NSF Nanoscale Science and Engineering Grantees Conference: Nanotechnology for Sustainable Society
December 7-8, 2022

Nanotechnology-enabled Materials and Processes for Sustainable Pollution Mitigation

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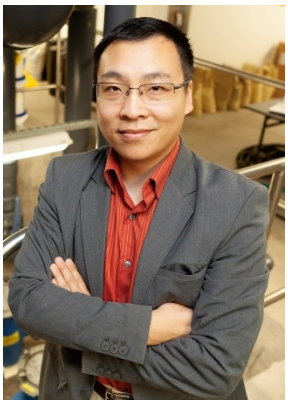

Abstract Dr. Zhang's research embraces multifacted aspects of nanotechnology primarily for environmental and agricultural applications such as micropollutant capture, descruction and resource recovery from wastewater. For instance, membrane separation techniques have found wide applications in diverse areas of these two fields owing to their compelling advantages of high throughput, mature production lines for membranes and other accessories, modulated assembly and deployment. However, their inherent disadvantages such as (bio)fouling, concentration polarization and membrane aging limit applications of membrane-based processes. Numerous attempts have been made to design and prepare novel membrane types, surfaces, and modules with antifouling features such as tuning surface geometries, morphologies and/or other properties to improve permeation and overcome these inherent limitations. Integration of chemical reactivity and nanocatalysis into conventional membrane filtration leads to smart and innovative membrane separation systems with chemically or catalytically active properties that effectively suppress the limitations of inherent conventional membrane filtration systems such as pollutant rejection or degradation, and membrane fouling. Reactive membrane systems usually include photocatalytic membranes, electrochemical membranes, and other hybridized forms such as Fenton or Fenton-like membrane processes. Other innovative membranes such as piezoelectrical membranes and sonochemical membranes are also emerging and show promise in reducing membrane fouling, but they have the dual effect of mechanical vibration and chemical oxidation in membrane fouling mitigation or pollutant degradation. This talk will provide an overview of reactive membrane development and how future nanotechnology could support sustainable pollution mitigation via novel membrane processes.

***Bio*:** Wen Zhang is currently an associate professor of NJIT's Newark College of Engineering in the Department of Civil and Environmental Engineering with a second appointment in the Department of Chemical and Material Engineering. Wen is a licensed Professional Engineer (P.E.) registered in

the States of New Jersey and Delaware. He is an American Academy of Environmental Engineers and Scientists (AAEES) Board Certified Environmental Engineer (BCEE). Dr. Wen Zhang's research focuses on colloidal interfaces and processes that are crucial for environmental and chemical engineering applications. His research embraces environmental behavior and interfacial processes for nanomaterials, microplastics and soft particles such as microbes and bubbles, catalytic/reactive membrane filtration systems for desalination, resource recovery and emerging contaminant removal, photocatalysis, microalgal removal and harvesting. His lastest research also expands from agricultural applications of nanobubbles to lithium recovery from spent lithium-ion batteries.