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Perturbing the Tg of Polymers by 50-100 K in Nanoconfined Freely Standing Films and by the Presence of Neighboring Layers of Other Polymers JOHN TORKELSON, SOYOUNG KIM, Northwestern University — We demonstrate via the temperature dependence of fluorescence intensity intrinsic to the polymer of interest or from dye labels that the glass transition temperature (Tg) of a polymer can be altered by 50-100 K by nanoconfinement in freely standing films and in multilayer systems in which the neighboring layers are different polymers. In the former case, Tg always decreases from bulk Tg; in the latter case, Tg decreases or increases depending on the Tg of the neighboring polymer layer and factors that may be related to fragility. We employ fluorescence to characterize the gradient in Tg from the perturbing interfaces. These studies reveal that the theory by de Gennes for the Tg reduction in freely standing films cannot be correct and that the perturbation to Tg by a neighboring layer of another polymer can extend as much as 100 nm into the layer of interest.

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