

Assemblies of DNA grafted nanoparticles deciphered by SAXS

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For the past decade or two, DNA has been of interest for nanoparticle assembly. Either single or double stranded oligo-nucleic acids have been grafted to nanoparticles for exploiting their hybridization as a way to make bondings between the particles. The polyelectrolyte ligand on its end contains a sequence recognition unit, called the sticky end, that would bind to its designed pair through the base-pairing interaction. When two non-self-complementary sequences are used, for example TTCC and AAGG, the particles with the former sequence would only bind to ones with the other, behaving like cations and anions in ionic crystals.

We recently reported that when the size of core particles of a component in the binary system is extremely small, the particle shows non-ionic behaviors, more analogous to the free electron in metals, leading to complex structures such as Frank-Kasper A15 phase. In this presentation, we will review our DNA directed nanoparticle assembly works, discuss about associated particle interactions, and look for the similarities of our DNA system with other soft-matter assembly system in general.