

DEPARTMENT OF CIVIL ENGINEERING

SEMINAR

Tempospatially confined catalytic membranes for recalcitrant wastewater remediation

Professor Liu Fu Ningbo Institute of Materials Technology and Engineering (Nimte), Chinese Academy of Sciences, China

Date: November 6, 2024 (Wednesday)
Time: 4:00 p.m. – 5:00 p.m.
Venue: Room 632C, 6/F Haking Wong Building, The University of Hong Kong

Abstract

Membrane catalysis that couples AOPs with membrane filtration process has been regarded as a promising technology to overcome the environmental pollution challenges. The nano-confined membrane allows for the optimum interaction of catalytic active sites, oxidants, and pollutants, resulting in high degradation efficiency. However, the practical applications are impeded due to the trade-off effect between catalytic efficacy and membrane permeance. Herein, we developed a tubular macroporous ceramic catalytic interface activated PMS to mainly produce 102, which exhibited a wide pH and high-salinity tolerance. Sufficient diffusion distance of long-lived 102 and intrapore channel length allow for thorough degradation of pollutants in the macropores (~ 130 nm). We developed a diffusion-reaction model to understand the spatiotemporal distribution and mass transfer process of 102 in the macropores. Under continuous cross-flow operation, the membrane could achieve instantaneous catalytic degradation of tetracycline (TC, 99.9%), bisphenol A (BPA, 98.9%), methylene blue (MB, 99.9%). At the same time, MCM could achieve high total organic carbon (TOC) removal rates of the real high-salinity CCIW, indicating its application in real CCIW treatment.

About the Speaker

Fu Liu is a full professor at Ningbo Institute of Materials Technology and Engineering (Nimte), Chinese Academy of Sciences (CAS). He is the head of Zhejiang International Joint Laboratory of Advanced Membrane Materials & Processes. He received his Ph.D. degree in polymer chemistry and physics from Zhejiang University in 2007, he moved to Imperial College, London as a postdoctoral research associate (2018-2010). He joined Nimte in 2010 and he leads a research group (advanced functional membrane) of 30 people in Nimte, CAS since 2015.

His research interests focus on PVDF/PTFE hollow fiber membranes and catalytic membranes for wastewater treatment, polyamide and COF nanofiltration membranes for desalination and resource reclamation, polymeric membranes for biomedical separation and purification. He has published more than 150 peer-reviewed papers in Advanced Materials, Advanced Sciences, Materials Horizons, Journal of Membrane Science etc. He received over 10000 citations.

For more information, please refer to his lab website: https://membrane.nimte.ac.cn/

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