Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Influence of Finite System Size, Cooling Rate, and Chain Interpenetration on the Local Glass Transition Temperature Tg(z) Profile in Polystyrene Next to Different Polymers ROMAN BAGLAY, CONNIE ROTH, Dept. of Physics, Emory University — We have recently shown very broad 350-400 nm and asymmetric local glass transition temperature Tg(z) profiles across glassy-rubbery polymer-polymer interfaces that have important implications for our understanding of local properties in polymer blends and block copolymers, as well as the study of interfacial perturbations. Our previous work focused on a single interface with semi-infinite domains, allowing the Tg(z) disturbance to propagate unhindered by the presence of other interfaces, allowing bulk Tg to be recovered on either side of the interface. In these systems, the penetration distance of the Tg(z) disturbance propagated 225-250 nm into polystyrene (PS) next to lower-Tg polymers such as PnBMA and PiBMA (so-called soft confinement), while penetrating 100-125 nm next to higher-Tg polymers such as PSF and PMMA (hard confinement). Here we explore factors that can make it easier to compare our experimental data with computer simulations that frequently use periodic boundary conditions creating additional interfaces and are limited to short time scales, equivalent to faster cooling rates. We find that the addition of a second PnBMA interface (finite system size) truncates the Tg(z) profile preventing bulk dynamics from being recovered even within a PS domain as large as 300 nm. In addition, we examine the influence of faster cooling rates and the implications of limiting chain interpenetration between the two domains.

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Date submitted: 11 Nov 2016 Electronic form version 1.4