THE UNIVERSITY OF HONG KONG

DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

Nanofiltration membrane swelling phenomenon - from process regulation to materials innovation

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Time: 3:00 p.m. – 4:00 p.m.
Venue: CPD-3.16, Run Run Shaw Tower, Centennial Campus, HKU

ABSTRACT
Efficient separation of industrial liquids plays an important role in carbon peaking and carbon neutrality goals. Nanofiltration (NF) membrane can separate small organics and inorganic salts, but the separation selectivity and antifouling ability need further improvement. In this talk, first, the membrane fouling aggravation with operation time during the industrial application will be introduced and membrane swelling phenomenon is considered as the main reason. The mechanisms and consequence of membrane swelling at alkaline pH and high salt concentration are discussed, and it can also be manipulated for improving separation performance. Afterwards, an anti-swelling polyamide NF membrane is prepared by "selective-etching-induced reinforcing" strategy. Then, a novel technique known as solvent-controlled swelling-diffusion is proposed for membrane fabrication. This innovative strategy involves the utilization of specific solvents to induce controlled swelling and subsequent diffusion of functional polymers into the polyamide matrix, thereby tailoring the microstructure of the membrane (pore structure and charge distribution), leading to improved separation selectivity and antifouling performance.

ABOUT THE SPEAKER
Jianquan LUO obtained his Ph.D. in Biochemical Engineering from Chinese Academy of Sciences (CAS) in 2010. He then earned a Ph.D. in Industrial Process Engineering from University of Compiegne of Technology in France in 2012. From 2012, he moved to Technical University of Denmark (DTU) as a postdoctoral fellow, and worked in the Center for BioProcess Engineering, DTU Chemical Engineering. At the end of 2014, he returned to Institute of Process Engineering, CAS as a professor. He currently serves as the Director of the Green Biochemical Process division. Over the years, he has been involved in the preparation of high-performance separation membrane materials and their applications in fields such as biocatalysis, bio-separation, food processing, and wastewater resource utilization. He has published over 200 SCI-indexed papers, in journals such as AIChE Journal, Chemical Engineering Science, Industrial & Engineering Chemistry Research, Chemical Engineering Journal, Advanced Functional Materials, and Journal of Membrane Science. He has applied for over 40 invention patents, with more than 20 of them granted. His work has been cited over 8000 times on Google Scholar, and he has an H-index of 48 on Web of Science. He received the Young Expert with Outstanding Contribution on Membrane Technology in China. He currently serves as Chairman of Young Scientists committee of China Seawater Desalination and Water Reuse Society, an editor of "Results in Engineering," and an editorial board member of "Journal of Membrane Science," "Desalination," "Chinese Chemical Letters," and "Membrane Science and Technology (Chinese)."

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