

The Department of Mechanical Engineering/College of Engineering and Applied Sciences
Stony Brook University

Mechanical Engineering Seminar



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Lecture Title: Fate of Manufactured Nanomaterials and Naturally Occurring Cyanotoxins in Natural and Engineered Systems

Thursday, March 22, 2012, 11AM, Room 173 Light Engineering

Abstract

There are growing concerns over the degradation of our water resources by a host of “emerging contaminants” (i.e., contaminants that have the potential to enter the environment and cause harm to ecosystems and/or human health, but are not regulated or commonly monitored). In this presentation, I will discuss the processes controlling the fate of two emerging classes of contaminants: manufactured nanomaterials and naturally occurring cyanotoxins. First, I will show that the fate of nanosilver, one of the largest volume nanoparticle additives in consumer products, depends critically on both aggregation and dissolution. By contrast, the fate of naturally occurring cyanotoxins is affected by a host of processes, particularly their association with clays, iron oxides, and other classes of sediment material. My research has shown, for example, that greater than 90% of the cyanotoxin microcystin-LR may adsorb to nano-sized iron particles. I demonstrate that this adsorption is controlled by electrostatic interactions between the negatively charged toxin and the pH-dependent charge of the iron particles, with greater adsorption occurring at pH values below the isoelectric point where the particles are positively charged. My presentation will conclude by demonstrating how ultrafiltration coupled to powdered activated carbon can be used to effectively remove microcystin-LR from drinking water. Elucidating the fate and transport of these emerging classes of contaminants in natural and engineered systems is vitally important to understanding the risk these compounds pose to human health and the environment.

Biography

Harold Walker is a Professor in the Department of Civil, Environmental, and Geodetic Engineering at The Ohio State University and has a courtesy appointment in the School of Earth Science. Professor Walker is also Director of the Ohio Water Resources Center, the federally authorized and state-designated Water Resources Research Institute for the state of Ohio.

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