TIFR Centre for Interdisciplinary Sciences, Narsingi, Hyderabad 500075

Seminar

Self-Assembly of Nanoparticles: Can DNA Lead the Way?

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DNA, the blue-print of life, is an ideal molecular building block, as the length, binding strength, and binding specificity are highly programmable. Nanoparticles can be arranged into specifically programmed crystalline structures using DNA as a surface ligand to mediate interparticle interactions. Unlike conventional colloidal assembly techniques, where drying leads to the assembly of nanoparticles *via* hard sphere close packing, DNA-nanoparticle assembly is performed in solution and the particular crystalline arrangement that forms is dictated by the maximization of DNA hybridization events. Thus, the resulting structures often must remain in solution to maintain order. In this talk, I will discuss how to make and transition nanoparticle superlattices by DNA-mediated assembly to solid-state without any encapsulation. The concept of reconstitutable lattices from DNA-assembled materials, structures that can be assembled in solution, stored in an amorphous form in the solid-state, and re-expanded in solution by controlled solvation will be discussed.

Learning the lessons from solid-state transition of DNA-assembled superlattices, the nanoparticle assembly was extended to make patterned nanostructures on solid supports. By combining DNA assembly with top-down lithography methods such as e-beam lithography or dip-pen nanolithography, one can control the spacing, symmetry, composition, and shape of the patterned nanoparticle ensembles, with nanometric precision and registry. This could potentially be useful for combinatorial screening of optical nanoconstructs comprised of positionally encoded plasmonic/optical structures.

Thursday, Jan 30th 2014

11:30 AM (Tea/Coffee at 11:15 AM)

Seminar Hall, TCIS