Electro-chemically Enhanced Membrane Technology for Low-energy and Low-chemical Desalination and Water Reuse

Qianhong She [a,b,*]

[a] School of Civil and Environmental Engineering, Nanyang Technological University, Singapore

[b] Singapore Membrane Technology Centre, Nanyang Environment and Water Research Institute, Nanyang Technological University, Singapore

*Corresponding author: qhshe@ntu.edu.sg, telephone: +65-6790-5294

Abstract:

The integration of electrochemical process into membrane separation can result in new membrane technology with enhanced performance. In this talk, we will introduce our new development of electro-chemically enhanced membrane technology for desalination and water reuse. We focus on the introduction of our development of a novel electrochemical membrane system (EMS) for low-energy and chemical-free regulation of solution pH as well as the associated applications. We will first introduce the fundamentals of EMS developed in our study. Then we will introduce its applications, including (1) enhancing boron removal in seawater desalination, and (2) alleviating fouling in water treatment. Our results reveal that the novel electro-chemically enhanced membrane technology developed in our research can significantly reduce energy consumption and chemical usage in desalination and water reuse.

Keywords: electrochemical membrane system, desalination, water reuse, reverse osmosis, low energy