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Reduced Glass Transition Temperatures of Thin Polymer Films - Confinement Effect or Artifact? OLIVER BAEUMCHEN, JOSHUA D. MCGRAW, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1, JAMES A. FORREST, Department of Physics and Astronomy and Guelph-Waterloo Physics Institute, University of Waterloo, Waterloo, ON, Canada, N2L 3G1, KARI DALNOKI-VERESS, Department of Physics & Astronomy and the Brockhouse Institute for Materials Research, McMaster University, Hamilton, ON, Canada, L8S 4M1 — For two decades there have been reports of measurements of reduced glass transition temperatures (T_g) in polymer, and in particular poly-styrene, films. These results have motivated theoretical models and a variety of sophisticated experiments probing interfacial polymer properties. While the much larger reductions in T_g for free standing films have suggested the importance of the free surface, a significant concern has been raised about a possible correlation between anomalous dynamics and incomplete equilibration of the sample. Here, we present new ellipsometry measurements which unambiguously address this concern. The glass transition in free standing and supported films can be changed by many 10's of degrees by manipulating the interfacial properties. Taken together with previous work the results clearly reveal the importance of free interfaces as we transition from two, to one, to zero free interfaces.

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