"Design and Self-assembly of Molecular-Mimicking Colloidal Particles"

Wednesday
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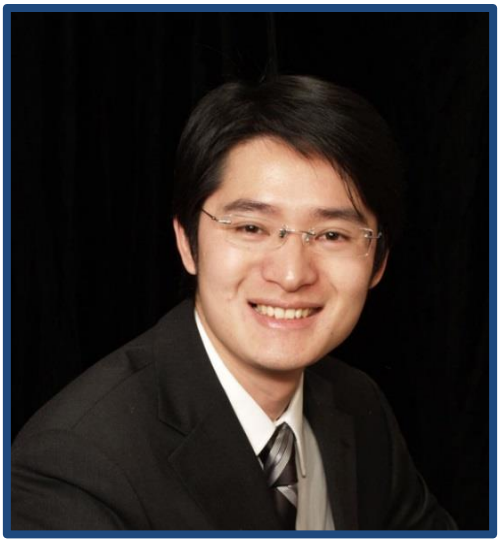
3:00 pm
Wu and Chen Auditorium
Levine Hall



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Abstract

Colloidal particles are of particular interest, because of their broad applications; e.g., in coating, sensing, and photonic crystals. Assembly of colloidal particles into ordered architectures is essential for engineering new functional materials and devices, as well as for understanding the assembly behavior of atoms and molecules. Despite tremendous progress that has been made in the past decades, unmet challenges still remain at this frontier. In this talk, I will present our efforts on the synthesis and self-assembly of molecular-mimicking colloidal particles. First, I will present the design and self-assembly of nanoscale supracolloidal molecules (~50-200 nm in diameter) with defined valences and surface patches. The supracolloidal molecules are fabricated by assembling binary inorganic nanoparticles isotropically grafted with block copolymers. The valences and surface patches (i.e., local surface chemistry) of the supracolloids can be precisely tuned by controlling the polymer ligands on nanoparticle surfaces. It is remarkable that such supracolloids can further assemble into hierarchical structures via directional interactions. Second, I will present the synthesis of monodisperse nonconventional colloidal rods (e.g., banana-shaped rods) by emulsion-templated growth method. These rods resemble shaped liquid-crystal mesogens (e.g., banana-shaped liquid crystals) to assemble into arrange of classic liquid-crystal phases.

Bio

Dr. Zhihong Nie is an Associate Professor in the Department of Chemistry and Biochemistry at the University of Maryland. He is also a faculty member in the Marlene and Stewart Greenebaum Cancer Center and the Department of Materials Science and Engineering. Prior to his academic appointment in Maryland, he received his Ph.D. degree in Polymer Materials and Chemistry from the University of Toronto in 2008. He then worked as a NSERC Postdoctoral Fellow in George M. Whitesides' group at Harvard University (2008-2010). He is the recipient of a number of awards, including CMNS Outstanding Junior Faculty Award (2014), 3M Non-tenured Faculty Award (2014, 2015), ACS PRF Doctoral New Investigator Award (2013), NSF CAREER Award (2012) and K. C. Wong Research Scholarship (2011). His research interests include molecular and nanoparticle self-assembly, cancer theranostics, programmable soft materials, and microfluidics.

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