Nanoscale self-assembly guided by DNA and geometry: Structures, transformations and rational design

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The structural plasticity and tunable interactions provided by DNA chains offer a broad range of possibilities to direct the organization of nanoscale objects into well defined systems, as well as to induce the structural transformations on demand. We have studied the assembly of clusters and extended 2D and 3D array architectures from nanoscale components of multiple types driven by DNA recognition, chain effects and geometrical factors. Our work explores how DNA-encoded interactions between inorganic nano-components can guide the formation of well-defined superlattices, how the morphology of self-organized structures can be regulated in-situ, and what factors govern a phase behavior. The role of flexible chains, particle anisotropy, and external stimuli on a structure formation and its transformation will be discussed in details. I will also demonstrate the use of the discussed approaches for rational nanomaterial engineering. ***Acknowledgement:*** *This research is supported by the U.S. DOE Office of Science and Office of Basic Energy Sciences under contract No. DE-AC-02-98CH10886.*