control</i></p>   |
| 09:40 ~ 10:20 | <p><b>Lecture 2: Prof. Dibakar BHATTACHARYYA</b><br/> University of Kentucky, USA<br/> <i>Nanocomposite and Multifunctional Membranes for Water Remediation</i></p>  |
| 10:20 ~ 10:40 | <b>Coffee Break</b>  |
| 10:40 ~ 11:20 | <p><b>Lecture 3: Prof. William B. KRANTZ</b><br/> University of Colorado, USA<br/> <i>Evaporimetry for Determining the Pore-Size Distribution – Conception to Commercial Prototype</i></p>                     |
| 11:20 ~ 12:00 | <p><b>Lecture 4: Dr. Emile CORNELISSEN</b><br/> KWR, The Netherlands<br/> <i>Osmotic Processes for Purification, Concentration and Dilution</i></p>  |
| 12:00 ~ 13:10 | <b>Lunch</b>   |
| 13:10 ~ 13:50 | <p><b>Lecture 5: Prof. Mark BENJAMIN</b><br/> University of Washington, USA<br/> <i>Microgranular Adsorptive Filtration (<math>\mu</math>GAF) for Membrane Pretreatment – Mechanisms and Effectiveness</i></p> |
| 13:50 ~ 14:30 | <p><b>Lecture 6: Prof. Hans COSTER</b><br/> University of Sydney, Australia<br/> <i>Development of an In-situ and On-line Membrane Monitoring System for Spiral Wound Modules</i></p>                          |
| 14:30 ~ 15:10 | <p><b>Lecture 7: Mr. Hideyuki KOMORI</b><br/> Kurita R&amp;D Asia, Singapore<br/> <i>Advanced Chemical Application in the Desalination and Reclamation Process</i></p>   |
| 15:10 ~ 15:30 | <b>Coffee Break</b>  |
| 15:30 ~ 16:10 | <p><b>Lecture 8: Prof. I Gede WENTEN</b><br/> Bandung Institute of Technology, Indonesia<br/> <i>A Novel PP Based Superhydrophobic Membrane</i></p>  |
| 16:10 ~ 16:50 | <p><b>Lecture 9: Prof. Seungkwon HONG</b><br/> Korea University, South Korea<br/> <i>Improving Energy Efficiency of SWRO Desalination with Advanced Technologies</i></p>                                       |

|               |  |
|---------------|--|
| 16:50 ~ 17:30 | <p style="text-align: center;"><b>Closing Lecture: Prof. Gary AMY</b><br/>National University of Singapore, Singapore<br/>Vice President of Membrane Society in Singapore (MEMSIS)<br/><i>Membrane-Based Seawater Desalination: Present Practice and Future Trends</i></p> |
| 17:30 ~ 17:40 | <b>Group Photo Taking</b>  |