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Neighboring Domains Perturb Glass Transition Temperature on Multilayer Films and Nanostructured Polymer Blend Systems SOYOUNG KIM, CONNIE ROTH, RODNEY PRIESTLEY, JOHN TORKELSON, Northwestern University — The impact of free surface and polymer-substrate interfaces on the glass transition temperature (Tg) in nanoconfined geometries has been studied for over a decade. Free surfaces reduce the requirement for cooperative dynamics and tend to decrease Tg; attractive interactions with a substrate interface reduce mobility and tend to increase Tg. Employing a multilayer fluorescence technique, we show how the Tg dynamics of PS layers are perturbed by immiscible polymer-polymer interfaces. We determine the length scale over which adjoining layers can perturb the PS layer. Finally, we demonstrate the tunability of the Tg of ultrathin PS layers atop different types of polymers. Our results indicate that the cooperative segmental dynamics of an ultrathin PS layer are strongly coupled to the neighboring domains through the narrow polymer-polymer interface. These results suggest a novel route to create new material properties controlled by the type and thickness of polymers in a multilayer film geometry. Studies with nanostructured blends to monitor Tg perturbation by neighboring domain are also underway.

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