Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Marangoni-Driven Topographic Patterning of Polymer Thin Films CHRISTOPHER ELLISON, JOSHUA KATZENSTEIN, DUSTIN JANES, JULIA CUSHEN, NATHAN PRISCO, NIKHIL HIRA, DANA MCGUFFIN, The University of Texas at Austin — When exposed to UV light polystyrene (PS) undergoes partial dehydrogenation of its polymer backbone, raising its surface energy. By exposing a PS thin film to UV light through a photomask, a surface energy pattern can be programmed in to the polymer film. Upon heating the film to a liquid state without the mask present, the polymer flows from the unexposed (relatively low surface energy) to exposed (relatively high surface energy) regions of the film. The driving force for this phenomenon is the Marangoni Effect, familiar to most in the 'tears' or 'legs' in a glass of wine, which describes convective mass transfer due to surface energy gradients. This flow results in three-dimensional topography reflective of the photomask used in the patterning step, which can be preserved indefinitely by quenching the film below its glass transition temperature. In this talk, this process, a preliminary model, and its kinetics will be described.

Christopher Ellison
The University of Texas at Austin

Date submitted: 09 Nov 2012 Electronic form version 1.4