

UNH Materials Science Seminar

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Murkland Hall 202, University of New Hampshire

Uniform nonspherical colloidal particles with anisotropic properties

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Colloidal particles are ubiquitous for a broad spectrum of applications. Many current applications require non-spherical particles. These can dramatically modify light scattering properties and suspension rheology; they are also beneficial for engineering biomaterials and colloid composites. Synthesizing non-spherical particles at colloidal length scales is difficult because surface tension favors spherical shapes. Although this limitation may be overcome with advanced techniques such as microfluidics and clusterization separations, these precision processes generally produce small yields, severely limiting their utility for practical applications. This talk introduces a framework for the large-scale synthesis of a variety of uniform non-spherical particle types. Our technique involves controlling the directionality of phase separations in seeded polymerization techniques by manipulating the cross-linking density gradients of the seed particles. This precise control over phase separation patterns allows us to obtain novel non-spherical particle shapes while controlling their chemical anisotropy, and produces sufficient quantities to allow us to characterize their bulk properties, such as their close-packed volume fractions.

Dr. Kim received his Ph.D. in 2000 from Hanyang University and is currently a Postdoctoral Fellow in the School of Engineering and Applied Physics and the Dept. of Physics at Harvard University. He has received awards for outstanding doctoral thesis and for Korea Outstanding Technology. His research areas are in nano-, micro-encapsulations; microfluidics; fabrication of supra-structured colloids; hierarchical self-assemblies; colloid (or emulsion) interactions; nano-composites; drug stabilizations; skin permeations and lipid assemblies.