Designing high performance nanocomposite membranes for specific water treatment applications

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Abstract

One of the grand challenges afflicting human society is inadequate access to suitable water resources. Membrane water treatment is expected to play an increasingly important role in addressing the water challenge. In this presentation, we plan to discuss the development of polymer-matrix nanocomposite membranes for drinking water treatment, brackish and seawater desalination, and wastewater treatment and reuse. The advanced nanocomposite membranes could be designed to meet specific water treatment applications by tuning their structure and physicochemical properties (e.g. hydrophilicity, porosity, charge density, and thermal and mechanical stability) and introducing unique functionalities (e.g. antibacterial, photocatalytic or adsorptive capabilities). The nanocomposite membranes could be classified into (1) conventional nanocomposite, (2) thin-film nanocomposite (TFN), (3) thin-film composite (TFC) with nanocomposite substrate, and (4) surface located nanocomposite, based on the membrane structure and location of nanomaterial. A wide range of examples will be presented to illustrate how materials properties could be explored to enhance membrane performance and antifouling characteristics. Challenges and future research directions in developing high performance nanocomposite membranes are also be discussed.

Biography

Baolin Deng is Chair Professor in Environmental Engineering at Southern University of Science and Technology. He is currently on leave from the University of Missouri where he is LaPierre Professor in the Department of Civil & Environmental Engineering. Deng's research concerns with drinking water treatment, wastewater treatment and reuse, membrane fabrication and application, and important environmental process kinetics and mechanisms relevant to contaminated site remediation. He has been PI/co-PI for over three dozen research projects including the CAREER award from the National Science Foundation. He published over 100 peer-reviewed journal articles and book chapters with >5000 citation and H-index 38 (Google Scholar). Deng has served on the EPA Science Advisory Board Drinking Water Committee, and is the Asian Regional Editor for *Environmental Engineering Science*.

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