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Modifying Effects of Plasticizer, Chain Connectivity, and Chain Adsorption on the Physical Aging and Interfacial Gradient in Dynamics in Thin Polystyrene Films MICHAEL THEES, CONNIE ROTH, Dept. of Physics, Emory University — How the glass transition and physical aging in thin films change with confinement is nontrival, with studies in the literature showing that these effects can be modified by various factors including chain adsorption to substrate interfaces and addition of diluents. Some studies indicate that addition of plasticizer appears to eliminate confinement effects such as Tg gradients and possibly impacts chain adsorption to substrates. In contrast, how plasticizer affects physical aging in glassy polymers has been largely unexplored experimentally, despite various theoretical and simulation efforts. Previously we have shown that for neat polystyrene (PS) films, with molecular weights MW ¡ 3000 kg/mol, physical aging rates in thin films decrease with decreasing film thickness consistent with expectations from local Tg gradients. However, we have recently found that for very high molecular weights, MW ¿ 7000 kg/mol, the physical aging rate in thin films was more bulk like, suggesting a diminished gradient in dynamics related to chain connectivity and possibly chain adsorption to the substrate interface. Here, we explore how the addition of dioctyl phthalate (DOP) plasticizer to PS can alter the physical aging rate of thin films and possibly modify the adsorbed layer.

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