



College of Engineering
Department of
Mechanical & Industrial Engineering

The Sidney E. Fuchs Seminar Series

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Frank H. Walk Design Presentation Room



Engineering Challenges in Bioremediation

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Water is the most ample yet the most polluted resource in our planet. Organic materials such as enzymes and whole cells are increasingly being used for biotechnology applications including bioremediation where reactive organisms are encapsulated in hyperporous silica materials to be used in removal of industrial and agricultural pollutants from drinking water. At the intersection of materials engineering, microbiology and transport engineering, this field introduces unique challenges, especially when translating the science conducted in the laboratory scale to full-scale industrial and commercial use. In this presentation, we focus on the mass transfer phenomenon associated with organic reactive systems in porous media and cover the issues associated with optimization of reactivity, material properties, scalability, longevity, storage stability vs. cost in these systems designed to remove pesticides and hydrocarbon pollutants from water. We introduce experimental and numerical studies to select, optimize and utilize a variety of synthetic ecological systems to try to address these problems.

* Prof. Aksan received his B.S. and M.S. degrees in Mechanical Engineering from the Middle East Technical University in Ankara, Turkey. He completed his Ph.D. studies on thermomechanics of collagenous tissues in Michigan State University, Mechanical Engineering Department. He worked for three years as a post-doctoral researcher in Center for Engineering in Medicine in Massachusetts General Hospital, Harvard Medical School before joining the faculty of Mechanical Engineering in University of Minnesota (UMN) in 2005. Dr. Aksan is the recipient of the NSF Career Award (2007), the McKnight Land-Grant Professorship from UMN, and the JSPS Fellowship. His research interests are Bioencapsulation, Biothermodynamics, Biostabilization, and Bi-heat/Mass Transfer.