Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

High-Speed Block Copolymer Self-Assembly under Ambient Conditions DAE UP AHN, YIFU DING, University of Colorado — Self-assembled block copolymer (BC) nanopatterns have critical application impacts on nanotemplates and scaffolds for the fabrication of nanometer scale periodic arrays, nanostructured networks and membranes for fuel cells, and high-density information storage media in computers and related devices. To achieve such application potentials, well-aligned BC nanopatterns should be reliably engineered in a thin film on a variety of functional substrates within a practical time-scale for industrial production. Here, we illustrate an exceedingly high-speed BC self-assembly under ambient conditions, which is not readily achievable in a vacuum. Only in a few seconds, BC nano-cylinders perpendicular to an energetically preferential surface have been spontaneously developed in a thin BC film under air. The time-scale for the BC self-assembly under air is at least 1000 times faster than that under vacuum. However, a micro-scale film instability that seriously impairs BC nanostructures has also rapidly evolved under air prior to the lateral self-organization of BC nano-cylinders. To suppress the evolution of micro-scale film instability and also to enhance the lateral order of BC nano-cylinders, we have imposed geometric confinements during the thermal annealing process of a thin BC film. Consequently, only in a few minutes, we have prepared hexagonally well-aligned BC nano-cylinders perpendicular to the bottom surface of geometric confinements under ambient conditions.

Dae Up Ahn
University of Colorado

Date submitted: 18 Nov 2010 Electronic form version 1.4