Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Thermodynamics and Kinetics of Defect Annihilation in Block Copolymer Assembly JUAN DE PABLO, Institute for Molecular Engineering, University of Chicago — Directed copolymer seassembly (DSA) offers a promising alternative for patterning at sub-lithographic length scales. Much progress has been made over the past decade, but a number of significant challenges remain. In particular, it is essential that the concentration of defects in self-assembled block polymer films be brought down to levels that are compatible with semiconductor fabrication requirements. Recent work has shown that many of the defects that arise in block copolymer films assembled on nano-patterned substrates represent highly unfavorable non-equilibrium states that are stabilized by large free energy barriers. It is therefore of interest to identify the kinetic mechanisms that may lead to elimination of such barriers. In this work we use theory and simulations to determine the pathways through which defects are annealed or annihilated in directed copolymer assembly processes. We examine the effects of composition, pattern characteristics, solvent concentration and general material characteristics on directed assembly, and propose general guidelines and fabrication strategies that are likely to lead to defect-free assembly of block polymers on lithographically patterned substrates.

Juan de Pablo
University of Chicago

Date submitted: 19 Nov 2014 Electronic form version 1.4