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**Structural flexibility of DNA-Nanoparticle Assemblies**[1]

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Encoding interactions between nanoparticles using DNA allows for creation of new classes of materials in which particles arrange in superlattices with the structure mainly defined by particle geometry and interactions between DNA shells. The phase behavior in these systems quite often can be rationalized using the interaction energy maximization argument for DNA provided key-lock recognition. However, a polymeric nature of DNA connections can bring about an unexpected phase behavior with structures typically not observed for non-directional interactions. In addition, DNA sensitivity to various specific and non-specific stimuli provides for precise lattice tunability within a given phase. We will provide several examples of phase change in systems of DNA interacting nanoparticles, where unusual, low dimensional structures form due to collective behavior of DNA chains. We will also discuss various ways to dynamically change superlattice parameters using physical variables such as electrostatic interactions or external osmotic pressure for continuous lattice tunability or using DNA machinery to program a step-wise change in the lattice parameter of the assemblies.

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