

Presented By:

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Department of
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Engineering

Civil Engineering Seminar Series

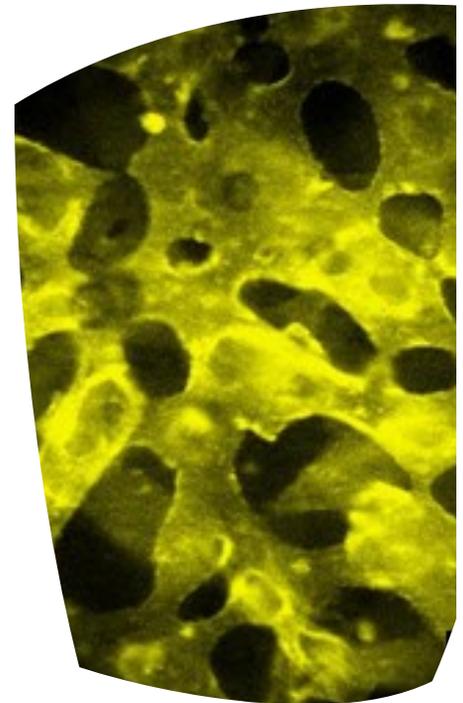
Thursday, February 2nd, 2017

MDEA

2:00PM - 3:00PM

Bijels: Self-Assembled Materials with Unique Transport & Mechanical Properties

Particle sequestration at the interface of immiscible fluids has been known for more than a century and exploited in the formulation of solid-stabilized (Pickering) emulsions for drug delivery, oil recovery, food, and personal care products, to name a few. More recently, new classes of multi-phase mixtures have emerged that exploit interfacial colloid jamming, bridging, ordering, and aggregation for the self-assembly of complex higher-order structures from colloidal building blocks, such as bicontinuous interfacially jammed emulsion gels (bijels), and bridged emulsion gels. These multiphase mixtures enjoy a number of unique morphological characteristics at the nano- to micrometer scales that result in superior transport and mechanical properties, and their formation by self-assembly allows rapid synthesis of bulk materials with macroscopic dimensions that enjoy such properties. In this talk, I will review the fundamentals and recent developments in colloidal self-assembly at fluid interfaces, present a novel materials synthesis route that we have pioneered based on these concepts, and discuss the applications of our technology in electrochemical energy conversion and storage, sensing, catalysis, and tissue engineering. Finally, I will discuss our ongoing efforts to better understand the link between the microstructure, rheology, and processability of this new class of soft materials.



Ali Mohraz received his BSc, ME, and PhD in Chemical Engineering from Azad University, The City College of New York, and The University of Michigan, respectively, and his postdoctoral training at the Frederick Seitz Materials Research Laboratory at The University of Illinois in Urbana-Champaign. He is currently Associate Professor of Chemical Engineering and Materials Science at the University of California, Irvine. Dr. Mohraz's primary research interests are in colloid science and complex fluids engineering, including colloidal assembly at fluid interfaces and nonlinear rheology of soft materials.