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Confinement for Thin Film on Substrates with Different Geometric Curvatures JIE XU, JIAO CHEN, GI XUE, Nanjing University — Molecular chain conformation in thin polymer film on substrates with different geometric curvature was examined using fluorescence non-radiative energy transfer (NRET) spectroscopy. We find that thin film on concave substrate exhibits significant differences in vitrification behavior, in both magnitude and thickness dependence, from the planar film. NRET measured a more compact morphology, while dynamical scanning calorimetry detected an increased glass transition temperature (T_g) for the concave thin film, with respect to bulk film. In contrast to planar film where properties are thickness dependent, polymer concave film shows that its conformation and T_g are solely dependent on curvature radius. Surprisingly, these properties converted back to the bulk values when the substrate was removed, indicating the crucial importance of interaction imposed by the concave hard wall. These spectroscopic data matched perfectly the calorimetric results and provided a new implication to understanding geometric confinement on dynamics.

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