Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Phase Behavior of DNA-Functionalized Nanoparticles: Dependence on Number and Orientation of Attached DNA strands WEI DAI, CHIA WEI HSU, Wesleyan U., Middletown, CT, FRANCESCO SCIORTINO, U. of Rome 1, FRANCIS STARR, Wesleyan U., Middletown, CT — Nanoparticles (NP) functionalized with single-stranded DNA (ssDNA) offer a route to custom-designed, self-assembled nanomaterials. The large length scale of the DNA links relative to the core NP size allows the formation of interpenetrating networks that give rise to unusual phase behavior. Among 3-, 4-, and 5-functionalized NP, we find phase diagrams with up to four amorphous phases (i.e., polyamorphism) which consist of interpenetrating networks. Our work demonstrates that regular symmetry of the functionalized NP is not a prerequisite for interpenetration. For the particular case of 6-functionalized NP with octahedral symmetry, the system forms (at least) six distinct crystalline structures (i.e., polymorphism), consisting of up to six interpenetrating simple cubic (sc) lattices.

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Date submitted: 20 Nov 2009 Electronic form version 1.4