



DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

Engineering Next-Generation Membranes for a Sustainable Future

Professor Nicholas LOW
Nanjing Tech University, China

Date: May 22, 2024 (Wednesday)
Time: 2:00 p.m. – 3:00 p.m.
Venue: Room 612B, 6/F Haking Wong Building, The University of Hong Kong

ABSTRACT

The development of molecular and ion-selective membranes is key to a sustainable future, offering clean and energy-saving separation solutions for separation processes in water treatment, resource recovery, and gas and air purification. In this seminar, I will discuss the latest advancements in the design and fabrication of various types of membranes, targeting critical gas and liquid phase separation.

We will explore the fabrication of hybrid polymer-inorganic membranes based on the integration of novel porous materials, such as Metal-Organic Frameworks and emerging two-dimensional nanosheets, as selective building blocks, and conventional solution-processible polymeric materials as membrane matrices and discuss examples of how the marriage of these materials can offer unique advantages over single-material membranes in applications such as gas separation and desalination.

Additionally, we will examine advanced fabrication techniques, encompassing a streamlined and energy-saving ceramic processing method and ceramic 3D printing, to create high-temperature tolerant ceramic membranes suitable for high-temperature air purification, as well as the design of fibrous membranes for room-temperature air purification.

We will end this talk with a discussion on the potential of next-generation ion-selective membranes and electro-driven separation processes for carbon capture and resource recovery, aligning with the global initiatives towards a sustainable tomorrow. We anticipate that future membrane technology advancements will lead to broader and more efficient membrane applications, fueled by the discovery of novel molecular/ion-selective materials, advancements in membrane manufacturing processes, and the development of new tools and techniques for engineering membranes tailored to specific separation processes.

ABOUT THE SPEAKER

Nicholas Ze Xian Low is a Jiangsu Distinguished Professor at the National Engineering Research Center for Special Separation Membrane and the State Key Laboratory of Materials-Oriented Chemical Engineering at Nanjing Tech University. He is also an Adjunct Senior Research Fellow in the Department of Chemical and Biological Engineering at Monash University, Australia. Prior to joining Nanjing Tech, Low co-founded and served as the technical CEO of 2D Water (2017-2022), a spin-out from Monash University actively involved in the commercialization of graphene-based membrane desalination technology, and was a postdoctoral research fellow in the Centre of Advanced Separations Engineering, University of Bath, U.K. (2015-2017). Low receives his bachelor's degree (2012) and PhD (2016) in Chemical Engineering from Monash University. Low is dedicated to advancing energy-efficient separation membranes based on porous materials, including metal-organic frameworks and 2D nanosheets, targeting industrial separation challenges across resource recovery, desalination, and environmental remediation. His research has been supported by EPSRC Programme Grant (UK), ARC Industry Transformation Hub Grant (Australia), National Natural Science Foundation of China Foreign Scholar Research Fund (China), and Jiangsu Provincial Science and Technology Program (China). He has published over 80 papers to date, including in *Chemical Reviews*, *Nature Communication*, *Angewandte Chemie*, and *Journal of Membrane Science*. His contributions have been acknowledged through receiving the 2018 Foundation for Young Australians Young Social Pioneer Award, the 2019 Australian Research Council Hub Excellence Award, ISPT2023 ECR Best Presentation Award, and the 2023 RINENG Young Investigator Award.

- ALL ARE WELCOME -