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Confinement and interfacial effects on the alpha relaxation dynamics of thin polymer films RODNEY PRIESTLEY, Department of Chemical Engineering, Northwestern University, Evasnton, IL USA, LINDA BROADBELT, Department of Chemical Engineering, Northwestern University, Evanston, IL USA, KOJI FUKAO, Department of Macromolecular Science and Engineering, Kyoto Institute of Technology, Kyoto, Japan, JOHN TORKELSON, Departments of Chemical and Biological Engineering and Materials Science and Engineering, Northwestern University, Evanston, IL USA — It is now known that both the glass transition temperature (T_g) and the alpha relaxation dynamics can deviate substantially from the bulk with confinement of polymer films. Using a novel fluorescence multilayer method, it has been established that the deviations in T_g observed with decreasing film thickness for polystyrene and poly(methyl methacrylate) films supported on silica is a result of interfacial effects. Since the glass transition is related to the cooperative segmental (alpha) relaxation dynamics, it must be that these dynamics at the interfaces are different from the bulk. However, because of experimental limitations no direct measurement of the complete alpha relaxation time distribution at the interfaces has been conducted. Here we present results of a novel dielectric multilayer method that allows for such measurements. Our results indicate that both the alpha relaxation time distribution and the average alpha relaxation time are affected by the interfaces for polystyrene films.

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