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Hindering Cooperative Segmental Dynamics at the Free Surface of Polystyrene: The Impact of Narrow Immiscible Interfaces in Polymer Multilayer Films CONNIE B. ROTH[1], JOHN M. TORKELSON[2], Northwestern University, Evanston, IL 60208-3120 — The glass transition temperature (Tg) of individual layers within multilayer films of different polymers are measured to investigate how competing free surface and substrate interactions are mediated by the narrow interfaces between the immiscible polymer layers. We demonstrate that the enhanced mobility at the free surface of polystyrene (PS), as characterized by the -32 K Tg reduction observed in a 14-nm thick PS surface layer on bulk PS, can be virtually eliminated by placing a 14-nm thick PS surface layer on bulk poly(methyl methacrylate) (PMMA) and bulk poly(2-vinyl pyridine) (P2VP). We explore the extent to which the interfacial widths and layer thicknesses affect the propagation of the enhanced cooperative segmental dynamics at the free surface of PS into the film.

[1]Dept. of Chemical and Biological Engineering
[2]Depts. of Chemical and Biological Engineering and Materials Science and Engineering

Connie B. Roth
Northwestern University, Evanston, IL 60208-3120

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