

MAR06-2005-000161

Abstract for an Invited Paper  
for the MAR06 Meeting of  
the American Physical Society

**Phase Behavior, Structure, and Assembly of Microsphere-Nanoparticle Mixtures.**

JENNIFER LEWIS, University of Illinois

The phase behavior, structure, and assembly of microsphere-nanoparticle mixtures have been investigated. A new mechanism for regulating the stability of colloidal particles, known as nanoparticle haloing, has been identified in binary mixtures that possess both high charge and size asymmetry. Negligibly charged colloidal microspheres, which flocculate when suspended alone in aqueous solution, undergo a remarkable stabilizing transition upon the addition of critical volume fraction of highly charged nanoparticle species. Using confocal microscopy, we have characterized the structural evolution of colloidal phases formed during sedimentation on patterned and non-patterned substrates as a function of varying composition. Through nanoparticle engineering, we have created robust colloidal crystals that can be harvested from solution without introducing drying related defects as well as colloidal gels whose structure and rheological properties vary dramatically.