Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Structural evolution of thiol-capped gold nanoparticle monolayers undergoing controlled nanowetting[1] DIEGO PONTONI, KYLE ALVINE, Physics Department and DEAS, Harvard University, Cambridge, MA, 02138, ANTONIO CHECCO, OLEG GANG, BEN OCKO, Brookhaven National Laboratory, Upton, NY, 11973, PETER PERSHAN, Physics Department and DEAS, Harvard University, Cambridge, MA, 02138, FRANCESCO STELLACCI, Massachusetts Institute of Technology, Cambridge, MA, 02129 — Monolayers of thiol-capped gold nanoparticles characterized by a poydisperse/bimodal size distribution were prepared on silicon substrates and were subsequently wet by nano-thin liquid layers of solvents of varying quality. The structural changes were probed in-situ by synchrotron X-ray surface scattering. It is found that thin solvent films of thickness comparable to the nanoparticle size tend to improve the monolayer uniformity regardless of the quality of the solvent. On the other hand, thick films dissolve the monolayer if the liquid is a good solvent, while induce nanoparticle aggregation in the case of a bad solvent. The interplay of size-selective segregation and nanoparticle aggregation overcomes the intrinsically large polydispersity and leads to the formation of oriented colloidal crystallites.

[1]Work supported by the NSF (DMR-0124936, NSF03-03916). Synchrotron measurements performed at X22B, National Synchrotron Light Source, Brookhaven National Lab and supported by DOE grants DE-FG02-88ER45379 and DE-AC02-98CH10886.

Diego Pontoni
Physics Department and DEAS, Harvard University, Cambridge, MA, 02138

Date submitted: 30 Nov 2004 Electronic form version 1.4