University of Minnesota
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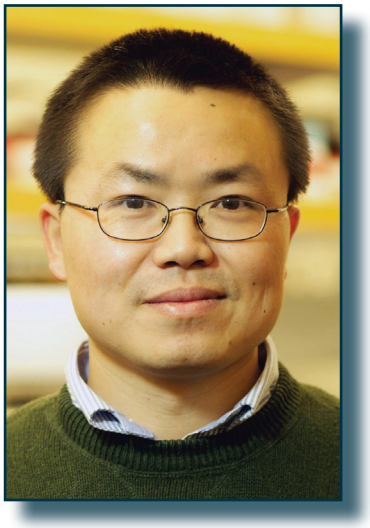
Department of Chemistry

Dow Lecture Series

9:45 a.m. Thursday, February 23 • 331 Smith Hall



Associate Professor

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Magnetic Assembly of Responsive Photonic Nanostructures

Research interests: Synthesis, self-assembly, functionalization and applications of nanostructured materials.

Website: http://chem.ucr.edu/index.php?main=faculty&facsort=profile&faculty=yinl

Abstract

The practical utilization of responsive colloidal photonic nanostructures has been limited by the low fabrication efficiency in typical self-assembly approaches, narrow tunability, slow responses to the external stimuli, and incomplete reversibility. In this presentation, we exploit magnetic field as an effective stimulus to guide the assembly of colloidal building blocks into periodically arranged photonic particle arrays and then reversibly tune the photonic properties of the resulting structures by manipulating the external magnetic field. The instant creation of a strong interparticle magnetic dipole-dipole interaction, which balances interparticle repulsive interactions such as the electrostatic force, provides the driving force for rapid assembly of superparamagnetic colloidal particles into dynamic photonic chains typically within one second. Magnetic forces, acting remotely over a large distance, not only drive the formation of colloidal photonic arrays with a wide range of interparticle spacing, but also allow convenient control of the photonic properties of the colloidal assemblies by changing the interparticle separation or their orientation. The magnetic assembly approach can be extended to rapidly organize nonmagnetic particles into photonic structures through the “magnetic hole” strategy, which greatly broadens the applicability to different materials. Finally, by taking advantage of the magnetically responsive photonic system, we demonstrate various applications such as field-responsive display, structural color printing, and anti-counterfeiting devices.

Host: Professor Andreas Stein
Refreshments will be served prior to the seminar.