Seminar Series

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Interfacial Control in Photochromic Systems

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Abstract

The manipulation of physical interactions between structural moieties on the molecular scale is a fundamental hurdle in the realization and operation of nanostructured materials and high surface area microsystem architectures. These include such nano-interaction-based phenomena as self-assembly, fluid flow, and interfacial tribology. One avenue for directed control utilizes photosensitive molecular structures to tune such interactions reversibly. This material strategy provides optical actuation of nano-interactions impacting behavior on both the nano- and macroscales and with potential to impact directed nanostructure formation, microfluidic rheology, and tribological control. Our work in development of monolayers and colloidal systems with photochromic derivatives will be described to show capabilities to control fluidic movement and the photo-aggregation and/or deposition of colloidal particles. Three dimensional patterning of porous structures by optical mediation of the surface phase transformation will also demonstrate the capabilities of photo-controlled material assembly. Optical effects are characterized and related to the reversible control of the surface phenomena. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under Contract DE-AC04-94AL85000.

Biography

Dr. Bell is a Principle Member of the Technical Staff at Sandia National Laboratories where he has been a researcher since 1999. His research is focused on the synthesis of functional colloidal materials, suspension characterization related to interparticle potential expressed as particle interaction energy determination, suspension rheology, and control of assembly processes in colloidal systems. Research activities include control over particle shape and growth processes, the fabrication of components via solution processing of nanoscale powders, and the interaction of dispersants with colloidal systems to control macroscopic system responses and ceramic materials processing.