Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Self-Assembly of Two Dimensional Hard Rod Fluids in the Presence of Surface Barriers DEREK A. TRIPLETT, KRISTEN A. FICHTHORN, The Pennsylvania State University — Hard rods are interesting building blocks for assembly as they organize themselves into different phases depending on their aspect ratio and concentration. Much work has been done to develop an understanding of the various phases exhibited by bulk, hard-rod fluids in two and three dimensions. For applications in nanoelectronics, it is desirable to be able to assemble nanowires into various structures conducive to nanocircuitry. In this work, we use Monte Carlo simulations to examine the phase behavior of two different systems involving two-dimensional, colloidal nanowires. In the first study, we probe the influence of regularly spaced surface barriers on the ordering of two-dimensional hard rods. By varying the spacing between the barriers and their size relative to the rods, we demonstrate that a number of interesting phases can be achieved, indicating that surface barriers can effectively tune the alignment of the rods. In a second study, we probe the hard-sphere templated assembly of colloidal nanowires. We demonstrate that a number of interesting and potentially beneficial phases occur as the rod length relative to the sphere diameter, rod aspect ratio, and concentration is varied.

Derek A. Triplett
The Pennsylvania State University

Date submitted: 04 Jan 2006 Electronic form version 1.4