Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Evaporation-induced ordering in solution-cast block copolymer thin films SEAN PARADISO, KRIS DELANEY, HECTOR CENICEROS, CARLOS GARCIA-CERVERA, GLENN FREDRICKSON, UC Santa Barbara — Block copolymer thin films are currently being investigated for a wide variety of applications, ranging from separation membranes to organic photovoltaics and lithographic masks. Over the last decade or so, there has been mounting interest in using solvent casting techniques to control morphology selection in thin films either through spin coating, drop casting, or simple annealing under a mixture of solvent vapors. While these added degrees of freedom and process variables offer the promise of enhanced morphology control, they necessarily add extra dimensions and inter-dependencies between parameters that must be sorted out before this control can be effectively exercised. To this end, we have adapted a dynamical extension of Self-Consistent Field Theory to study the dynamics of ordering from a dilute copolymer solution to a dry, ordered thin film. This talk will offer a visual summary of the range in behavior available to a single copolymer + neutral solvent system in both 2D (lamella-forming) and 3D (cylinder-forming) environments. In addition, a brief analysis will be presented on the competing time scales, equilibrium, and non-equilibrium effects that appear to govern the initiation event and propagation of evaporation-induced ordering fronts.

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Date submitted: 08 Nov 2012 Electronic form version 1.4