“A Nanoscale View of Aqueous Interfaces”

Wednesday
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3:00 pm
Wu and Chen Auditorium
Levine Hall

Mark L. Schlossman
Prof. and Associate Department Head of Physics
University of Illinois at Chicago

Abstract
The utilization of aqueous solutions in a wide range of applications, such as the development of water treatment technologies, requires fundamental investigations that apply and develop a modern scientific view of water and its interactions with solutes and organic components. We have developed X-ray scattering techniques to probe aqueous interfaces on the nanoscale, with a recent focus on electrostatic phenomena at aqueous-organic interfaces. This focus includes ion distributions at aqueous-organic interfaces, voltage-tunable nano-structuring of aqueous interfaces with nanoparticles, and the mechanism of ion transport through liquid interfaces. We plan to discuss our recent development of a thermal switch that allows us to address the challenge of probing fast ion transport through liquid-liquid interfaces on nanometer length scales. This has led to the X-ray characterization of intermediate states in the transport process that suggest a role for nanoscale interfacial dynamical processes in ion transport.

Bio
Mark Schlossman is a Professor in the Department of Physics at the University of Illinois at Chicago (UIC). His research group investigates molecular scale effects at water and aqueous solution interfaces, with an emphasis on phenomena occurring at aqueous-organic liquid-liquid interfaces. These phenomena include molecular and particle self-assembly and directed assembly, molecular recognition and non-covalent binding, fluctuation effects, peripheral membrane protein-lipid interactions, ion distribution and transport at interfaces, and electrostatic control of nanoscale features of water interfaces. Such phenomena underlie processes important to many scientific and industrial applications, including water purification and environmental remediation. These investigations have gone hand-in-hand with advances in X-ray scattering techniques to study liquid interfaces, including accompanying developments in experimental methodologies, data analysis, and connections with modern theory. He has led the development and operation of instrumentation at national synchrotron X-ray sources that enabled those investigations. Prior to joining UIC, Mark worked at the University of Chicago, was a post-doctoral with Peter Pershan at Harvard, and received his PhD with Carl Franck at Cornell in the study of soft matter physics. For more information, please visit http://schloss.people.uic.edu.