Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Tailoring block copolymer morphology via control of topographical surface: A self consistent field theoretic study
XIANGGUI YE, BRIAN J. EDWARDS, BAMIN KHOMAMI, Materials Research and Innovative Laboratory, Department of Chemical and Biomolecular Engineering, University of Tennessee, Knoxville, TN 37996
— It is well known that chemically patterned or topologically complex substrates can direct self-assembly of adsorbed layers or thin films of block copolymers. In this study we have examined the self-assembly of a lamella-forming diblock copolymer guided by topological complexity, namely, substrates composed of trenches with different heights and widths. In general, when the substrate is neutral to both blocks of the copolymer, the perpendicular lamella morphology is obtained. However, when the substrate has a preferred affinity to one of the blocks, a host of novel morphologies including different bi-continuous network structures can be created by judiciously manipulating the trench height and width. Overall, this study clearly demonstrates the impact of this class of simulations in rational design of morphologies in thin multicomponent polymeric films with application to technologies such as filtration, and high-surface area membranes.

Xianggui Ye
Materials Research and Innovative Laboratory,
Department of Chemical and Biomolecular Engineering,
University of Tennessee, Knoxville, TN 37996

Date submitted: 26 Nov 2011 Electronic form version 1.4