Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Phase Behavior of All-Hydrocarbon "Diblock-Random" Copolymers BRYAN BECKINGHAM, RICHARD REGISTER, Princeton University — "Block-random" copolymers (A_xB_{1-x})-(A_yB_{1-y}), where each of the two blocks is a random copolymer of monomers A and B, present a convenient and useful variation on the typical block copolymer architecture, as the interblock interactions and physical properties can be tuned continuously through the random block's composition. The ability to tune the effective interaction parameter between the blocks continuously, allows for the order-disorder transition temperature (T_{ODT}) to be tuned independently of molecular weight using only two monomers. This flexibility makes block-random copolymers a versatile platform for the exploration of polymer phase behavior and structure-property relationships. Here, we present the phase behavior of hydrogenated derivatives of various lamellae-forming diblock-random copolymers where one block is a styrene/isoprene (S*r*I) random copolymer. Using small-angle x-ray scattering, we investigate a series of isoprene hydrogenated hI-S*r*hI with varying styrene content, determine order-disorder transition temperatures and compare the observed phase behavior to that of more typical S-hI block copolymers via mean-field theory. Additionally, diblock-random copolymers, 50 wt. % styrene in the S*r*I block, are synthesized with polyisoprene, polybutadiene or polystyrene blocks and we examine the phase behavior of both their hydrogenated derivatives, prepared with catalysts which either leave the S units intact or saturate them to vinylcyclohexane.

Bryan Beckingham
Princeton University

Date submitted: 07 Nov 2012

Electronic form version 1.4