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Oral Sessions - Monday

Presenting authors are indicated by an asterisk*. See the most up-to-date version of the program book at www.membranes.org/nams-2020/

Oral 1 - MEMBRANE FOULING I ..pg 1

12 pm – 1:40 pm, ROOM 1

Session Chairs

Steven Weinman

The University of Alabama

Dan Miller

Lawrence Berkeley National Laboratory

12:00 pm (Room 1, Monday)

Oral 1 - Electrochemical Prevention of Mineral Scale on Electrically Conducting Desalination Membranes

David Jassby (University of California, Los Angeles), Unnati Rao (University of California, Los Angeles), Bongyeon Jung* (University of California, Los Angeles).

12:20 pm (Room 1, Monday)

Oral 2 - Assessment of Oil Fouling By Oil-Membrane Interaction Energy

Henry Tanudjaja* (Nanyang Technological University), Jia Wei Chew (Nanyang Technological University).

12:40 pm (Room 1, Monday)

Oral 3 - Role of Instability Phenomena in Mitigating Membrane Fouling

Weiyi Li* (Southern University of Science and Technology), Xin Liu (Southern University of Science and Technology).

1:00 pm (Room 1, Monday)

Oral 4 - Do membrane hydrophobicity and hydrodynamic shear affect the initial deposition and pioneering colonization of anaerobes isolated from an anaerobic membrane bioreactor?

Yang Yang* (Ben-Gurion University of the Negev), Gideon Oron (Ben-Gurion University of the Negev), Moshe Herzberg (Ben-Gurion University of the Negev), Roy Bernstein (Ben-Gurion University of the Negev).

1:20 pm (Room 1, Monday)

Oral 5 - Nanofiltration of saline oil-water emulsions: Combined effect of salt concentration polarization and fouling by oil on flux performance

Charifa Hejase (Michigan State University), Vlad Tarabara* (Michigan State University).

Oral 2 – CARBON CAPTURE I ...pg. 3

12 pm – 1:40 pm, ROOM 2

Session Chairs

Winston Ho

Ohio State University

David Hopkinson

National Energy Technology Laboratory

Katherine Hornbostel

University of Pittsburg

12:00 pm (Room 2, Monday)

Oral 6 - Novel Facilitated Transport Membrane and Process for Post-Combustion Carbon Capture

Yang Han* (The Ohio State University), Kai Chen (The Ohio State University), Witopo Salim (The Ohio State University), Dongzhu Wu (The Ohio State University), Winston Ho (The Ohio State University).

12:20 pm (Room 2, Monday)

Oral 7 - Carbon Molecular Sieves with Superior H₂/CO₂ Separation Properties at Elevated Temperatures for Pre-combustion CO₂ Capture

Haiqing Lin* (The State University of New York at Buffalo), Hien Nguyen (The State University of New York at Buffalo), Maryam Omidvar (The State University of New York at Buffalo).

12:40 pm (Room 2, Monday)

Oral 8 - Carbon Capture Performance of Crosslinked Polyphosphazene Blend Membranes

Victor A Kusuma* (National Energy Technology Laboratory), Zi Tong (National Energy Technology Laboratory), Lingxiang Zhu (National Energy Technology Laboratory), Joshua McNally (Idaho National Laboratory), James Baker (National Energy Technology Laboratory), Christopher Orme (Idaho National Laboratory), David Hopkinson (National Energy Technology Laboratory), Frederick Stewart (National Energy Technology Laboratory).

1:00 pm (Room 2, Monday)

Oral 9 - Design and Techno-Economic Analysis of a Zeolite Membrane Reactor Intensified IGCC Process

Lie Meng (Arizona State University), Haoren Lu (Nexant, Inc.), Gerald Choi (Nexant, Inc.), Jerry Lin* (Arizona State University).

1:20 pm (Room 2, Monday)

Oral 10 - Synthesis of Sterically Hindered Polyvinylamine and Its Application in Facilitated Transport Membranes for CO₂ Capture from Flue Gas

Ting-Yu Chen* (The Ohio State University), Xuepeng Deng (The Ohio State University), Li-Chiang Lin (The Ohio State University), Winston Ho (The Ohio State University).

Oral 3 – SEAWATER DESALINATION ...pg. 5

12 pm – 1:40 pm, ROOM 3

Session Chairs

Bill Phillip

University of Notre Dame

12:00 pm (Room 3, Monday)

Oral 11 - New Insights into Solute-Selectivity Relationship of Thin-Film Composite Polyamide Membranes

Xi Chen* (Columbia University), Chanhee Boo (Columbia University), Ngai Yin Yip (Columbia University).

12:20 pm (Room 3, Monday)

Oral 12 - Omniphobic PVDF-HFP nanofibrous membrane with Pine-needle-like hierarchical TiO₂ nanostructures: Towards enhanced performance for membrane distillation

Weihua Qing* (New Jersey Institute of Technology), Xianhui Li (The University of Hong Kong), Chuyang Tang (University of Hong Kong / University of New South Wales).

12:40 pm (Room 3, Monday)

Oral 13 - Energy Barriers for Decoupled Cation and Anion Transport in Sub-nanometer Pores

Xuechen Zhou* (Yale University), Razi Epsztein (Technion), Jaehong Kim (Yale University), Menachem Elimilech (Yale University).

1:00 pm (Room 3, Monday)

Oral 14 - High Free Volume, Ion-containing Pentiptycene-based Polysulfone Membranes for Water Purification Application

Tao Wang* (University of Notre Dame), Ruilan Guo (University of Notre Dame), Feng Gao (University of Notre Dame), Bill Phillip (University of Notre Dame).

1:20 pm (Room 3, Monday)

Oral 15 - Zwitterionic Polysulfone Membranes for Pervaporation

Tejaswi Nori* (Arizona State University).

Oral 4 – EMERGING MATERIALS FOR LIQUID SEPARATION I ...pg. 8**12 pm – 1:40 pm, ROOM 4****Session Chairs****Hee-Jeung Oh**

The Pennsylvania State University

Baoxia Mi

University of Berkeley, California

Piran Kidambi

Vanderbilt University

12:00 pm (Room 4, Monday)**Oral 16 - Charge-modified polysulfones as a platform for membrane separations**

Matthew Green* (Arizona State University), Yi Yang (Arizona State University), Mani Modayil Korah (Arizona State University), Hoda Shokrollahzadeh Behbahani (Arizona State University), Tejaswi Nori (Arizona State University).

12:20 pm (Room 4, Monday)**Oral 17 - Diffusion-Induced in situ Growth of Covalent Organic Frameworks for Composite Membranes**

Priyanka Manchanda* (King Abdullah University of Science and Technology), Suzana Nunes (King Abdullah University of Science and Technology).

12:40 pm (Room 4, Monday)**Oral 18 - Lyotropic Liquid Crystals with Water-Continuous Nanostructure as Thin-film Composite Nanofiltration Membranes**

Yizhou Zhang* (University of Pennsylvania), Chinedum Osuji (University of Pennsylvania).

1:00 pm (Room 4, Monday)**Oral 20 - Two-Dimensional Covalent Organic Frameworks with Various Backbones and Pore Surface Engineering as Selective Layers of Thin-Film Composite Membranes**

Phuoc Duong (University of Wyoming), Valerie Kuehl (University of Wyoming), Veronica Spaulding (University of Wyoming), Jiashi Yin (University of Wyoming), John Hoberg (University of Wyoming),

Bruce Parkinson (University of Wyoming), Katie Li-Oakey* (University of Wyoming).

Oral 5 – INORGANIC MATERIALS...pg .10**12 pm – 1:40 pm, ROOM 5****Session Chairs****Kumar Varoon Agrawal**

Ecole polytechnique fédérale de Lausanne

Luis Francisco Villalobos

Ecole polytechnique fédérale de Lausanne

12:00 pm (Room 5, Monday)**Oral 21 - Synthesis of polycrystalline ZIF-8 membranes in few minutes for CO₂/N₂ and CO₂/CH₄ separation**

Kumar Varoon Agrawal* (Ecole polytechnique fédérale de Lausanne), Jian Hao (Ecole polytechnique fédérale de Lausanne), Deepu Babu (Ecole polytechnique fédérale de Lausanne).

12:20 pm (Room 5, Monday)**Oral 22 - Zeolite membrane separator for safe Li-ion batteries**

Kishen Rafiz (Arizona State University), Jerry Lin* (Arizona State University).

12:40 pm (Room 5, Monday)**Oral 23 - Preparation and nanofiltration properties of thin film meso-porous oxide membranes via the sonochemical precipitation method**

Minghui Qiu* (Nanjing Tech University), Zhihao Jin (Nanjing Tech University), Hendrik Verweij (The Ohio State University), Yiqun Fan (Nanjing Tech University).

1:00 pm (Room 5, Monday)**Oral 24 - Optimization of the performance of the photocatalytic TiO₂ membranes fabricated by suspension plasma spray (SPS) process**

Elnaz Alebrahim* (Concordia University), Md. Saifur Rahaman (Concordia University), Christian Moreau (Concordia University).

1:20 pm (Room 5, Monday)

Oral 25 - Few-nanometer thick organosilica membranes for high-temperature H₂/CO₂ separation

Haiqing Lin* (The State University of New York at Buffalo), Lingxiang Zhu (Energy National Energy and Technology Laboratory), Liang Huang (The State University of New York at Buffalo).

Oral Sessions - Tuesday

Presenting authors are indicated by an asterisk*. See the most up-to-date version of the program book at www.membranes.org/nams-2020/

Oral 6 - MEMBRANE FOULING II ..pg. 13

11:00 am – 12:40 pm, ROOM 1

Session Chairs

Steven Weinman

The University of Alabama

Dan Miller

Lawrence Berkeley National Laboratory

11:00 am (Room 1, Tuesday)

Oral 26 - Exploring and modeling the effect of pattern geometry on nanofiltration membrane fouling

Anna Malakian* (Clemson University), Lucas Messick (Clemson University), Tara Spitzer (Clemson University), Scott Husson (Clemson University).

11:20 am (Room 1, Tuesday)

Oral 27 - Oscillation induced aggregation to reduce colloidal fouling in microfiltration

Hamdy Abo Zaid (Ben-Gurion University of the Negev), Levi Gheber (Ben-Gurion University of the Negev), Jack Gilron* (Ben-Gurion University of the Negev).

11:40 am (Room 1, Tuesday)

Oral 28 - Living Filtration Membranes Demonstrate Anti-Biofouling Properties

Carson Bechtel (Montana Technological University), Katherine Zodrow* (Montana Technological University).

12:00 pm (Room 1, Tuesday)

Oral 29 - Covalently grafting graphene oxide onto UF membranes to improve antifouling properties

Xiaoyi Chen* (State University of New York at Buffalo), Erda Deng (State University of New York at Buffalo), Dongwon Park (State University of New York at Buffalo), Blaine Pfeifer (State University of New York at Buffalo), Haiqing Lin (State University of New York at Buffalo).

12:20 pm (Room 1, Tuesday)

Oral 30 - Laser-Induced Graphene for Charged Membrane Applications Enabled by Sequential Infiltration Synthesis

David Bergsman* (Massachusetts Institute of Technology), Beza Getachew (Massachusetts Institute of Technology), Jeffrey Grossman (Massachusetts Institute of Technology).

12:40 pm (Room 1, Tuesday)

Oral 151 - Mineral scale formation and dissolution in RO operation in cyclic modes of operation

Yoram Cohen (University of California, Los Angeles), Anditya Rahardianto* (University of California, Los Angeles), Yeunha Kim (University of California, Los Angeles), Tae Lee (University of California, Los Angeles), Muhammad Bilal (University of California, Los Angeles).

Oral 7 – CARBON CAPTURE II ...pg. 16

11:00 am – 12:40 pm, ROOM 2

Session Chairs

Winston Ho

Ohio State University

David Hopkinson

National Energy Technology Laboratory

Katherine Hornbostel

University of Pittsburgh

11:00 am (Room 2, Tuesday)

Oral 31 - High flux CO₂-selective single-layer graphene membranes: synthesis and scale-up

Kumar Varoon Agrawal* (Ecole polytechnique fédérale de Lausanne), Shiqi Huang (Ecole polytechnique fédérale de Lausanne).

11:20 am (Room 2, Tuesday)

Oral 32 - Tuning the transport properties of CANAL ladder polymers by alkyl substitutions and backbone conformation modification

Francesco Maria Benedetti* (Massachusetts Institute of Technology), Holden Lai (Stanford University), Jun Myun Ahn (Stanford University), Zexin Jin (Stanford University), Albert Wu (Massachusetts Institute of Technology), Maria Grazia De Angelis (University of Bologna), Yan Xia (Stanford University), Zachary Smith (Massachusetts Institute of Technology).

11:40 am (Room 2, Tuesday)

Oral 33 - Subambient Carbon Capture using Next Generation Hollow Fiber Membrane Modules at the National Carbon Capture Center

David Hasse* (Air Liquide), Shilu Fu (Air Liquide), Shdhir Kulkarni (Air Liquide), Alex Augustine (Air Liquide), Trapti Chaubey (Air Liquide), Dean Kratzer (Air Liquide), Noemi Collado (Air Liquide).

12:00 pm (Room 2, Tuesday)

Oral 34 - Scalable charge-modified polysulfone IL support membrane morphologies for CO₂ capture in space

Mani Modayil Korah* (Arizona State University), Matthew Green (Arizona State University), Yi Yang (Arizona State University).

12:20 pm (Room 2, Tuesday)

Oral 35 - Ultra-thin supported graphene oxide membrane for CO₂ capture

Yi Zhou* (Ohio State University).

Oral 8 – EMERGING MATERIALS FOR LIQUID SEPARATION II ...pg. 18

11:00 pm – 12:40 pm, ROOM 3

Session Chairs

Hee-Jeung Oh

The Pennsylvania State University

Baoxia Mi

University of Berkeley, California

Piran Kidambi

Vanderbilt University

11:00 am (Room 3, Tuesday)

Oral 36 - Ultrathin Two-Dimensional Covalent Organic Framework (COF) Membranes for Molecular Separations

David Shaffer* (University of Houston), Rahul Shevate (University of Houston).

11:20 am (Room 3, Tuesday)

Oral 37 - Toward Systematic Tuning of Thin-Film Composite Membrane Selectivity

Mackenzie Anderson* (University of California, Los Angeles).

11:40 am (Room 3, Tuesday)

Oral 38 - Dry-Wet Phase Inversion Synthesis Role on Graphene Oxide-Polysulfone Membrane for Membrane Distillation

Lucy M Camacho* (Texas A&M University-Kingsville), Samuel Olatunji (Texas A&M University-Kingsville).

12:00 pm (Room 3, Tuesday)

Oral 39 - Phosphorene- Based Antifouling Membranes: Synthesis, Fabrication and Applications

Joyner Eke* (University of Kentucky), Isabel Escobar (University of Kentucky).

12:20 pm (Room 3, Tuesday)

Oral 40 - Understanding Virus Prefilters in Improving the Filtration Performance of the

Planova BioEX Virus Filter for Monoclonal Antibodies

Solomon Isu* (University of Arkansas), AAA ZZZ (Pennsylvania State University), Xianghong Qian (University of Arkansas), Andrew Zydney (Pennsylvania State University), Ranili Wickramasinghe (University of Arkansas).

Oral 9 – OSMOTICALLY DRIVEN PROCESSES ...pg. 21

11:00 pm – 12:40 pm, ROOM 4

Session Chairs

Tony Straub

University of Colorado Boulder

Andrea Achilli

The University of Arizona

11:00 am (Room 4, Tuesday)

Oral 41 - Reverse-fluxed Draw Solutes Removal and Microalgae Production in an Osmotic Photobioreactor System For Complete Water Recovery from Secondary Effluent

Zixuan Wang* (Washington University in St. Louis), Zhen He (Washington University in St. Louis), Yi-Ying Lee (University of Maryland Center for Environmental Science and University of Maryland Baltimore County), David Scherr (Virginia Polytechnic Institute and State University), Yantao Li (University of Maryland Center for Environmental Science and University of Maryland Baltimore County).

11:20 am (Room 4, Tuesday)

Oral 42 - Zwitterionic Hydrogels with Polyamide-Skin Layers Mitigating Concentration Polarization for Forward Osmosis

Thien Tran* (University at Buffalo, The State University of New York), Shiwei Pan (Wanhua Chemical Group Co., Ltd), Xiaoyi Chen (The State University of New York at Buffalo), Adrienne Blevins (University of Colorado Boulder), Yifu Ding (University of Colorado Boulder), Haiqing Lin (The State University of New York at Buffalo).

11:40 am (Room 4, Tuesday)

Oral 43 - A Simplified Modeling Framework to Investigate Osmotically Driven Processes at the System-scale

Zachary Binger* (The University of Arizona), Andrea Achilli (The University of Arizona).

12:00 pm (Room 4, Tuesday)

Oral 44 - Experimental Demonstration of Power Generation from Fertilizer via Pressure Retarded Osmosis

Pouyan Pourmovahed (Oakland University), Jonathan Maisonneuve* (Oakland University).

12:20 pm (Room 4, Tuesday)

Oral 45 - Mitigation of Biological Fouling in a Forward Osmosis Membrane Bioreactor

Derrick Satterfield (University of Nevada, Reno), Jack Griffin (University of Nevada, Reno), Terin George (University of Nevada, Reno), Sage Hiibel* (University of Nevada, Reno).

Oral 10 – WATER REUSE...pg. 23

11:00 pm – 12:40 pm, ROOM 5

Session Chairs

Vicky Karanikola

Ecole polytechnique fédérale de Lausanne

Jack Girlon

Ben-Gurion University of the Negev

11:00 am (Room 5, Tuesday)

Oral 46 - Desalination for a Circular Water Economy

Megan Mauter* (Stanford University).

11:20 am (Room 5, Tuesday)

Oral 47 - The impact of pre-chlorination on microfiltration fouling during municipal wastewater effluent filtration for water reuse

Kunal Gupta* (Texas A&M University), Shankar Chellam (Texas A&M University).

11:40 am (Room 5, Tuesday)

Oral 48 - Understanding colloidal fouling formation during inline coagulation/ultrafiltration process

Bianca Souza Chaves* (The University of Arizona),
Andrea Achilli (The University of Arizona).

12:00 pm (Room 5, Tuesday)

Oral 49 - Combination of AnMBR with outdoor microalgae cultivation for industrial wastewater treatment, resource recovery and near-zero waste

Roy Bernstein* (Ben-Gurion University at Negev).

12:20 pm (Room 5, Tuesday)

Oral 50 - Membrane Surface Characterization Upon Cleaning of a Heavily Fouled Reverse Osmosis Membrane from an Advanced Reclamation Facility

Bilal Abada* (Texas A&M University), Shankar Chellam (Texas A&M University).

Oral Sessions - Wednesday

Presenting authors are indicated by an asterisk*. See the most up-to-date version of the program book at www.membranes.org/nams-2020/

Oral 11 – POLYMERIC AND MIXED-MATERIALS – GAS SEPARATION I ...pg 26

11:00 am – 12:40 pm, ROOM 1

Session Chairs

Ben Sundell

Armaco

Zachary Smith

Massachusetts Institute of Technology

Xiaoli Ma

University of Wisconsin-Milwaukee

11:00 am (Room 1, Wednesday)

Oral 51 - Effect of thermal treatment on the structure and gas transport properties of a triptycene-based polybenzoxazole exhibiting configurational free volume

Ryan D. Crist (University of Oklahoma), Zihan Huang (University of Notre Dame), Ruilan Guo (University of Notre Dame), Michele Galizia* (University of Oklahoma).

11:20 am (Room 1, Wednesday)

Oral 52 - Optimizing Plasticization Benefits of Polyimides for Membrane-based Natural Gas Sweetening

Yang Liu* (Georgia Institute of Technology), William Koros (Georgia Institute of Technology), Gongping Liu (Nanjing Tech University), Mohamed Eddaoui (King Abdullah University of Science and Technology), Zhijie Chen (King Abdullah University of Science and Technology).

11:40 am (Room 1, Wednesday)

Oral 53 - New Facilitated Transport Membranes for Hydrogen Purification from Coal-Derived Syngas

Yang Han* (The Ohio State University), Xuepeng Deng (The Ohio State University), Li-Chiang Lin (The Ohio State University), Winston Ho (The Ohio State University).

12:00 pm (Room 1, Wednesday)

Oral 54 - High Performance Gas Separation Membranes from CANAL Ladder Polymerization

Yan Xia (Stanford University), Holden Lai* (Stanford University).

12:20 pm (Room 1, Wednesday)

Oral 55 - Carbon Molecular Sieve Membranes for Petrochemical Gas Separations

Surendar Venna* (Dow Inc.), Thomas Fitzgibbons (Dow Inc.), Derrick Flick (Dow Inc.), James Heard (Dow Inc.), Jay (Junqiang) Liu (The Dow Chemical Company), Hali McCurry (Dow Inc.), Nikki Montanez (Dow Inc.), Gerard Rogers (Dow Inc.), Li Tang (Dow Inc.), Cole Witham (Dow Inc.), Abhishek Roy (Dow Inc.).

Oral 12 – BIOINSPIRED AND BIOMIMETIC MATERIALS...pg. 28

11:00 am – 12:40 pm, ROOM 2

Session Chairs

Yuexiao Shen

Texas Tech University

Patrick Saboe

National Renewable Energy Laboratory

11:00 am (Room 2, Wednesday)

Oral 56 - Artificial Water Channels- toward biomimetic membranes for desalination

Mihail Barboiu* (Institut Europeen des Membranes).

11:20 am (Room 2, Wednesday)

Oral 57 - Nature-inspired ion conducting polymers for energy conversion and storage devices

Shudipto K Dishari* (University of Nebraska-Lincoln).

11:40 am (Room 2, Wednesday)

Oral 58 - Ultra-High Ionic Exclusion Through Carbon Nanomembranes

Yang Yang (Bielefeld University), Roland Hillmann (Bielefeld University), Yubo Qi (Bielefeld University), Riko Korzetz (Bielefeld University), Niklas Biere (Bielefeld University), Daniel Emmrich (Bielefeld University), Michael Westphal (Bielefeld University), Björn Büker (Bielefeld University), Andreas Hütten (Bielefeld University), André Beyer (Bielefeld University), Dario Anselmetti (Bielefeld University), Armin Götzhäuser* (Bielefeld University).

12:00 pm (Room 2, Wednesday)

Oral 59 - High Density Membrane Protein-Polymer Nanosheets-Based Biomimetic Membranes

Yu-Ming Tu* (The University of Texas at Austin), Woochul Song (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin), Manish Kumar (The University of Texas at Austin).

12:20 pm (Room 2, Wednesday)

Oral 60 - Biomimetic carbon nanotube and AAO systems utilizing electro-dynamic interfaces

Bruce Hinds* (University of Washington).

Oral 13 – MICROPOROUS / CATALYTIC MATERIALS ...pg. 30

11:00 am – 12:40 pm, ROOM 3

Session Chairs

Ayse Asatekin

Tufts University

Will Tarpeh

Stanford University

Vlad Tarabara

Michigan State University

11:00 am (Room 3, Wednesday)

Oral 61 - Membranes with Integrated Nanomaterials: Material Science Advances and Applications

Dibakar Bhattacharyya* (University of Kentucky), Hongyi (Derek) Wan (University of Kentucky), Anthony Saad (University of Kentucky), Ronald Vogler (University of Kentucky), Trisha Nickerson (University of Kentucky), Ashish Aher (University of Kentucky), Saiful Islam (University of Kentucky).

11:20 am (Room 3, Wednesday)

Oral 62 - Efficient Ammonia Decomposition in a Catalytic Membrane Reactor to Enable Hydrogen Storage and Utilization

Zhenyu Zhang (CSM), Javishk Shah (CSM), J. Douglas Way (CSM), Colin Wolden* (Colorado School of Mines).

11:40 am (Room 3, Wednesday)

Oral 63 - Tuning Ultrafiltration Membrane Performance via Surface Graft Polymerization of Acrylic Acid Enabled by Air Plasma Activation

Yian Chen* (University of California, Los Angeles), Soomin Kim (University of California, Los Angeles), Yoram Cohen (University of California, Los Angeles).

12:00 pm (Room 3, Wednesday)

Oral 64 - Monitoring protein fouling on patterned membranes by light microscopy and simulation

Anna Malakian* (Clemson University), Bowen Ling (Stanford University), Ilenia Battiato (Stanford University), Scott Husson (Clemson University).

12:20 pm (Room 3, Wednesday)

Oral 65 - Influences of Microwave Irradiation on Performances of Membrane Filtration and Catalytic Degradation of Perfluorooctanoic Acid (PFOA)

Fangzhou Liu* (New Jersey Institute of Technology).

**Oral 14 – HIGH SALINITY
STREAMS, BRINE MINIMIZATION
AND ZLD ...pg. 33**

11:00 am – 12:40 pm, ROOM 4

Session Chairs

Kerri Hickenbottom

The University of Arizona

Jon Brant

University of Wyoming

11:00 am (Room 4, Wednesday)

**Oral 66 - Minimal and zero liquid discharge
with reverse osmosis using low-salt-
rejection membranes**

Zhangxin Wang* (Yale University), Menachem Elimelech (Yale University), Akshay Deshmukh (Yale University), Yuhao Du (Yale University).

11:20 am (Room 4, Wednesday)

**Oral 67 - Evaluation of Integrated
Electrocoagulation-Microfiltration and Direct
Contact Membrane Distillation Processes
for Treating Produced Water**

Mahmood Jebur* (University of Arkansas), Ranil Wickramasinghe (University of Arkansas), Mahdi Malmali (Texas Tech University), Xianghong Qian (University of Arkansas), Yunxia Hu (Tianjin Polytechnic University), Yuhe Cao (University of Arkansas), Yu-Hsuan Chiao (University of Arkansas).

11:40 am (Room 4, Wednesday)

**Oral 68 - A Novel Membrane Distillation-
Crystallization Approach for Inland Brine
Treatment**

Evangelos Balis (University of Nevada, Reno), Jack Griffin (University of Nevada, Reno), Sage Hiibel* (University of Nevada, Reno).

12:00 pm (Room 4, Wednesday)

**Oral 69 - Critical Analysis of Membrane
Distillation at High Salinity**

Mukta Hardikar* (The University of Arizona), Andrea Achilli (The University of Arizona).

12:20 pm (Room 4, Wednesday)

**Oral 70 - Testing mineral scaling
propensities of fluorinated and non-
fluorinated polyamide thin film composite
membranes**

Sankaranarayanan Ayyakudi Ravichandran* (University of Colorado Boulder), Josue Velasco (University of Colorado Boulder), Saied Delagah (U.S. Department of Interior), John Pellegrino (University of Colorado).

**Oral 15 – PROCESS
INTENSIFICATION AND
INTEGRATION ...pg. 35**

11:00 am – 12:40 pm, ROOM 5

Session Chairs

Hannah Murnen

Compact Membrane Systems

Ed Sanders

Air Liquide

11:00 am (Room 5, Wednesday)

**Oral 71 - Energy Efficiency of Electro-Driven
Brackish Water Desalination: Electrodialysis
Significantly Outperforms Membrane
Capacitive Deionization**

Mohan Qin* (University of Wisconsin-Madison), Sohun Patel (Yale University), W. Shane Walker (The University of Texas at El Paso), Menachem Elimelech (Yale University).

11:20 am (Room 5, Wednesday)

**Oral 72 - CO₂-Selective Membrane for
Enhancing H₂ Utilization in Solid Oxide Fuel
Cells**

Kai Chen* (The Ohio State University), Witopo Salim (Membrane Technology & Research Inc.), Yang Han (The Ohio State University), Mike Gasda (Bloom Energy Corporation), Winston Ho (The Ohio State University).

11:40 am (Room 5, Wednesday)

Oral 73 - Flow Patterns through densely packed hollow fibers: a CFD study for membrane distillation

Albert Kim* (University of Hawaii), Hyeon-Ju Kim (Korea Research Institute of Ships and Ocean Engineering), Deok-Soo Moon (Korea Research Institute of Ships and Ocean Engineering).

12:00 pm (Room 5, Wednesday)

Oral 74 - Analysis of Membrane Processes for CO₂ Removal and H₂ Reuse for Solid Oxide Fuel Cells

Kai Chen* (The Ohio State University), Yang Han (The Ohio State University), Mike Gasda (Bloom Energy Corporation), Winston Ho (The Ohio State University).

12:20 pm (Room 5, Wednesday)

Oral 75 - Experimental evaluation of an optimized concentration gradient battery

Fei Liu* (University of North Carolina at Chapel Hill), Ryan Kingsbury (University of North Carolina at Chapel Hill), Mikayla Armstrong (University of North Carolina at Chapel Hill), Orlando Coronell (University of North Carolina at Chapel Hill).

Oral 16 – POLYMERIC AND MIXED-MATERIALS – GAS SEPARATION II ...pg. 38

1:00 pm – 3:00 pm, ROOM 1

Session Chairs

Ben Sundell

Armaco

Zachary Smith

Massachusetts Institute of Technology

Xiaoli Ma

University of Wisconsin-Milwaukee

1:00 pm (Room 1, Wednesday)

Oral 76 - Microporous Pentiptycene-based Polymers with Heterocyclic Rings for High Performance Gas Separation Membranes

Zihan Huang* (University of Notre Dame), Claire Yin (University of Notre Dame), Gregory Kline (University of Notre Dame), Ruilan Guo (University of Notre Dame).

1:20 pm (Room 1, Wednesday)

Oral 77 - High-Performance Gas Separation Membranes Based on Poly(benzimidazole)

Alexander Bridge* (The University of Texas at Austin), Joshua Moon (The University of California Santa Barbara), Joan Brennecke (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin).

1:40 pm (Room 1, Wednesday)

Oral 78 - Polybenzimidazole-Derived Carbon Molecular Sieve Hollow Fiber Membranes with Tailored Oxygen Selective Transport

Jong Geun Seong* (Los Alamos National Laboratory), John Matteson (Los Alamos National Laboratory), Jeremy Lewis (Los Alamos National Laboratory), John Baca (Los Alamos National Laboratory), Alexander Josephson (Los Alamos National Laboratory), Troy Holland (Los Alamos National Laboratory), Joel Kress (Los Alamos National Laboratory), Kathryn Berchtold (Los Alamos National Laboratory), Rajinder Pal Singh (Los Alamos National Laboratory).

2:00 pm (Room 1, Wednesday)

Oral 79 - Tailoring structural and functional features of high-performance ionenes and ionic composites designed for membrane-based gas separations

Kathryn O'Harra* (University of Alabama), Irshad Kammakam (University of Alabama), Jason Bara (University of Alabama).

2:20 pm (Room 1, Wednesday)

Oral 80 - Azo-UiO-66 MOF for low-energy CO₂ capture adsorbents and mixed matrix membranes for CO₂/N₂ separation

Bradley Ladewig* (Karlsruhe Institute of Technology), Nicholas Prasetya (Imperial College London).

2:40 pm (Room 1, Wednesday)

Oral 81 - Physical aging of sub-micron PBI membranes at elevated temperatures

Melanie Merrick* (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin).

Oral 17 – MEMBRANE SYNTHESIS AND CASTING I ...pg. 41

1:00 pm – 3:00 pm, ROOM 2

Session Chairs

Christine Duval

Case Western Reserve University

1:00 pm (Room 2, Wednesday)

Oral 82 - Polyamide Nanofiltration Membrane with Highly Uniform Sub-nanometre Pores for Sub-1Å Precision Separation

Yuanzhe Liang* (Vanderbilt University).

1:20 pm (Room 2, Wednesday)

Oral 83 - Synthesis of Ultrahigh MW Polyvinylamine for Incorporation in Membranes for CO₂ Capture

Kai Chen* (The Ohio State University), Yang Han (The Ohio State University), Winston Ho (The Ohio State University).

1:40 pm (Room 2, Wednesday)

Oral 84 - Surface Patterning of Microporous Membranes using Thermally Induced Phase Separation under Confinement

Shouhong Fan* (University of Colorado at Boulder), Yifu Ding (University of Colorado Boulder).

2:00 pm (Room 2, Wednesday)

Oral 85 - Membrane with cross-linked zwitterionic nanopores achieves sub-nanometer separations

Samuel J Lounder* (Tufts University), Ayse Asatekin (Tufts University).

2:20 pm (Room 2, Wednesday)

Oral 86 - Highly Permeable and Selective Crosslinked Polymer Membranes for Energy Efficient Gas Separation

Si Li* (University of Notre Dame), Gregory Kline (University of Notre Dame), Ruilan Guo (University of Notre Dame).

2:40 pm (Room 2, Wednesday)

Oral 152 - Lyotropic liquid crystal templating for making ultrafiltration membranes

Sahar Qavi (New Mexico State University), Aaron Lindsay (New Mexico State University), Millicent Firestone (Los Alamos National Laboratory), Reza Foudazi* (New Mexico State University).

Oral 18 – DOWNSTREAM BIOPROCESSING ... pg. 43

1:00 pm – 3:00 pm, ROOM 3

Session Chairs

Prity Bengani-Lutz

Repligen

Onur Kas

UCB

James McGrath

University of Rochester

1:00 pm (Room 3, Wednesday)

Oral 87 - Membrane adsorbers for medical isotope purification

Christine E Duval* (Case Western Reserve University), Maura Sepesy (Case Western Reserve University), Priyanka Suresh (Case Western reserve University).

1:20 pm (Room 3, Wednesday)

Oral 88 - New Multimodal Anion-Exchange Membranes for Polishing of Biologics

Joshua Osuofa* (Clemson University), Daniel Henn (Purilogics, LLC), Anna Forsyth (Purilogics, LLC), Jinxiang Zhou (Purilogics, LLC), Scott Husson (Clemson University).

1:40 pm (Room 3, Wednesday)

Oral 89 - Fouling and Retention Behavior of BioOptimal MF-SL Microfilter during Cell Culture Harvesting

Ranil Wickramasinghe (University of Arkansas), Xianghong Qian* (University of Arkansas), Da Zhang (University of Arkansas).

2:00 pm (Room 3, Wednesday)

Oral 90 - Development of nanopocket membranes for tangential flow analyte capture (TFAC) of extracellular vesicles

Thomas Gaborski* (Rochester Institute of Technology), Mehdi Dehghani (Rochester Institute of Technology), Shayan Gholizadeh (Rochester Institute of Technology).

2:20 pm (Room 3, Wednesday)

Oral 91 - Catch and Display Diagnostics: Capturing Non-protein Biologics on Ultrathin Silicon Membranes Using Size and Affinity-based Separations

Michael Klaczko* (University of Rochester), Kilean Lucas (University of Rochester), William Houlihan (University of Rochester), Julia Kuebel (University of Rochester), Jonathan Flax (University of Rochester), Richard Waugh (University of Rochester), James McGrath (University of Rochester).

Oral 19 – MEMBRANE CHARACTERIZATION ...pg. 45

1:00 pm – 3:00 pm, ROOM 4

Session Chairs

Santiago Romero

University of Edinburgh

1:00 pm (Room 4, Wednesday)

Oral 92 - Tailoring the Structure and Performance of Model Polyamide-based Membranes for Desalination

William Mulhearn (NIST), Peter Beaucage (NIST), Ryan Nieuwendaal (NIST), Christopher Soles (NIST), Christopher Stafford* (NIST).

1:20 pm (Room 4, Wednesday)

Oral 93 - Applying Transition-State Theory to Model Solute Transport in Membranes with Sub-nanometer Pores

Razi Epsztein* (Technion), Ryan M. Duchanois (Yale University), Cody L. Ritt (Yale University), Menachem Elimelech (Yale University).

1:40 pm (Room 4, Wednesday)

Oral 94 - Unraveling the Clay-Membrane Interactions during An Osmotically Driven Process via Optical Coherence Tomography

Xin Liu* (Southern University of Science and Technology), Weiyi Li (Southern University of Science and Technology).

2:00 pm (Room 4, Wednesday)

Oral 95 - Local density and free volume inhomogeneities govern transport properties in reverse osmosis membranes

Michael Geitner* (The Pennsylvania State University), Tyler Culp (The Pennsylvania State University), Abhishek Roy (Dow), Mou Paul (Dow), Steve Jons (DuPont), Jeffrey Wilbur (DuPont Water Solutions), Manish Kumar (The University of Texas at Austin), Enrique Gomez (The Pennsylvania State University).

2:20 pm (Room 4, Wednesday)

Oral 96 - Probing the Structure and Dynamics of Membranes under Realistic Operating Conditions, using Operando Spectroscopy

Casey O'Brien* (University of Notre Dame).

1:40 pm (Room 5, Wednesday)

Oral 99 - Functionalized Ceramic Ion Exchange Membranes for Electrodialysis

Gregory M Newbloom* (Membrion, Inc.), Rachel Malone (Membrion, Inc.), Ryan Kingsbury (Membrion, Inc.), Aditya Salunkhe (Membrion, Inc.).

Oral 20 – MEMBRANES FOR ELECTROCHEMICAL APPLICATIONS I ...pg. 47

1:00 pm – 3:00 pm, ROOM 5

Session Chairs

Geoff Geise

University of Virginia

Orlando Coronell

University of North Carolina at Chapel Hill

Chris Arges

Louisiana State University

Shudipto Dishari

University of Nebraska

2:00 pm (Room 5, Wednesday)

Oral 100 - Tradeoff in membranes for artificial photosynthesis: Ion transport and product crossover

Sarah M Dischinger* (Lawrence Berkeley National Laboratory), Dan Miller (Lawrence Berkeley National Laboratory), Blaine Carter (Lawrence Berkeley National Laboratory), Shubham Gupta (Lawrence Berkeley National Laboratory).

2:20 pm (Room 5, Wednesday)

Oral 101 - Highly Selective Ion Separations with Pressure-driven Flow through Charged Nanoporous Membranes

Chao Tang* (University of Notre Dame), Andriy Yaroshchuk (Polytechnic University of Catalonia), Merlin Bruening (University of Notre Dame).

1:00 pm (Room 5, Wednesday)

Oral 97 - Modelling and validation of concentration dependence of ion exchange membrane permselectivity: significance of convection and Manning's counter-ion condensation theory

Ryan Kingsbury* (University of North Carolina at Chapel Hill), Orlando Coronell (University of North Carolina at Chapel Hill).

1:20 pm (Room 5, Wednesday)

Oral 98 - The Influence of Ion Association on Ion Solubility in Ion Exchange Membranes

Rahul Sujnani* (The University of Texas at Austin), Oscar Nordness (The University of Texas at Austin), Joshua Saunders (The University of Texas at Austin), Joan Brennecke (The University of Texas at Austin), Lynn Katz (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin).

Oral Sessions - Thursday

Presenting authors are indicated by an asterisk*. See the most up-to-date version of the program book at www.membranes.org/nams-2020/

Oral 21 – MOLECULAR AND PROCESS MODELING ...pg. 50

11:00 am – 12:40 pm, ROOM 1

Session Chairs

David Warsinger

Purdue University

Shihong Lin

Vanderbilt University

11:00 am (Room 1, Thursday)

Oral 102 - Effect of packing nonuniformity at the fiber bundle-case interface on flow distribution and separation performance for hollow fiber membrane modules

Lili Sun (University of Toledo), Atabong Etiendem (University of Toledo), Glenn Lipscomb* (University of Toledo, Toledo).

11:20 am (Room 1, Thursday)

Oral 103 - Estimating fluid pressure gradients within crosslinked aromatic polyamide using molecular dynamics

Riley Vickers* (University of North Carolina at Chapel Hill), Timothy Weigand (University of North Carolina at Chapel Hill), Casey Miller (University of North Carolina at Chapel Hill), Orlando Coronell (University of North Carolina at Chapel Hill).

11:40 am (Room 1, Thursday)

Oral 104 - High-throughput computational prediction of the cost of carbon capture using mixed matrix membranes

Janice Steckel* (U.S. Department of Energy), Christopher Wilmer (University of Pittsburgh), Samir Budhathoki (DOE/NETL), Olukayode Ajayi (Brewer Science).

12:00 pm (Room 1, Thursday)

Oral 105 - Opportunities for high productivity and selectivity desalination via osmotic distillation with improved membrane design

Anthony Straub (University of Colorado Boulder), Sangsuk Lee* (University of Colorado Boulder).

12:20 pm (Room 1, Thursday)

Oral 106 - Ion association as key element in RO and NF modeling

Viatcheslav Freger* (Technion – IIT)

Oral 22 – MEMBRANE SYNTHESIS AND CASTING II ...pg. 52

11:00 am – 12:40 pm, ROOM 2

Session Chairs

Christine Duval

Case Western Reserve University

11:00 am (Room 2, Thursday)

Oral 107 - Atomically Thin Graphene Membranes for Desalination and Molecular Separations

Piran Kidambi* (Vanderbilt University).

11:20 am (Room 2, Thursday)

Oral 108 - A Comparison of PolarClean, Gamma-Valerolactone and their Mixture as Bio-derived solvents for Polysulfone Membrane Fabrication

Xiaobo Dong* (University of Kentucky), Tequila Harris (Georgia Tech), Isabel Escobar (University of Kentucky).

11:40 am (Room 2, Thursday)

Oral 109 - Electrospun Pretreatment Membranes

Husain Mithaiwala* (Arizona State University), Matthew Green (Arizona State University).

12:00 pm (Room 2, Thursday)

Oral 110 - Aqueous phase separation of responsive copolymers for sustainable and mechanically stable membranes

Wouter Nielen* (University of Twente), Joshua D. Willott (University of Twente), Wiebe M. de Vos (University of Twente).

12:20 pm (Room 2, Thursday)

Oral 111 - Stepwise synthesis of oligoamide film on porous supports for preparing new types of membranes

Paramita Manna (Ben-Gurion University of the Negev), Roy Bernstein (Ben Gurion University), Ron Kasher* (Ben Gurion University of the Negev).

Oral 23 – MEMBRANE DISTILLATION AND PERVAPORATION ...pg. 54

11:00 am – 12:40 pm, ROOM 3

Session Chairs

Lee Vane

United States Environmental Protection Agency

11:00 am (Room 3, Thursday)

Oral 112 - Elucidating the Trade-off between Membrane Wetting Resistance and Water Vapor Flux in Membrane Distillation

Chenxi Li (University of British Columbia), Xuesong Li (Tongji University), Xuwei Du (Colorado State University), Ying Zhang (University of British Columbia), Tiezheng Tong (Colorado State University), Arun Kota (North Carolina State University), Jongho Lee* (University of British Columbia).

11:20 am (Room 3, Thursday)

Oral 113 - Cost optimization of gap membrane distillation

Timothy V Bartholomew* (National Energy Technology Laboratory), Alexander Dudchenko (Stanford University), Nicholas Siefert (National

Energy Technology Laboratory), Meagan Mauter (Stanford University).

11:40 am (Room 3, Thursday)

Oral 114 - Modeling Pilot-Scale Air Gap Membrane Distillation as a Special Case of Permeate Gap Membrane Distillation

Mukta Hardikar* (The University of Arizona), Phakdon (University of Arizona), Itzel Marquez (Central Michigan University), Eduardo Saez (University of Arizona), Andrea Achilli (The University of Arizona).

12:00 pm (Room 3, Thursday)

Oral 115 - Economic Evaluation of Membrane Distillation as a Competitive Brackish Water Desalination Technology

Haamid S Usman* (Concordia University), Md. Saifur Rahaman (Concordia University), Khaled Touati (Concordia University).

12:20 pm (Room 3, Thursday)

Oral 116 - Conducting thermal energy to the membrane/water interface for the enhanced desalination of hypersaline brines using membrane distillation

Jingbo Wang* (University of California, Los Angeles), Yiming Liu (University of California, Los Angeles), Unnati Rao (University of California, Los Angeles), Navid Ebrahimi (University of California, Los Angeles), Eric Hoek (University of California, Los Angeles), Tzahi Cath (Colorado School of Mines), Nils Tilton (Colorado School of Mines), Craig Turchi (NREL), Yongho Sungtaek Ju (University of California, Los Angeles), David Jassby (University of California, Los Angeles).

Oral 24 – MODULE MODELING AND DESIGN ...pg. 57

11:00 am – 12:40 pm, ROOM 4

Session Chairs

David Ladner

Clemson University

Nils Tilton

Colorado School of Mines

Grigorios Panagakos

National Energy Technology Lab

11:00 am (Room 4, Thursday)

Oral 117 - Rough or wiggly? Membrane topology and morphology for fouling control

Bowen Ling* (Stanford University), David Ladner (Clemson University), Ilenia Battiato (Stanford University).

11:20 am (Room 4, Thursday)

Oral 118 - Characterization of laminar, transitional, and turbulent flow regime in membrane modules

Alexander Dudchenko* (Stanford University), Meagan Mauter (Stanford University).

11:40 am (Room 4, Thursday)

Oral 119 - 3D Numerical simulations of temperature polarization in vacuum membrane distillation systems with active membrane heating

Mark Dudley* (Colorado School of Mines), Nils Tilton (Colorado School of Mines), David Jassby (UCLA), Eric Hoek (UCLA), Craig Turchi (NREL), Tzahi Cath (Colorado School of Mines), Michael Heeley (Colorado School of Mines).

12:00 pm (Room 4, Thursday)

Oral 120 - Direct numerical simulations of unsteady mixing in direct contact membrane distillation systems with different spacer blockages and vertical offsets

Jincheng Lou (Colorado School of Mines), Jacob Johnston (Colorado School of Mines), Denis Martinand (University of Aix Marseille), Nils Tilton* (Colorado School of Mines).

12:20 pm (Room 4, Thursday)

Oral 121 - Hydrodynamic load exerted on a moving bundle of hollow fibers using constraint dissipative hydrodynamics: hydrorattle simulation

Albert S. Kim* (University of Hawaii at Manoa), Kwang Jin Lee (Kolon Industries, Inc.), Moo Seok Lee (Kolon Industries, Inc.), Hyeon-Ju Kim (Korea Research Institute of Ships and Ocean Engineering), Jung-Hyun Moon (Korea Research Institute of Ships and Ocean Engineering).

Oral 25 – MEMBRANES FOR ELECTROCHEMICAL

APPLICATIONS II ...pg. 59

11:00 am – 12:40 pm, ROOM 5

Session Chairs

Geoff Geise

University of Virginia

Orlando Coronell

University of North Carolina at Chapel Hill

Chris Arges

Louisiana State University

Shudipto Dishari

University of Nebraska

11:00 am (Room 5, Thursday)

Oral 122 - Understanding water-splitting thermodynamics and kinetics in micropatterned bipolar membranes

Subarna Kole* (Louisiana State University), Christopher Arges (Louisiana State University).

11:20 am (Room 5, Thursday)

Oral 123 - Co-permeation behavior of methanol and acetate in polyether-based cation exchange membranes

Jung Min Kim* (Auburn University), Bryan Beckingham (Auburn University).

11:40 am (Room 5, Thursday)

Oral 124 - Carbon nanotube thin film deposition on hollow fiber membranes: addressing the scalability challenges of conductive membranes

Melissa J Larocque* (McMaster University), David Latulippe (McMaster University), Charles De Lannoy (McMaster University).

12:00 pm (Room 5, Thursday)

Oral 125 - Selective ion conducting membranes for non-aqueous redox flow battery applications

Patrick McCormack (University of Virginia), Hongxi Luo (University of Virginia), Gary Koenig (University of Virginia), Geoffrey M Geise* (University of Virginia).

12:20 pm (Room 5, Thursday)

Oral 126 - Graphene/Nafion Based Membrane Structure for Crossover Mitigation in Energy Storage and Conversion Systems

Saheed A Bukola* (National Renewable Energy Laboratory), Zhaodong Li (National Renewable Energy Laboratory), Christopher Antunes (National Renewable Energy Laboratory), Jason Zack (National Renewable Energy Laboratory), Glenn Teeter (National Renewable Energy Laboratory), Jeffrey Blackburn (National Renewable Energy Laboratory), Bryan Pivovar (National Renewable Energy Laboratory).

Oral 26 – ORGANIC SOLVENT SEPARATIONS ...pg. 61

1:00 pm – 3:00 pm, ROOM 1

Session Chairs

Ryan Lively

Georgia Institute of Technology

Steve White

Membrane Technology and Research

Michele Galizia

University of Oklahoma

Neel Rangnekar

ExxonMobil

1:00 pm (Room 1, Thursday)

Oral 127 - Molecular origin of flux non-linearity in Organic Solvent Nanofiltration

Kelly P. Bye (University of Oklahoma), Michele Galizia* (University of Oklahoma).

1:20 pm (Room 1, Thursday)

Oral 128 - Thin-film nanocomposite membranes with enhanced permeability and selectivity for organic solvent forward osmosis

Bofan Li* (National University of Singapore), Susilo Japip (National University of Singapore), Tai-Shung Chung (National University of Singapore).

1:40 pm (Room 1, Thursday)

Oral 129 - Studies in separation of organic solvent mixtures during reverse osmosis and nanofiltration by a perfluorodioxole copolymer membrane

John Chau (New Jersey Institute of Technology), Kamallesh Sirkar* (New Jersey Institute of Technology).

2:00 pm (Room 1, Thursday)

Oral 130 - Complex aromatic hydrocarbon mixture OSRO separation using defect-engineered Torlon® hollow fiber membranes

Hye Youn Jang (Georgia Institute of Technology),
Ryan Lively (Georgia Institute of Technology).

2:20 pm (Room 1, Thursday)

Oral 131 - Organic solvent nanofiltration (OSN) membranes for separation of close-boiling mixtures and high-boilers

Petrus Cuperus* (SolSep BV), Ingrid Wienk (SolSep BV).

2:40 pm (Room 1, Thursday)

Oral 150 - Polymer Membrane-based Liquid Hydrocarbon Fractionation

Ronita Mathias* (Georgia Institute of Technology), Kirstie Thompson (Georgia Institute of Technology), Daeok Kim (Imperial College London), Jihoon Kim (Imperial College London), Neel Rangnekar (ExxonMobil), JR Johnson (ExxonMobil), Scott Hoy (ExxonMobil Research and Engineering), Irene Bechis (Imperial College London), Andrew Tarzia (Imperial College London), Kim Jelfs (Imperial College London), Benjamin McCool (ExxonMobil Research and Engineering), Andrew Livingston (Imperial College London), M.G. Finn (Georgia Institute of Technology), Ryan Lively (Georgia Institute of Technology).

Oral 27 – CONTAMINANT REMOVAL FROM WATER ...pg 64

1:00 pm – 3:00 pm, ROOM 2

Session Chairs
Prakhar Prakash
Chevron

1:00 pm (Room 2, Thursday)

Oral 132 - Adsorption of organic micropollutants to polymer surfaces probed by second harmonic scattering laser spectroscopy

Will Cole (University of California Berkeley), Hoyun Wei (University of California Berkeley), Son Nguyen

(University of California Merced), Charles Harris (University of California Berkeley), Dan Miller* (LBNL), Richard Saykally (University of California Berkeley).

1:20 pm (Room 2, Thursday)

Oral 133 - Laser-induced graphene polymer composite membranes as electrically active filters for contaminant removal

Christopher J Arnusch* (Ben Gurion University of the Negev).

1:40 pm (Room 2, Thursday)

Oral 134 - Printing zwitterionic copolymer thin film composite (TFC) membranes: Enabling Tunability of Thickness and Remarkable Permeances for Nanofiltration Applications

Xin Qian* (University of Connecticut), Jeffrey McCutcheon (University of Connecticut), Ayse Asatekin (Tufts University), Samuel Louder (Tufts University), Tulasi Ravindran (University of Connecticut).

2:00 pm (Room 2, Thursday)

Oral 135 - Enhancing antimicrobial properties of Chitosan/ Graphene Oxide membrane for waste water treatment application

Raheleh Daneshpour* (University of Arkansas), Lauren Greenlee (University of Arkansas).

2:20 pm (Room 2, Thursday)

Oral 136 - Early-stage membrane fouling detection for improving membrane cleaning efficiency

Thomas Schäfer* (Polymat, University of the Basque Country), Iliane Rafaniello (POLYMAT, University of the Basque Country).

Oral 28 – INDUSTRIAL APPLICATIONS ...pg. 66

1:00 pm – 3:00 pm, ROOM 3

Session Chairs

Dibakar Bhattacharyya
University of Kentucky

CJ Kurth

Solecta Membranes

1:00 pm (Room 3, Thursday)

Oral 137 - Produced water desalination using high temperature membranes

Cheng Chen* (Chevron), Prakash Prakash (Chevron), Xiaofei Huang* (Hydranautics), Rich Franks (Hydranautics).

1:20 pm (Room 3, Thursday)

Oral 138 - Membrane based upgrading of Biogas: Using Realtime Controls and Selective Distribution of Membrane Types to Effectively Respond to Varying Gas Flow and Gas Quality

Steven K Pedersen* (Evonik Canada Inc.), Erik Hoving (Evonik Cooperation).

1:40 pm (Room 3, Thursday)

Oral 139 - Industrial Applications of Membranes in the Membrane Science, Engineering and Technology (MAST) Center at the University of Arkansas

Ranil Wickramasinghe* (University of Arkansas).

2:00 pm (Room 3, Thursday)

Oral 140 - High Throughput Development of Carbon Molecular Sieve Membranes and Adsorbents for Olefin/Paraffin Separations

Jay (Junqiang) Liu* (The Dow Chemical Company).

Oral 29 – AWARDS SESSION ...pg. 68

1:00 pm – 3:00 pm, ROOM 4

Session Chairs

Caleb Funk

DuPont

Bruce Hinds

University of Washington

1:00 pm (Room 4, Thursday)

Oral 141 - 3D Printed Adsorber for Capturing Chemotherapy Drugs before They are Released in the Body

Hee Jeung Oh* (Pennsylvania State University), Mariam Aboian (Yale University), Michael Yi (University of California, Berkeley), Jacqueline Maslyn (University of California, Berkeley), Whitney Loo (University of California, Berkeley), Xi Jiang (Lawrence Berkeley National Laboratory), Dilworth Parkinson (Lawrence Berkeley National Laboratory), Mark Wilson (University of California, San Francisco), Teri Moore (UCSF), Colin Yee (UCSF), Gregory Robbins (Carbon, Inc.), Florian Barth (Carbon, Inc.), Joseph DeSimone (Carbon, Inc.), Steven Hettis (University of California, San Francisco), Nitash Balsara (University of California, Berkeley).

1:20 pm (Room 4, Thursday)

Oral 142 - Mechanical properties of thin-film composite membranes and the roles they play on transport in osmotic processes

Jaime Idarraga-Mora* (Clemson University), Anthony Childress (Clemson University), Parker Friedel (Clemson University), Michael Lemelin (Clemson University), Alton O'Neal (Clemson University), Morgan Pfeiler (Clemson University), Steven Weinman (The University of Alabama), Apparao Rao (Clemson University), David Ladner (Clemson University), Scott Husson (Clemson University).

1:40 pm (Room 4, Thursday)

Oral 143 - Engineering Selective Desalination Membranes by Controlling Functional Group Configuration

Hongxi Luo* (University of Virginia), Kevin Chang (University of Virginia), Kevin Bahati (University of Virginia), Geoffrey Geise (University of Virginia).

2:00 pm (Room 4, Thursday)

Oral 144 - More than wetting resistance: How membrane surface wettability regulates water vapor permeability and mineral scaling in membrane distillation

Tiezheng Tong* (Colorado State University), Xuewei Du (Colorado State University), Wei Wang (North Carolina State University), Arun Kota (North Carolina State University), Yiming Yin (Colorado State University), Kofi Christie (Vanderbilt University), Shihong Lin (Vanderbilt University).

2:20 pm (Room 4, Thursday)

Oral 145 - Comprehensive study of dissolved methane harvesting using omniphobic membrane contactor

Abhishek Dutta* (University of British Columbia).

2:40 pm (Room 4, Thursday)

Oral 146 - Quantification of the CO₂-induced plasticization of glassy polymer and CMS film membranes from the behavior of CH₄ diffusivity, and how observations of multicomponent sorption and permeation rectified recurring

Giuseppe Genduso* (King Abdullah University of Science and Technology), Ingo Pinnau (KAUST).

Oral 30 – MEMBRANES FOR ELECTROCHEMICAL APPLICATIONS III ...pg. 72

1:00 pm – 3:00 pm, ROOM 5

Session Chairs

Geoff Geise

University of Virginia

Orlando Coronell

University of North Carolina at Chapel Hill

Chris Arges

Louisiana State University

Shudipto Dishari

University of Nebraska

1:00 pm (Room 5, Thursday)

Oral 147 - Tailoring Non-Aqueous Electrolyte Concentration enables Optimum Ion Transport in Pentablock Terpolymer Cation Exchange Membranes

Michelle Lehmann* (University of Tennessee), Jameson Tyler (University of Tennessee), Ethan Self (Oak Ridge National Laboratory), Jagjit Nanda (Oak Ridge National Laboratory), Tomonori Saito (Oak Ridge National Laboratory), Thomas Zawodzinski (University of Tennessee).

1:20 pm (Room 5, Thursday)

Oral 148 - Powering up Biomedical Devices by Harnessing Energy from Reverse Electrodialysis using Sodium Concentrations from the Flow of Human Blood

Efecan Pakkaner* (University of Arkansas), Jessica Orton (University of Arkansas), Jamie Hestekin (University of Arkansas), Christa Hestekin (University of Arkansas).

1:40 pm (Room 5, Thursday)

Oral 149 - Ionic conductivity of ion exchange membranes: Measurement techniques and salt concentration dependence

José Carlos (University of Michigan, Ann Arbor),
Jovan Kamcev* (University of Michigan, Ann Arbor).

Poster Sessions - Monday

Presenting authors are indicated by an asterisk*. See the most up-to-date version of the program book at www.membranes.org/nams-2020/

Poster 1: Materials ...pg. 74

2:00 pm – 3:00 pm

Session Chairs

Boya Xiong

The University of Alabama

Beza Getachew

Massachusetts Institute of Technology

Yuexiao Shen

Texas Tech University

Poster 1 - Influence of aliphatic and aromatic fluorine groups on the gas permeability and morphology of fluorinated polyimides

Albert Wu* (MIT), James Drayton (MIT), Katherine Mizrahi Rodriguez (MIT), Zach Smith (MIT).

Poster 2 - Interlayer Spacing and Separation Performance of Graphene Oxide Membranes in Organic Solvent

Sunxiang Zheng* (University of California, Berkeley), Baoxia Mi (University of California, Berkeley).

Poster 3 - Fluoride- and Hydroxide-Containing Facilitated Transport Membranes for CO₂ Removal From Solid Oxide Fuel Cells

Kai Chen* (The Ohio State University), Witopo Salim (Membrane Technology & Research Inc.), Yang Han (The Ohio State University), Mike Gasda (Bloom Energy Corporation), Winston Ho (The Ohio State University).

Poster 4 - Advancing NF Membranes: Role of Surface Charge and Support

Francisco Leniz* (University of Kentucky), Dibakar Bhattacharyya (University of Kentucky), Isabel Escobar (University of Kentucky).

Poster 5 - The development of honeycomb-graphene oxide coated porous polymeric membranes

Feihu Wang* (Ben-Gurion University of the Negev).

Poster 7 - Activated Carbon as a Photothermal Absorber for Solar Driven Air-Gap Membrane Distillation

Maryam AlQaydi* (Khalifa University), Arwa Alshareif (Khalifa University), Ibrahim Mustafa (Khalifa University), Faisal AlMarzooqi (Khalifa University), Hassan Arafat (Khalifa University).

Poster 8 - Application of 3D Printed Minimal Surface Area Spacers on PVDF Membranes for Treating Fracking Wastewater via Membrane Distillation

Shahriar Habib* (The University of Alabama), Steven Weinman (The University of Alabama).

Poster 9 - Molecularly Engineered 6FDA-based Polyimide Membranes for Sour Natural Gas Separation

Zhongyun Liu* (Georgia Institute of Technology), Yang Liu (Georgia Institute of Technology), Wulin Qiu (Georgia Institute of Technology), William Koros (Georgia Institute of Technology).

Poster 10 - Membrane with cross-linked zwitterionic nanopores achieves sub-nanometer separations

Samuel Lounder* (Tufts University), Ayse Asatekin (Tufts University).

Poster 11 - Tuning Pore Size and Robustness of Membranes Formed by Scalable Self-Assembly of Random Copolymer Micelles

Luca Mazzaferro* (Tufts University), Ilin Sadeghi (Massachusetts Institute of Technology), Ayse Asatekin (Tufts University).

Poster 12 - Electron tomography reveals the 3D microstructure of virus filtration membranes

Kaitlyn Brickey (Pennsylvania State University), Andrew Zydney (Penn State University), Enrique Gomez (Penn State University).

Poster 13 - Tuning the binding strength of membrane adsorbers in radiochromatography

Priyanka Suresh* (Case Western reserve University), Christine Duval (Case Western Reserve University).

Poster 14 - Resilient Hollow Fiber Nanofiltration Membranes Fabricated from Copolymers

Michael Dugas* (University of Notre Dame).

Poster 17 - Effect of Metal Ions Dissociated in Cross-linked Poly(Ethylene Oxide) (XLPEO) on Physical Properties and Gas Transport Characteristics

Taliehsadat Alebrahim* (The State University of New York at Buffalo), Alisa Chakraborty (The State University of New York at Buffalo), Haiqing Lin (The State University of New York at Buffalo).

Poster 19 - High Density Membrane Protein-Polymer Nanosheets-Based Biomimetic Membranes

Yu-Ming Tu* (The University of Texas at Austin), Woochul Song (University of Texas at Austin), Benny Freeman (The University of Texas at Austin), Manish Kumar (University of Texas at Austin).

Poster 20 - Polyvinyl Alcohol (PVA) Hydrogel Underlayer to Support CVD Graphene on Ultrafiltration Membranes as a Support for Water Desalination

Mansour Saberi* (Clemson University), Scott Husson (Clemson University), Stephen Creager (Clemson University).

Poster 21 - Ion Transport Improvement by Surface Modified Beads

Jamie Hestekin (University of Arkansas), Leticia Santos de Souza* (University of Arkansas), John Moore (University of Arkansas), Christa Hestekin (University of Arkansas).

Poster 22 - Surface Nano-structuring with Tethered Poly(acrylic acid) Chains for Tuning Ultrafiltration Membrane Performance

Yian Chen* (University of California, Los Angeles), Yoram Cohen (University of California, Los Angeles).

Poster 23 - Membrane Capacitive Deionization using Quaternized Polymer Blends

Robert McNair* (University of Manchester), Robert Dryfe (University of Manchester), Gyorgy Szekely (King Abdullah University of Science and Technology).

Poster 24 - Ion-Stabilized Organic Solvent Nanofiltration Membranes from PIM/PBI Polymer Blends

Gergo Ignacz* (King Abdullah University of Science and Technology), Gyorgy Szekely (King Abdullah University of Science and Technology).

Poster 25 - Synthesis and Gas Transport Properties of CO₂-philic Anionic Poly(ionic liquid) Composite Membranes

Irshad Kammakam* (University of Alabama), Jason Bara (University of Alabama).

Poster 26 - Synthesis and Characterization of Chlorinated RO Membrane Model Compounds – Insights into the Role of N-Cl Species in the Chlorination of Polyamide Membranes

Dean Welsh* (DuPont / FilmTec Corporation), Rachel Ehlert (DuPont), Kyoungmoo Koh (DuPont), Mou Paul (Dow), Tom Peterson (Dow), Nipon Pothayee (Dow), Mark Rickard (DuPont), Abhishek Roy (DOW), David Wilson (Dow).

Poster 27 - Spray-Coated Graphene Oxide Hollow Fibers for Nanofiltration

Gheorghe Falca* (King Abdullah University of Science and Technology), Lakshmeesha Upadhyaya (King Abdullah University of Science and Technology), Valentina Elena Musteata (King Abdullah University of Science and Technology), Suzana Nunes (King Abdullah University of Science and Technology).

Poster 28 - Laser-Induced Graphene for Charged Membrane Applications Enabled by Sequential Infiltration Synthesis

David Bergsman* (Massachusetts Institute of Technology), Beza Getachew (MIT), Jeffrey Grossman (Massachusetts Institute of Technology).

Poster 31 - Nafion based mosaic nanofiltration membranes with tuneable charge and permeability

Michael Zelner* (Technion - IIT), Philipp Jahn (Universität Duisburg-Essen), Mathias Ulbricht (Universität Duisburg-Essen), Viatcheslav Freger (Technion - IIT).

Poster 32 - Graphene Oxide (GO) Nanocomposite Anion Exchange Membranes for Improved Electrodialysis

Levente Cseri* (University of Manchester), Peter M. Budd (University of Manchester), Gyorgy Szekely (King Abdullah University of Science and Technology).

Poster 33 - Large-Area Composite-Membrane based on Ultra-Thin Carbon Nanomembranes

Nikolaus Meyerbroeker* (CNM Technologies GmbH), Polina Angelova (CNM Technologies GmbH), Henning Vieker (CNM Technologies GmbH), Albert Schnieders* (CNM Technologies GmbH).

Poster 34 - Biomimetic carbon nanotube-containing membranes for water purification

Mauricio Dantus (Technion), Yun-Chiao Yao (Lawrence Livermore National Laboratory), Aleksandr Noy (Lawrence Livermore National Laboratory), Viatcheslav Freger (Technion - IIT).

Poster 35 - Preparation of organic solvent and thermal resistant polytriazole membranes with enhanced mechanical properties

Stefan Chisca* (KAUST), Gheorghe Falca (KAUST), Valentina Elena Musteata (King Abdullah University of Science and Technology), Suzana Nunes (King Abdullah University of Science and Technology).

Poster 36 - Hydrogen-sieving single-layer graphene membranes obtained by crystallographic and morphological optimization of catalytic copper foil

Mojtaba Rezaei* (Ecole polytechnique fédérale de Lausanne), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne).

Poster 37 - Nanoporous, Ionic, Lyotropic Liquid Crystal Polymer Membranes: permanent pore modification, characterization of ion-exchange properties, and fabrication of ultrathin films

Michael McGrath* (University of Colorado at Boulder).

Poster 38 - Porous, high surface area polymers with controlled pore size <20 nm, via 1-step controlled radical polymerization

Mahati Chintapalli* (PARC).

Poster 39 - Oxone®-Mediated TEMPO-Oxidized Cellulose Nanomaterials Form I and Form II

John Moore* (University of Arkansas).

Poster 40 - 6FDA-based Ionic Polyimides-Ionic Liquid Composites for Advanced Gas Separation

Grayson Dennis* (University of Alabama).

Poster 136 - Single-layer graphene membranes by crack-free transfer for gas separation with sub-angstrom resolution

Shiqi Huang* (Ecole polytechnique fédérale de Lausanne), Jing Zhao (Nanjing Tech University), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne).

Poster 137 - Centimeter-Scale Gas-Sieving Nanoporous Single-Layer Graphene Membrane

Wan-Chi Lee (Ecole polytechnique fédérale de Lausanne), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne).

Poster 138 - Synthetic saponite clays as additives for reducing aging effects in PIM-1 membranes

Federico Begni (Università degli Studi del Piemonte Orientale), Geo Paul (Università degli Studi del Piemonte Orientale), Elsa Lasseuguette* (University of Edinburgh), Enzo Mangano (University of Edinburgh), Chiara Bisio (Università degli Studi del Piemonte Orientale), Maria-Chiara Ferrari (U. Edinburgh), Giorgio Gatti (Università degli Studi del Piemonte Orientale).

Poster 139 - Free volume manipulation of a 6FDA-HAB polyimide using a solid-state protection/deprotection strategy

Sharon Lin* (Massachusetts Institute of Technology), Taigyoo Joo (Massachusetts Institute of Technology), Francesco Maria Benedetti (Massachusetts Institute of Technology), Laura Chen (Massachusetts Institute of Technology), Albert Wu (MIT), Katherine Mizrahi Rodriguez (MIT), Qihui Qian (Massachusetts Institute of Technology), Cara Doherty (CSIRO), Zach Smith (MIT).

Poster 140 - Facile and time-efficient carboxylic acid functionalization of PIM-1: effect on molecular packing and gas separation performance

Katherine Mizrahi Rodriguez* (MIT), Albert Wu (MIT), Qihui Qian (Massachusetts Institute of Technology), Gang Han (MIT), Sharon Lin (Massachusetts Institute of Technology), Hyunhee Lee (MIT), Won Seok Chi (Chonnam National University), Francesco Maria Benedetti (Massachusetts Institute of Technology), Cara Doherty (CSIRO), Zach Smith (MIT).

Poster 141 - Strategy for acquiring high CO₂ permeance performance for dense ceramic-carbonates membranes by total conductivity modification

Oscar Ovalle* (Arizona State University), Jerry Lin (Arizona State University).

Poster 149 - Synthesis and in situ functionalization of microfiltration membranes via high internal phase emulsion templating

Ryan Zowada* (New Mexico State University), Muchu Zhou (New Mexico State University), Reza Foudazi (New Mexico State University), Anna Malakian (Clemson University).

Poster Sessions - Tuesday

Presenting authors are indicated by an asterisk*. See the most up-to-date version of the program book at www.membranes.org/nams-2020/

Poster 2: Processes ...pg. 92

1:00 pm – 2:00 pm

Session Chairs

Boya Xiong

Massachusetts Institute of Technology

Beza Getachew

Massachusetts Institute of Technology

Yuexiao Shen

Texas Tech University

Poster 41 - Polyelectrolyte complexation induced Aqueous Phase Separation for the next generation of sustainable membranes

Muhammad Irshad Baig* (University of Twente), Elif Nur Durmaz (University of Twente), Joshua D. Willott (University of Twente), Wiebe M. de Vos (University of Twente).

Poster 42 - Impact of Post-Synthetic Modification Routes on Filler Structure and Performance in Metal–Organic Framework Based Mixed-matrix Membranes

Qihui Qian* (Massachusetts Institute of Technology).

Poster 43 - Nanofiltration Membranes by Salinity Gradient Induced Aqueous Phase Separation

Elif Nur Durmaz* (University of Twente), Muhammad Irshad Baig (University of Twente), Joshua D. Willott (University of Twente), Wiebe M. de Vos (University of Twente).

Poster 44 - Co-permeation behavior of methanol and acetate in polyether-based cation exchange membranes

Jung Min Kim* (Auburn University), Bryan Beckingham (Auburn University).

Poster 45 - Radio frequency induction heated membranes in vacuum membrane distillation

Arezou Anvari* (Temple University), Avner Ronen (Temple University).

Poster 46 - Using Inorganic Salts in Forward Osmosis to Remove Water from High Osmotic Pressure Mineral Processing Effluents

Noel Devaere* (University of Toronto), Vladimiro Papangelakis (University of Toronto).

Poster 47 - Radio Frequency Induction Heated Membranes in Vacuum Membrane Distillation

Arezou Anvari* (Temple University), Avner Ronen (Temple University).

Poster 48 - Membrane Processes for CO₂ Removal and H₂ Reuse for Solid Oxide Fuel Cells: Process Design and Techno-Economic Analysis

Kai Chen* (The Ohio State University), Yang Han (The Ohio State University), Mike Gasda (Bloom Energy Corporation), Winston Ho (The Ohio State University).

Poster 49 - Conducting thermal energy to the membrane/water interface for the enhanced desalination of hypersaline brines using membrane distillation

Jingbo Wang* (University of California, Los Angeles), Yiming Liu (University of California, Los Angeles), Unnati Rao (UCLA), Navid Ebrahimi (University of California, Los Angeles), Eric Hoek (UCLA), Tzahi Cath (Colorado School of Mines), Nils Tilton (Colorado School of Mines), Craig Turchi (NREL), Yongho Sungtaek Ju (University of California, Los Angeles), David Jassby (UCLA).

Poster 50 - Membrane Surface Characterization Upon Cleaning of a Heavily Fouled Reverse Osmosis Membrane from an Advanced Reclamation Facility

Bilal Abada* (Texas A&M University), Shankar Chellam (Texas A&M University).

Poster 51 - Biomimetic Analysis of crown ethers as ion channels for rapid and selective Li⁺ transport

Chenhao Yao* (University of Texas at Austin), Manish Kumar (University of Texas at Austin), Nathaniel Lynd (The University of Texas at Austin).

Poster 52 - Multiphysics Simulation of CO₂ Removal from Seawater using Hollow Fiber Membrane Contactors

Joanna Rivero (University of Pittsburgh).

Poster 53 - Reactive membranes to prevent fouling by generating in situ microbubbles

Weiliang Bai* (University of Texas at Austin), Manish Kumar (University of Texas at Austin), Navid Saleh (University of Texas at Austin).

Poster 54 - The Influence of Ion Association on Ion Solubility in Ion Exchange Membranes

Rahul Sujanani* (The University of Texas at Austin), Oscar Nordness (The University of Texas at Austin), Joshua Saunders (The University of Texas at Austin), Joan Brennecke (The University of Texas at Austin), Lynn Katz (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin).

Poster 55 - Enhanced water evaporation through graphene nanopores via the Kelvin effect

Yuhang Fang* (Purdue University), Prabudhya Roy Chowdhury (Purdue University), Xiulin Ruan (Purdue University), David Warsinger (Purdue University).

Poster 56 - Batch counterflow reverse osmosis for energy efficient desalination at high recoveries

Abhimanyu Das* (Purdue University), David Warsinger (Purdue University).

Poster 57 - The Effect of Microplastic Shape, Size, and Concentration on Membrane Performance in Municipal Wastewater Treatment

Ryan LaRue* (McMaster University), Blake Patterson (McMaster University), Todd Hoare (McMaster University), David Latulippe (McMaster University).

Poster 58 - Does modifying commercial reverse osmosis membranes with solvent pre-treatment and additional polymerization enhance water permeability and salt rejection?

Mikayla Armstrong* (University of North Carolina at Chapel Hill), Orlando Coronell (University of North Carolina at Chapel Hill).

Poster 59 - Thin-film composite gas separation membranes prepared by interfacial polymerization of macrocyclic molecules

Woochul Song* (The University of Texas at Austin), Jaesung Park (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin), Manish Kumar (The University of Texas at Austin).

Poster 60 - Development of Novel Processes for the Synthesis of Membranes with Special Wettability

Siamak Nejadi* (University of Nebraska-Lincoln).

Poster 61 - Dissipative Particle Dynamics Simulation of PVDF Membrane Formation via Non-Solvent Induced Phase Separation Process

Suphanat Aphinyan (University of Arkansas), Eric Ledieu (University of Arkansas), David Ford (University of Arkansas), Xianghong Qian (University of Arkansas).

Poster 62 - Influences of Microwave Irradiation on Performances of Membrane Filtration and Catalytic Degradation of Perfluorooctanoic Acid (PFOA)

Fangzhou Liu* (NJIT).

Poster 63 - Performance of Combining Ozonation, Ceramic Membrane Filtration with Biological Activated Carbon Filtration for the Advanced Treatment of Hypersaline Petrochemical Wastewater

Jinting Hu* (Tsinghua Shenzhen International Graduate School).

Poster 64 - Cinchona-decorated cyclodextrin organocatalyst for asymmetric synthesis in a continuous-flow membrane reactor

Peter Kisszekelyi* (Budapest University of Technology and Economics) Abdulaziz Alammar (University of Manchester), Jozsef Kupai (Budapest University of Technology and Economics), Peter Huszthy (Budapest University of Technology and Economics) Barabas Julia (Budapest University of Technology and Economics), Tibor Holtzl (Budapest University of Technology and Economics), Lajos Szente (Cyclolab, Ciklodextrin Kutató-Fejlesztő Kft), Carlo Bawn (University of Manchester), Ralph Adams (University of Manchester), Gyorgy Szekely (King Abdullah University of Science and Technology).

Poster 65 - Membrane Separation of Nitrogen and Phosphorus Nutrients with Downstream Recovery as Struvite Fertilizer

Zahra Anari* (University of Arkansas), Lauren Greenlee (University of Arkansas).

Poster 66 - Effects of resin bead chemistries on the selective removal of industrially relevant metal ions using wafer-enhanced electrodeionization

Humeyra Ulusoy Erol* (University of Arkansas), Jamie Hestekin (University of Arkansas), Christa Hestekin (University of Arkansas).

Poster 67 - Ceramic membrane centered hybrid processes for water treatment

WANYI FU* (Tsinghua University), Xihui Zhang (Tsinghua University).

Poster 69 - Membrane charge weakly affects ion transport in reverse osmosis

Mikhail Stolov* (Technion - Israel Institute of Technology).

Poster 70 - Experimental measurement of single- and mixed-gas permeation through photo-responsive gas membranes

Bradley Ladewig* (Karlsruhe Institute of Technology), Jinju Zhang (Karlsruhe Institute of Technology), Nicole Jung (Karlsruhe Institute of Technology).

Poster 71 - Radical filtration for Water Purification

Shuyana Heredia* (University of Twente).

Poster 72 - membrane-toolkit: a Python package for fast, accurate, automated experimental data management

Ryan Kingsbury* (University of North Carolina at Chapel Hill).

Poster 73 - In-situ measurement of the mechanical properties of a foulant layer at a membrane surface

Jose Agustin Epstein* (Technion - Israel Institute of Technology), Guy Ramon (Technion - Israel Institute of Technology).

Poster 74 - On the reliability and comparability of organic solvent nanofiltration reports

Hai Anh Le Phuong* (The University of Manchester), Christopher F. Blanford (The University of Manchester), Gyorgy Szekely (King Abdullah University of Science and Technology).

Poster 76 - Experimental Design Study of Reinforced Hollow Fiber Membrane Casting

Walter Kosar* (Arkema Inc.), Gregory O'Brien (Arkema Inc.), Michele Crane (Arkema Inc.).

Poster 77 - Determination of Carbon Nanomembrane Permeability Coefficients via Radioactive Tracer Experiments

Raphael Dalpke (Bielefeld University), Anna Dreyer (Bielefeld University), Riko Korzetz* (Bielefeld University), André Beyer (Bielefeld University), Karl-Josef Dietz (Bielefeld University), Armin Gölzhäuser (Bielefeld University).

Poster 79 - Biocatalytic membrane reactor using immobilized phosphotriesterase for the degradation of pesticides

Giuseppe Vitola (National Research Council of Italy, Institute on Membrane Technology, CNR-ITM), Rosalinda Mazzei (National Research Council of Italy, Institute on Membrane Technology, CNR-ITM), Lidietta GIORNO* (National Research Council of Italy - Institute on Membrane Technology (CNR-ITM)).

Poster 80 - Membrane Filtration of Poly(dT60) Single-Stranded DNA

Hossein Nouri Alavijeh* (Clarkson University), Ruth E. Baltus (Clarkson University).

Poster 81 - Scaling Resistance in Nanophotonics-Enabled Solar Membrane Distillation

Francois Perreault* (Arizona State University).

Poster 82 - Generalized model for the prediction of the permeability of mixed-matrix using impermeable fillers of diverse geometry

Haoyu Wu* (University of Ottawa), Boguslaw Kruczek (University of Ottawa), Jules Thibault (U. Ottawa).

Poster 83 - Factors controlling the structure formation in isoporous hollow fiber membranes

Kirti Sankhala* (Helmholtz-Zentrum Geesthacht, Geesthacht), D. C. Florian Wieland (Helmholtz-Zentrum Geesthacht, Geesthacht), Joachim Koll (Helmholtz-Zentrum Geesthacht, Geesthacht), Maryam Radjabian (Helmholtz-Zentrum Geesthacht, Geesthacht), Clarissa Abetz (Helmholtz-Zentrum Geesthacht), Volker Abetz (Helmholtz-Zentrum Geesthacht).

Poster 84 - Solubility of Rare Earth Sulfates and Chlorined toward Electrochemical Membrane Recovery: Effect of pH

Mohammad U. Shafiq (Texas A&M University-Kingsville), Lucy Camacho* (Texas A&M University-Kingsville).

Poster 142 - Improved batch reverse osmosis configuration for better energy efficiency

Sandra Cordoba* (Purdue University), Abhimanyu Das (Purdue University), David Warsinger (Purdue University).

Poster 143 - Microalgae Filtration using Electrochemically Reactive Ceramic Membrane: Filtration Performances, Fouling Kinetics and Foulant Layer Characteristics

Qingquan Ma* (NJIT).

Poster 144 - Green solvent PVC ultrafiltration membrane

Baicang Liu* (Sichuan University), Wancen Xie (Sichuan University).

Poster 145 - Porous single-layer graphene membranes for carbon capture

Kuang-Jung Hsu* (Ecole polytechnique fédérale de Lausanne), Shiqi Huang (Ecole polytechnique fédérale de Lausanne), Guangwei He (Ecole polytechnique fédérale de Lausanne), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne).

Poster 146 - Bimodal Reverse Osmosis and Pressure Retarded Osmosis Framework

Akshay Rao* (Purdue University), Stephen Coan (Purdue University), Luke Wrede (Purdue University), Owen Li (Purdue University), George Elias (Purdue University), Sandra Cordoba (Purdue University), Michael Roggenburg (Purdue University), David Warsinger (Purdue University), Luciano Castillo (Purdue University).

Poster 147 - Effect of packing nonuniformity at the fiber bundle-case interface on flow distribution and separation performance for hollow fiber membrane modules

Lili Sun* (University of Toledo), Atabong Etiendem (University of Toledo), Glenn Lipscomb (University of Toledo, Toledo).

Poster 148 - Techniques for Measuring Gas and Vapor Solubility and Transport in Membranes

Mark Roper* (Hiden Isochema Ltd), Darren Broom (Hiden Isochema Ltd), Michael Benham (Hiden Isochema Ltd).

Poster 3: Applications ...pg. 111

2:00 pm – 3:00 pm

Session Chairs**Boya Xiong**

Massachusetts Institute of Technology

Beza Getachew

Massachusetts Institute of Technology

Yuexiao Shen

Texas Tech University

Poster 85 - Super water permeable PVDF UF membrane for fine separation

Shun Shimura* (Toray Industries, Inc.), Hiroki Eimura (Toray Industries, Inc.), Masayuki Hanakawa (Toray Industries, Inc.), Masahiro Kimura (Toray Industries, Inc.).

Poster 86 - Highly Permeable Polyethersulfone Substrates with Bicontinuous Structure for CO₂-Selective Composite Membranes

Ruizhi Pang* (The Ohio State University), Kai Chen (The Ohio State University), Yang Han (The Ohio State University), Winston Ho (The Ohio State University).

Poster 87 - Nutrient recovery from synthetic livestock wastewater effluent using electroactive membranes

Kartikeya Kekre* (Temple University), Arezou Anvari (Temple University), Avner Ronen (Temple University).

Poster 88 - High Aspect Ratio Nanoparticles with Controlled Interfacial Transport for Improved Reverse Osmosis Performance

Ethan Smith* (Virginia Tech), Stephen Martin (Virginia Tech).

Poster 89 - GO-based Membrane as Barrier against Toxic Vapors/Gases vs. Membrane-Supported MOFs

Cheng Peng (New Jersey Institute of Technology), Zafar Iqbal (New Jersey Institute of Technology),

Kamalesh Sirkar* (New Jersey Institute of Technology), Gregory Peterson (U.S. Army Edgewood Chemical Biological Center).

Poster 90 - Sterically Hindered Poly(N-methyl-N-vinylamine) Membranes for CO₂ Capture from Flue Gas

Ting-Yu Chen* (The Ohio State University), Xuepeng Deng (The Ohio State University), Li-Chiang Lin (The Ohio State University), Winston Ho (The Ohio State University).

Poster 91 - The impact of pre-chlorination on microfiltration fouling during municipal wastewater effluent filtration for water reuse

Kunal Gupta* (Texas A&M University), Shankar Chellam (Texas A&M University).

Poster 92 - Rapid Concentration and Isotopic Screening of Plutonium from Aqueous Systems Using Functionalized Membranes

James Foster* (Clemson University), Scott Husson (Clemson University), Timothy DeVol (Clemson University), Brian Powell (Clemson University).

Poster 93 - Amine-Containing CO₂-Selective Membrane and Process for Carbon Capture from Flue Gas

Yang Han* (The Ohio State University), Kai Chen (The Ohio State University), witopo salim (The Ohio State University), dongzhu wu (The Ohio State University), Winston Ho (The Ohio State University).

Poster 94 - Facilitated Transport Membranes with Tunable Amine-CO₂ Chemistry for Hydrogen Purification

Yang Han* (The Ohio State University), Xuepeng Deng (The Ohio State University), Li-Chiang Lin (The Ohio State University), Winston Ho (The Ohio State University).

Poster 95 - High-Performance Gas Separation Membranes Based on Poly(benzimidazole)

Alexander Bridge* (The University of Texas at Austin), Joshua Moon (California Nanosystems Institute, The

University of California Santa Barbara), Joan Brennecke (The University of Texas at Austin), Benny Freeman (The University of Texas at Austin).

Poster 96 - Development and Testing of Pervaporation Desalination Membranes

Elisabeth Thomas* (Arizona State University), Mary Laura Lind (Arizona State University).

Poster 97 - Synthesis of charged PEG macromonomers and their application towards antifouling thin-film composite membranes

Swati Sundararajan* (Ben-Gurion University of the Negev), Ron Kasher (Ben Gurion University of the Negev).

Poster 99 - Membrane Adsorbers for Medical Isotope Production

Maura Sepesy* (Case Western Reserve University), Benjamin Fugate (Case Western Reserve University), Christine Duval (Case Western Reserve University).

Poster 100 - Controlling Membrane Pore Structure of Polyelectrolyte Multilayer Nanofiltration Membranes for Selective Ion Removal

Ryan DuChanois* (Yale University).

Poster 101 - Uranium concentration using reactive polymer thin films and thin-film composite membranes for spectroscopic analyses

Abenazer Darge* (Clemson University), Yugantar Gera (Clemson University), Timothy DeVol (Clemson University), Scott Husson (Clemson University).

Poster 102 - Macrocyclic Nanofiltration Membranes for the Removal of Per- and Polyfluoroalkyl Substances in Drinking Water

Elham Abaie (Texas Tech University), Limeimei XU (Texas Tech University), Yuexiao Shen (Texas Tech University).

Poster 103 - Ultrafiltration for the purification of nucleic acid-based therapeutics

Ivan Manzano* (Penn State University), Andrew Zydney (Penn State University).

Poster 105 - UF membranes modified by covalently grafted graphene oxide with improved antifouling properties

Xiaoyi Chen* (State University of New York at Buffalo), Erda Deng (State University of New York at Buffalo), Dongwon Park (State University of New York at Buffalo), Blaine Pfeifer (State University of New York at Buffalo), Haiqing Lin (The State University of New York at Buffalo).

Poster 106 - Defining new performance metrics for the application of NF membranes in 'tough-to-treat' industrial wastewater applications

Abhishek Premachandra* (McMaster University), Nicole Perna (McMaster University), Susan O'Brien (McMaster University), Jacob McGivern (McMaster University), David Latulippe (McMaster University).

Poster 107 - Printing polyepoxyether thin film composite (TFC) membranes: Achieving membrane chemical robustness with tunable permeance for Nanofiltration Applications

Xin Qian* (University of Connecticut), Jeffrey McCutcheon (University of Connecticut), Rhea Verbeke (KU Leuven), Ivo Vankelecom (KU Leuven).

Poster 108 - A New Concept for Generating Mechanical Work from Gas Permeation

Sarah Moussaddy (Oakland University), Jonathan Maisonneuve* (Oakland University).

Poster 109 - Influences of Membrane Morphology and Biocompatibility on Hemodialysis Treatment Outcomes

Heloisa Westphalen (University of Saskatchewan), Amira abdelrasoul* (University of Saskatchewan).

Poster 110 - Highly permeable polymeric membrane fabrication through interfacial

polymerization of pillar[5]arene artificial water channels

Matthew Skiles (University of Texas at Austin), Woochul Song (University of Texas at Austin), Diana Cintron (University of Texas at Austin), Manish Kumar (University of Texas at Austin).

Poster 111 - Sorption of ternary gas mixtures of CO₂, CH₄ and C₂H₆ in PIM-1, and role of solubility in multicomponent gas separation

Francesco Maria Benedetti* (University of Bologna), Eleonora Ricci (University of Bologna), Antonella Noto (University of Bologna), Maria Grazia De Angelis (University of Bologna), Tim Merkel (Membrane Technology & Research Inc.), Jianyong Jin (The University of Auckland).

Poster 112 - Tailoring structural and functional features of high-performance ionenes and ionic composites designed for membrane-based gas separations

Kathryn O'Harra* (University of Alabama), Irshad Kammakam (University of Alabama), Jason Bara (University of Alabama).

Poster 113 - High-temperature H₂ purification from atom-thick g-C₃N₄ nanosheets hosting ordered nanopores

Luis Francisco Villalobos* (Ecole polytechnique fédérale de Lausanne), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne), Mostapha Dakhchoune (Ecole polytechnique fédérale de Lausanne).

Poster 114 - Interpenetrating Polymer Networks for Organic Solvent Nanofiltration Membranes

Gergo Ignacz* (King Abdullah University of Science and Technology), Gyorgy Szekely (King Abdullah University of Science and Technology).

Poster 115 - Enhancing antimicrobial properties of Chitosan/ Graphene Oxide membrane for waste water treatment application

Raheleh Daneshpour* (University of Arkansas), Lauren Greenlee (University of Arkansas).

Poster 116 - Hindering Lattice Flexibility Of Metal Organic Frameworks For CO₂-sieving

Deepu Babu* (Ecole polytechnique fédérale de Lausanne), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne).

Poster 117 - Graphene-based nanocomposite membranes with a mussel inspired polydopamine coating for produced water treatment

Gyorgy Szekely (King Abdullah University of Science and Technology), Abdulaziz Alammar* (University of Manchester).

Poster 118 - Enhanced Degradation of 1,4-dioxane by Photo-Fenton Reactive Ceramic Membrane

SHAN XUE* (NJIT).

Poster 119 - Zwitterionic-Containing Ultrathin Hydrogel Selective Layer for Fouling-Resistant Ultrafiltration Membranes

Alice Oliveira Aguiar* (Tufts University), Hyunmin Yi (Tufts University), Ayse Asatekin (Tufts University).

Poster 120 - Amphiphilic tercopolymer membranes for water vapor removal in air dehumidification

Faheem Akhtar* (KAUST), Kim Choon Ng (King Abdullah University of Science and Technology (KAUST)), Klaus-Viktor Peinemann (KAUST).

Poster 121 - Synthesis of sodalite precursor nanosheets and facile assembly for hydrogen purification

Mostapha Dakhchoune* (Ecole polytechnique fédérale de Lausanne), Kumar Varoon Agrawal (Ecole polytechnique fédérale de Lausanne), Luis Francisco Villalobos (Ecole polytechnique fédérale de Lausanne).

Poster 122 - Novel Electrospun Nanoparticle Nanofiber Composites for CO₂ separation

Amogh Meshram* (Arizona State University), Bin Mu (Arizona State University).

Poster 123 - Novel Nanofiltration Membranes for Isolation of Pharmaceutical Compounds

Gazelle Vaseghi* (Compact Membrane Systems), Kenneth Pennisi (Compact Membrane Systems), Hannah Murnen (Compact Membrane Systems), Sudip Majumdar (Compact Membrane Systems).

Poster 124 - Nexar Coated Hollow fibers for membrane dehumidification

Lakshmeesha Upadhyaya* (KAUST).

Poster 126 - A novel RGO-CCNT-based catalytic membrane with co-enhanced permeability and catalytic activity for high-efficiency degradation of charged antibiotics

Wenli Jiang* (University of California Berkeley), Sunxiang Zheng (University of California, Berkeley), Monong Wang (UC Berkeley), Baoxia Mi (UC Berkeley).

Poster 127 - Energy and performance optimization for electro dialysis water treatment

Zahra Abbasian Chaleshtari (New Mexico State University), Abdulhameed Alalwani (New Mexico State University), Reza Foudazi* (New Mexico State University).

Poster 128 - Enhancement of Nanofiltration Membranes through Chemical Bonding of Lignosulfonic Acid

Phillip Sandman* (University of Kentucky).

Poster 129 - TiO₂ Nanowires Based System for Urea Photodecomposition and Dialysate Regeneration

Guozheng Shao* (Univ. of Wash.), Yushi Zang (University of Washington), Bruce Hinds (Univ. of Washington).

Poster 130 - Improving Membrane Performance for CO₂ Capture With Ultrahigh MW Polyvinylamine

Kai Chen* (The Ohio State University), Yang Han (The Ohio State University), Winston Ho (The Ohio State University).

Poster 131 - Haloorganic Sorption and Degradation by Temperature Responsive Membranes

Rollie Mills* (University of Kentucky).

Poster 133 - The impact of monochloramines and dichloramines on reverse osmosis membranes in wastewater potable reuse process trains: A pilot-scale study

HYEJIN LEE (McMaster University), Amin Halali (McMaster University), Siva Sarathy (Trojan Technologies), Charles-François de Lannoy* (McMaster).

Poster 134 - Synchrotron-based X-ray Spectroscopy to Investigate the Fouling Mechanism on Reverse Osmosis Membranes

Valerie Niemann* (Stanford University), Hans-Georg Steinrück (Paderborn University), Michael Toney (SLAC National Accelerator Laboratory), William Tarpeh (Stanford University), Sharon Bone (SLAC National Accelerator Laboratory).

Poster 135 - Detection of biofouling on gold-coated MF membranes by in-situ electrical impedance spectroscopy

Nan Zhang* (McMaster University), HYEJIN LEE (McMaster University), Charles-François de Lannoy (McMaster University).

Poster 4: Undergraduate Competition ...pg. 133

2:00 pm – 3:00 pm

Session Chairs**Boya Xiong**

Massachusetts Institute of Technology

Beza Getachew

Massachusetts Institute of Technology

Yuexiao Shen

Texas Tech University

UG 1 - Enhancing the Energy Efficiency of Desalination via Batch Reverse Osmosis

Katie Brodersen* (Purdue University).

UG 2 - Continuous covalent organic framework membranes for dye/salt separation

Miguel Jaimes* (UW-Milwaukee).

UG 3 - Functionalization of Polyvinylidene Fluoride Membranes for Ion Separation Applications

Ronald Vogler* (University of Kentucky), Saiful Islam (University of Kentucky), Dibakar Bhattacharyya (U. Kentucky).

UG 4 - Ammonia and Water Flux in Membrane Distillation Using Spacers

Nobuyo Watanabe* (Barnard College of Columbia University).

UG 5 - A Liquid-liquid Hollow-Fiber Membrane contactor device to remove oceanic CO₂

Christopher Snodgrass* (University of Pittsburgh).

UG 6 - Predicting Octanol/Water Partition Coefficients from Molecular Structure

Vy (Jasmine) Tran* (Miami University).

UG 7 - Evaluating Electrocoagulation Process for Treating Produced Water

Alix-Cynthia-Ineza Karangwa* (University of Arkansas).

UG 8 - Influence of molecular interactions, membrane swelling and plasticization on pure and mixed fluid transport in OSN membranes

Kelly Bye* (University of Oklahoma).

UG 9 - Reduced graphene oxide membranes: properties and potential water applications

Trisha Nickerson* (University of Kentucky), Ashish Aher (U. Kentucky), Dibakar Bhattacharyya (U. Kentucky).

UG 11 - Perylene-Polyimide membranes

Aryan Louise Tan* (UCLA).

UG 12 - Effect of mechanical strain on the transport properties of thin-film composite membranes used in osmotic processes

Alton O'Neal* (Clemson University).

UG 13 - Advanced Water Treatment for Direct Potable Reuse

Ciara Lugo* (University of Arizona).