Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Revealing Structural Transformations during Crystallization of DNA-Nanoparticle Assemblies YUGANG ZHANG, FANG LU, Center for Functional Nanomaterials, Brookhaven National Laboratory, DANIEL VAN DER LELIE, Research Triangle Institute International, Research Triangle Park, NC, OLEG GANG, Center for Functional Nanomaterials, Brookhaven National Laboratory — Nanoparticle assembly via sequence-specific DNA recognition emerges as a powerful strategy for the fabrication of nanoparticle (NP)-based crystalline materials. Generally, a delicate thermal annealing is essential for the crystallization of NPs from kinetically trapped disordered states. Due to the complex coupling between interactions, entropic and chain effects in these systems, the crystallization pathway remains an intricate and open question. Herein, we present an experimental study of the crystallization process for DNA-directed nanoparticle assembly systems using synchrotron-based small angle x-ray scattering (SAXS). We demonstrated the effects of two crystallization-dominant factors, namely, temperature and volume fraction, on the structural transformation and order development. By combining a single component and binary systems we uncovered the evolution of global and local particle arrangements, such as correlation length, compositional disorder and coordination number, during the phase transformation. Research was supported by the U.S. Department of Energy, Office of Basic Energy Sciences, under Contract No. DE-AC02-98CH10886.

Yugang Zhang
Center for Functional Nanomaterials,
Brookhaven National Laboratory

Date submitted: 19 Dec 2012 Electronic form version 1.4