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Capillary-driven flow as a probe of enhanced surface mobility in glassy polymer films YU CHAI, University of Waterloo, Waterloo, On, Canada N2L 3G1, THOMAS SALEZ, Laboratoire de Physico-Chimie Théorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, JOSHUA D. MCGRAW, McMaster University, 1280 Main St. W, Hamilton, ON, Canada, L8S 4M1, ELIE RAPHAEL, Laboratoire de Physico-Chimie Théorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, JAMES A. FORREST, University of Waterloo, Waterloo, On, Canada N2L 3G1 — We present the use of a novel experimental arrangement [*McGraw et al. Soft Matter **7**, 7832 (2011)*] to directly distinguish the dynamical behavior and heterogeneity of polymer thin films above and below the glass transition temperature T_g. In particular, by monitoring the capillary-driven evolution of a stepped thin polystyrene film over a temperature range encompassing the bulk T_g value, we find evidence suggesting enhanced surface mobility. Furthermore, by varying the initial aspect ratio of the sample we can examine the heterogeneity of the sample dynamics. The results of these experiments above T_g are consistent with homogenous viscous flow [*McGraw et al. PRL **109**, 128303 (2012)],* whereas those below T_g indicate a localization of the flow over a thin surface layer only. We thus develop a linear thin film equation for superficial viscous flows, which is analogous to the surface diffusion model, and for which exact analytical solutions are known and in good agreement with the present experimental data.

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