Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Slow physical aging of thin polymer films of varying chain architecture[1] BRADLEY FRIEBERG, EMMANOUIL GLYNOS, PETER GREEN, University of Michigan — The physical aging rate of supported polystyrene (PS) films is influenced by film thickness, H, and by macromolecular architecture. For linear PS films, in the thickness range 300 nm to 50 nm, supported by silicon oxide substrates, the aging rate decreased by 15 percent. On the other hand, star-shaped PS, with functionality f=8 and with an average molecular weight per arm of Marm=25 kg/mol. exhibited a 25 percent decrease throughout the same thickness range. When Marm was decreased to 10 kg/mol the depression in aging rate was 45 percent. We reconcile these changes in physical aging in terms of model that accounts for gradients in the local Tg of the film in the vicinity of interfaces. These findings have important implications for the processing and function of thin polymer films for different applications.

[1]Support for this research from the National Science Foundation (NSF), Division of Material Research, Polymer Program No. 0906425 is gratefully acknowledged.

Bradley Frieberg
University of Michigan

Date submitted: 11 Nov 2011 Electronic form version 1.4