Abstract Submitted for the MAR10 Meeting of The American Physical Society

Crystallization Dynamics of DNA-functionalized Nanoparticles FRANCIS W. STARR, WEI DAI, Physics Dept., Wesleyan University, Middletown, SANAT KUMAR, Columbia University — As a step toward understanding techniques to create crystalline ordered arrays of DNA -linked nanoparticles (NP), we examine the dynamics of a model system of NP functionalized with six complementary strands of DNA that readily crystalizes. The octahedral geometry of the NP units naturally gives rise to cubic order; the length of the DNA linkers results in a NP lattice spacing that is large compared to the NP size, so that it also possible to form interpenetrating cubic crystals. We show that the formation of either single or interpenetrating crystals must preceded by a dense amorphous cluster, even in the absence of a metastable liquid-liquid transition. In this case, clustering is facilitated by the natural self-assembly of the DNA links. We detail the nucleation process through numerical simulations.

Francis W. Starr

Date submitted: 20 Nov 2009 Electronic form version 1.4