Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

The Effect of Humidity on the Ordering of Triblock Copolymer Thin Films JOONA BANG, Korea University, BUMJOON J. KIM, GILA E. STEIN, EDWARD J. KRAMER, CRAIG J. HAWKER, University of California, Santa Barbara, THOMAS P. RUSSELL, University of Massachusetts — Solvent cast diblock/triblock copolymer films of poly(styrene-*b*-ethylene oxide) (PS-PEO) and poly(styrene-*b*-methyl methacrylate-*b*-ethylene oxide) (PS-PMMA-PEO), with cylindrical microdomains of PEO or PMMA-PEO, have a high degree of long-range lateral order after solvent annealing. Relative humidity of the vapor during the solvent annealing has been shown to play an important role in achieving this order. Here, it was found that a PS-PMMA-PEO triblock copolymer having a lamellar morphology in bulk, develops a hexagonal array of depressed PEO domains on the film surface after solvent annealing under high humidity, while the film surface remains flat under less humid conditions. Cross-sectional TEM and GISAXS show that the film annealed under high humidity conditions exhibits a well-defined hexagonally-perforated lamellar (HPL) structure throughout its thickness, whereas a stack of lamellae aligned parallel to the surface is evident for the film annealed at lower humidity. These results strongly suggest that water vapor induces the morphological transition from lamellar to HPL by swelling the PEO.

Joona Bang
Korea University

Date submitted: 20 Nov 2006 Electronic form version 1.4