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DNA guided assembly of well-organized nano-architectures. OLEG GANG, DMYTRO NYKYPANCHUK, MATHEW MAYE, DANIEL VAN DER LELIE, Brookhaven National Laboratory — An incorporation of DNA in nano-object design provides a unique opportunity to establish reversible, chemically weak and highly selective interactions between the components of nanosystems. Assembly approaches based on this addressable interactions promise a possibility for creation of rationally designed multicomponent system. However, understanding interplay of interactions, cooperative phenomena leading to phase formation and experimental realizations of ordered phases has remained elusive. Using in-situ x-ray scattering methods, we have studied an assembly kinetics, structure development, and phase formation of DNA-capped nanoparticles on surfaces and in bulk for various DNA assembly schemes. The observed changes in the 2D DNA/nanoparticle array layer reveal an evolution of particle-surface separations and surface coverages. For 3D systems, formation of 3D assemblies with crystalline long-range order in two-component nanoparticle systems was observed. The DNA design, assembly schemes and thermodynamic pathway leading to this crystallization has been explored.

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