Joint Condensed Matter

and

Center for Soft Matter and Biological Physics

Seminar

Prof. Surita Bhatia

Materials Science and Chemical Engineering,

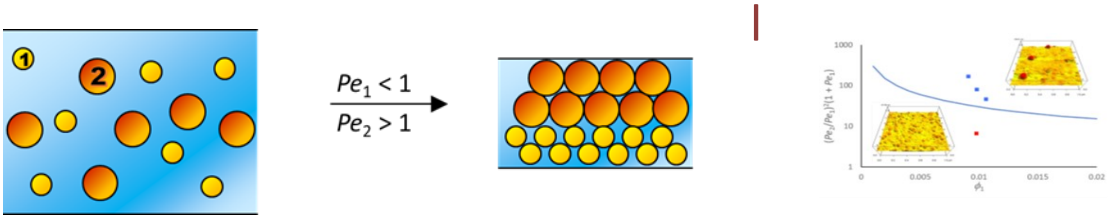
Stony Brook University, NY

"Stratification in Colloidal Films"

Monday, August 20, 2018

4:00pm – 5:00pm

304 Robeson Hall



Multicomponent films based on colloidal dispersions have a wide range of applications, including antimicrobial coatings for medical instruments, conductive textiles for flexible electronics, anti-reflective coatings for optical devices, paints for humid environments that are resistant to mold growth, and drug-loaded coatings for medical implants. Often, there is a need to spatially control location of certain components in the film. For example, silver nanoparticles can be used to impart antimicrobial activity to paints, but this component is expensive and may only be needed in the top few layers of the coating, not throughout the entire film. In principle, evaporative drying of multicomponent dispersions can be used to create films with a prescribed vertical concentration profile in a one-step process. In this talk, we present our recent results from atomic force microscopy (AFM) and small-angle X-ray scattering (SAXS) on films prepared from binary colloidal dispersions containing large and small particles of varying size and initial volume fraction. Our results show evidence of different types of stratification behavior, including large-on-top (e.g., large particles migrating to the top surface of the film), small-on-top, and "sandwich"-like layering. We discuss these results in terms of recent theories for stratification during evaporative drying.

Biosketch: Surita R. Bhatia has worked in the area of colloidal dispersions, soft materials, and rheology for over 20 years. She is Professor and Vice Chair for Research and Facilities in the Department of Chemistry at Stony Brook University. She previously held a joint position between Stony Brook and the Center for Functional Nanomaterials at Brookhaven National Laboratory, and prior to that was Professor of Chemical Engineering and Associate Director of the Institute for Cellular Engineering at the University of Massachusetts Amherst. Prof. Bhatia received her B.Ch.E. in Chemical Engineering from the University of Delaware, her Ph.D. in Chemical Engineering from Princeton University, and her postdoctoral training at the CNRS/Rhodia Complex Fluids research laboratory. She is a recipient of a National Science Foundation CAREER Award, a Dupont Young Professor Award, and a 3M Non-tenured Faculty Award. Prof. Bhatia has also received the 2012 AIChE Women's Initiatives Committee Mentorship Excellence Award and was an invited participant in the 2009 National Academy of Engineering "Frontiers of Engineering Education" Symposium and the 2011 NSF/AAAS Workshop on Diversity in Nanoscience Fields.