Massachusetts Institute of Technology
Department of Mechanical Engineering

MMEC SEMINAR SERIES

Mechanics: Modelling, Experimentation, Computation

Tuesdays @ 4:00pm – Room 3-370 **October 07, 2014**

Micro-Nanotechnologies to Study 3D Curvilinear Shape Formation and Janus Particle Formation

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Micro-nanotechnologies such as micro-patterning and atomistic simulations are enabling tools to study self-assembly of shapes at small scales. These self-assembly processes, often driven by mechanical interactions between different components, can lead to formations of particles, structures, or devices with unique properties. Here I will present two examples of how micro-nanotechnologies are used to study shape formation at micro- and nanoscales. The first demonstrates the mismatch strain-driven curvilinear shape formation by folding of polymer films, or rolling of semiconductor thin films. Experiments with combined top-down and bottom-up approach demonstrate capabilities to form various curvilinear shapes. Modeling of these systems is used to guide the fabrication and manufacturing of nanoscale components. These structures and devices are basic building blocks in electronic and optical applications. The second part of my presentation is an attempt to understand the mechanisms controlling the formation of nanoscale Janus particles fabricated by DNA-based molecular level self assembly. Janus particles are particles with two distinct properties on their surfaces. Molecular dynamics simulations are performed to study how two different types of molecules segregate on the surface of gold nano-particles. The simulation results lead to a surprise finding, which may be explained by graph theory. Janus particles can often self-assemble into different shapes/structures and can be used in unique applications such as drug delivery.

Seminar Host: Pedro Reis (preis@mit.edu)

*Please join us for **refreshments beforehand, outside Room 3-370***

For more information, visit our website at ***http://web.mit.edu/mmec/***
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