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Directing Translational and Orientational Order of Rectangular Particle Monolayers MARK FERRARO, THOMAS TRUSKETT, ROGER BONNECAZE, Univ of Texas, Austin — Recent advances have shown that the tunability of nanoparticle interactions can lead to a large number of thermodynamically accessible structures. The role of an external field in the assembly of particulate systems, however, is still incompletely understood. The use of larger scale patterned substrates to drive smaller scale assembly of particle monolayers can potentially expand the set of achievable lattices, and could be used in nanopatterning processes or in the manufacture of functional materials. In this presentation, grand canonical Monte Carlo (GCMC) simulations are used to assess the suitability of graphoepitaxial assembly for particle monolayers. Our prior work has shown that topographically or chemically patterned substrates can sufficiently organize hard-spheres, but many motivating applications can utilize anisotropic particle shapes (e.g. rectangular particles for bit-patterned media). Here, we describe our recent GCMC results for structures formed by rectangular particles in the presence of sparse enthalpic barriers. We examine systems of varying chemical potential, template geometry, and particle aspect ratio. Templates are evaluated by their ability to induce orientational and translational order, while maximizing pattern multiplication effects.

Mark Ferraro
Univ of Texas, Austin

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