Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Domain, Stripe, and Pattern Formation for Colloids on Optical Trap Arrays DANIELLE MCDERMOTT, University of Notre Dame, JEFFERY AMELANG, California Institute of Technology, LENA LOPATINA, CYNTHIA REICHHARDT, CHARLES REICHHARDT, Los Alamos National Laboratory — We examine pattern formation of colloids atop a square periodic substrate using large scale numerical simulations. The pins forming the substrate are modeled with a muffin-tin potential which is flat with localized traps. We show that with 4 colloids per pinning site the system has triangular ordering and with 5 colloids per site it has square ordering. We study intermediate fillings and identify a rich variety of distinct ordering regimes including disordered grain boundaries, crystalline stripe structures, superlattice orderings, and disordered patches of multiple phases. These different regimes are characterized with a Voronoi analysis, energy dispersion plots, and ordination of domains. We extend our studies to a wide range of other fillings which feature similar boundary formation patterns. Our results show that periodic substrates of muffin-tin potentials can be used to tailor grain boundary formation.

Danielle McDermott
University of Notre Dame

Date submitted: 06 Nov 2012 Electronic form version 1.4