Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Insight into Polymer De-wetting: A Neutron Reflectivity Study of Three-Arm Polystyrene Stars in Polystyrene Thin films[1] THUSITHA ETAMPAWALA, NAMPUENG PANGPAIBOON[2], DVORA PERAHIA, Clemson University, CANDICE HALBERT, JIM BROWNING, SNS, Oak Ridge National Laboratory, NISANART TRAIPHOL, Research Unit of Advanced Ceramics, Department of Materials Science Faculty of Science, Chulalongkorn University, Bangkok , Thailand, RAKCHART TRAIPHOL, Laboratory of Advanced Polymers and Nanomaterials, Department of Chemistry, Faculty of Science, Naresuan University, Phitsanulok, Thailand — While polymeric coatings are ubiquitous, de-wetting remains a challenge. As both enthalpic and entropic contributions often affect the de-wetting process, small changes either compositional or in processing conditions are sufficient to impact the stability of thin films. We have recently shown that blending small amounts of three-arm polystyrene (PS) star polymers are sufficient to inhibit de-wetting of thin polystyrene thin films. The role of the three-arm star has been investigated using neutron reflectometry. We have followed the distribution of the three-arm PS stars in a thin film of d-PS as function of time as the temperature was raised above Tg of the PS. Films of d-PS/h-three-arm star PS were cast from toluene and the polymer profiles were determined as a function of time as the temperature was varied. The result show a clear migration of the three-arm stars to both interfaces, enhancing the number of chain ends at the interface. As the molecular weights of the star arm increases, it migrates slower to the interface.

[1]This work is carried out under partial support of DOE grant DE-FG02-12ER46843
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Date submitted: 18 Nov 2012 Electronic form version 1.4