

Moments in Materials Presentation:  
***Colloids with valence:  
fabrication and directed self-assembly***

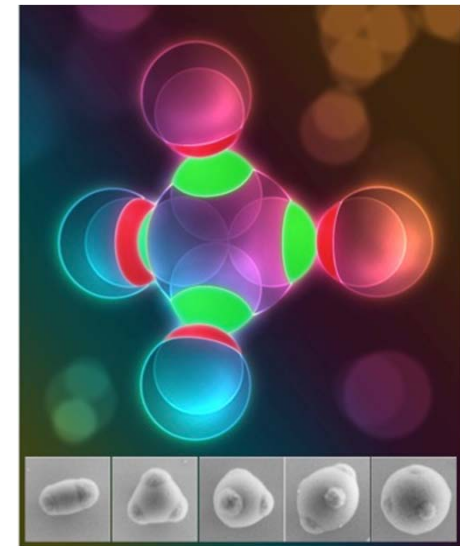
Speaker: Dr. Yufeng Wang

When: Thursday, June 12<sup>th</sup> 2014, 10:30 a.m.

Where: NWC, 7<sup>th</sup> floor meeting room, RM 703



In contrast to atoms and molecules, the number and symmetry of structures that self assemble from colloidal particles is restricted by the absence of directional specific bonds. To address this problem, we have developed a general method to produce a new type of colloidal particles, colloids with valence, which possess reversible, specific and directional interactions with well-defined symmetries. The primary hypothesis is that particles exhibiting distinct surface patches can be fabricated (patchy particles). The patches can be functionalized with biological (e.g. DNA) and synthetic macromolecules (e.g. block copolymer) containing recognition units, and provide directional bonding interactions. Directed self-assembly of those particles is demonstrated, by which a wide variety of colloidal structures mimicking molecular symmetries are formed. In addition, self-assembly of patchy colloids is viewed as chemical reactions and its kinetics is studied. We demonstrate that the assembling process follows a stepwise-sequential mechanism, as can be described by a model based on diffusion-controlled reactions.



Selected references

*J. Am. Chem. Soc.*, 134, 6866-6869, 2014; *J. Am. Chem. Soc.*, 135, 14064-14067, 2013; *Nature*, 491, 51-55, 2012.