



**Seminar Topic:
Assembly of Platonic Nanoparticles at Liquid/Liquid Interfaces**

Associate Professor Li Shuzhou

Abstract

Platonic particles are promising materials with nanoscale light-matter interactions in plasmonics and biosensing due to their unique structures caused by vertices, edges and facets. The position and orientation of platonic particles play a crucial role in determining the resultant assembled structures at a liquid/liquid interface. Therefore, it is desirable to develop a reliable theory which can predict the interfacial configuration of an isolated platonic nanoparticle from nanoparticle-solvent and solvent-solvent interactions. Our group has numerically explored all possible orientations of a platonic nanoparticle, including three specific orientations – (1) vertex up, (2) edge up, and (3) facet up. We also demonstrated that the free energy change theory could quantitatively predict the position and orientation of isolated platonic nanoparticles at a liquid/liquid interface, where the surface wettability of the nanoparticle can determine the most stable position and the preferred orientation. Molecular dynamics simulations were used to test our theory, where the surface wettability of a platonic solid was adjusted from extremely hydrophobic to extremely hydrophilic by changing the charge amount on the Ag surface. The simulation results were in excellent agreement with our theoretical prediction for an isolated Ag platonic nanoparticle at a hexane/water interface. We also extended this approach to the assembly of octahedral nanoparticles at liquid/liquid interfaces.

Biography

Dr Li Shuzhou received his BSc, MSc and PhD in Chemistry from Nankai University, Peking University and the University of Wisconsin respectively. After researching in the field of plasmonics in Northwestern University as a postdoctoral fellow, he joined Nanyang Technological University, Singapore in 2010. He is currently an Associate Professor in the School of Materials Science and Engineering. His research interests are theoretical and computational materials science. His research is focused on the following – (1) Assembly of nanostructures, (2) Design of highly sensitive substrates for surface enhanced Raman scattering and fluorescence, and (3) Discovering optical properties of metal-semiconductor nanostructures.

Wednesday, 10 April 2019 || Time: 2:00 – 3:00 pm
Venue: MSE Meeting Room (N4.1-01-28)
Hosted by: Professor Subbu Venkatraman