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Nucleation of Nanoparticle Superclusters from Solution[1] SIDDIQUE J. KHAN, C.M. SORENSEN, A. CHAKRABARTI, Dept. of Physics, Kansas State University — Colloids of surface ligated nanoparticles (NP) often act as solutions with the NP displaying reversible temperature and solvent dependent solubility. In many cases when the nanoparticles are highly uniform, the precipitating solid is a two- or three-dimensional superlattice of the nanoparticles. Thus there is strong analogy to the phase behavior of molecular solutions, and it is reasonable to ask what controls the phase behavior of nanoparticle solutions and what is the nature of nucleation and growth of the insoluble phase? We have recently developed [1] a phenomenological model for the effective interaction potential between two ligated gold nanoparticles. In the current work, we carry out Brownian Dynamics simulations using this NP-NP interaction potential. We will report results from our simulations for both dynamics and shape of pre- nucleating and post-nucleating superclusters.

[1] S.J. Khan, F. Pierce, C.M. Sorensen and A. Chakrabarti, Langmuir, 25, 13861 (2009).

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