



Spring 2008 Environmental Engineering seminar series



Presenting :

Dionysios D. Dionysiou, Ph.D., Professor
Department of Civil & Environmental Engineering
University of Cincinnati

Advanced Oxidation Technologies and Nanotechnologies for Water Treatment: Fundamentals, Development and Applications - Case study in the Destruction of Cyanobacterial Toxins

All Students, Faculty, and Staff are welcome

Abstract

The enormous diversity of toxic and organic pollutants of different chemical composition eliminates the possibility of using a universal treatment method and has led to the development of special treatment methods for water decontamination. The so-called Advanced Oxidation Technologies (AOTs) and Nanotechnologies (AONs) are among the most promising emerging chemical oxidation processes and are anticipated to play a crucial role in water treatment as stand-alone processes or in combination with conventional technologies. Among AONs, TiO_2 photocatalysis is of particular interest because of environmentally friendly features. TiO_2 photocatalysis is characterized by a specific oxidation pathway, which includes the formation of hydroxyl radicals ($\bullet\text{OH}$) or other powerful oxidizing species. The hydroxyl radicals are extremely reactive and readily attack most organic contaminants. As a result, the organic contaminants are sequentially transformed to simpler organic molecules that are eventually mineralized to CO_2 , H_2O , and mineral species (i.e., Cl). In general, due to rapid hydroxyl-radical-based oxidation reactions, AONs are characterized by high reaction rates and short treatment times.

Dr. Dionysiou will discuss some general aspects of AOTs, Environmental Nanotechnology (fundamentals, applications, implications), and specific examples of destruction of organic contaminants using hydroxyl radicals as well as TiO_2 -based AONs for the treatment and purification of water in general and in particular for the destruction of cyanobacterial toxins. He will discuss the development of a TiO_2 photocatalytic technology using nanotechnology and self-assembling strategies. Results will also be presented on the synthesis of TiO_2 catalyst in the form on films, and membranes and the application of these materials on the destruction of microcystin-LR, a potent cyanobacterial hepatotoxin.

**Thursday, February 21, 2008
4:10– 5:00pm
3540 Engineering Building
Refreshments Provided**

Michigan State University is committed to providing equal opportunity for participation in all programs, services and activities. Accommodations for persons with disabilities may be requested by contacting Dr. Volodymyr Tarabara (tarabara@egr.msu.edu).