

**George R. Brown School of Engineering**  
**Department of Chemical & Biomolecular Engineering**  
*Presents*



**Dr. Michael A. Bevan**  
**Associate Professor**  
**Chemical & Biomolecular Engineering**  
**Johns Hopkins University**  
**Thursday, October 9, 2008**  
**Duncan Hall – Room 1070 - 2:30 p.m.**  
*Reception to follow in Abercrombie B237*

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**“Colloidal Interactions, Dynamics,  
and Assembly on Energy Landscapes”**

The ability of nano-and micro-scale components to autonomously and reversibly assemble on energetic templates is broadly considered as an enabling process to numerous emerging technologies. As a result, there is strong interest in understanding how thermal motion, particle interactions, energetic templates, and external fields can be optimally coupled in assembly processes to elicit desired material and device responses. We approach this problem by directly relating equilibrium and dynamic colloidal microstructures to the combined effects of many-body interactions and  $kT$ -scale energy landscapes due to physically and chemically patterned surfaces. Colloidal trajectories are measured in 3D real space with nanometer resolution using integrated evanescent wave, video, and confocal microscopy methods. Equilibrium structures are connected to energy landscapes via statistical mechanical analyses, and colloidal dynamics are interpreted using theories for self-diffusion and Stokesian dynamics simulations. Findings from this work provide essential information to formally engineer (i.e. design, control, optimize) self- and directed- colloidal assembly processes on energetic patterns. Approaches developed in this work are currently being extended to investigate biomolecular systems.

**ABOUT THE SPEAKER**

Michael A. Bevan is an associate professor of Chemical & Biomolecular Engineering at Johns Hopkins University. He received his Ph.D. from Carnegie Mellon University in 1999. After post-doctoral appointments at the University of Melbourne, Australia, and the University of Illinois at Urbana-Champaign, he joined Texas A&M University in 2002 and Johns Hopkins University in 2008. Bevan's research investigates interactions, dynamics, and structure in interfacial colloidal systems. Bevan is a recipient of a 2004 CAREER award and a 2005 PECASE from the National Science Foundation.