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Glass Transition of Thin Star Polymer Films EMMANOUIL GLYNOS, University of Michigan, Ann Arbor, PETER GREEN, University of Michigan — The thickness dependence of the glass transition, T_g, of thin film polystyrene (PS) star molecules, supported by SiO_x substrates, has been examined using spectroscopic ellipsometry and compared to the behavior of linear PS chains. Linear PS chains exhibit a film thickness dependence on SiO_x substrates, decreasing with decreasing film thickness, for thicknesses h less than approximately 45 nm. This thickness dependence, when normalized by the bulk T_g, is observed for chains with a wide range of degrees of polymerization N, from $N <$ N_e (molecular weight between entanglements) to very large values of N. The T_gs of long chain star molecules, of low functionalities, f, exhibit the same thickness dependence. However, as the degree of polymerization of an arm length, Na, decreases the thickness dependence undergoes a transition, wherein T_g increases with decreasing h. These effects are discussed in terms of the role of architecture and entropic effects on the structure of the system. Implications on the chain dynamics will also be discussed.

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