UNH Materials Science Seminar

13:10-14:00, Wednesday, April 13, 2011
DeMeritt 240
University of New Hampshire

A "Tapas-style" Selection of Research Activities: Morphology Control in Polymer Colloid Synthesis, Particle Consolidation and Film Formation Modeling, and the Exploitation of Water

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This seminar will highlight a selection of polymer colloid related research activities in the Tsavalas research group. The term "polymer colloid" refers to a system in which particles of roughly 1nm to 1micron (in at least one dimension) are dispersed in a continuous phase of different composition. The continuous phase is most commonly water, nature's sexiest solvent these days, and the dispersed phase is most often comprised of spherical particles with dimensions between 30 to 200 nm in diameter. The confinement of chemical macromolecular synthesis reactions to these dimensions allows for polymeric nanoparticles of widely varied composition, multi-phase morphology, and a large external surface area for decoration with reactive functional groups on the particle surface. The applications of polymer colloids range from the (seemingly) mundane of architectural coatings, paints, adhesives, and even the coating on the piece of paper in your hand (yes, it's coated) to the exotic of advanced electronic materials, pharmaceutical encapsulation, stimuli-responsive smart materials, and water treatment, to name a few.

While there is nowhere near enough time to highlight all the ongoing research projects I am leading or have been collaborating on since coming to the Materials Science Program at UNH, I intend to highlight a few flavors of current work ("tapas-style"). Both experimental synthesis of controlled properties confined to nanodimensional particles and interesting applications of such particles will be described. The "exploitation" of water, the continuous phase that these particles are "born" in, will be highlighted both in terms of its use to achieve complex particle morphologies and as an in-situ, and "green" plasticizer during filming of the dispersed system to a continuous polymeric material. And finally, the dynamic modeling of two very different examples of colloidal systems will be described; latex film formation (dynamic packing, deformation and coalescence of particles from their originally dispersed state through to a consolidated material) and protein interactions in highly concentrated aqueous based solutions.

Host: Marshall Ming, ×1446