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Surface Dynamics of Molten Homopolymer Brushes GOKCE UGUR, BULENT AKGUN, WILLIAM J. BRITTAIN, MARK D. FOSTER, The University of Akron, Akron, OH 44325-3909, SURESH NARAYANAN, X-ray Science Division, Argonne National Laboratory, Argonne, IL 60439, HEEJU LEE, SANGHOON SONG, HYUNJUNG KIM, Department of Physics, Sogang University, Seoul 121-742, Korea, ZHANG JIANG, Sogang University, SUNIL K. SINHA, Department of Physics, University of California San Diego, La Jolla, CA 92093 —
The surface dynamics of densely grafted polystyrene and poly(n-butyl acrylate) homopolymer brushes of various thicknesses, synthesized using atom transfer radical polymerization were investigated by X-ray photon correlation spectroscopy for the first time. Brushes of thicknesses of 9, 26, 38, and 47 nm were considered. Within the range of time (0.2 -1100 s) and length scale (0.2-5 um) studied, no fluctuations of the brush surfaces were detectable for any thickness brush, presumably due to tethering of polymer chains to the substrate. Even 130 $^{\circ}$C above the bulk glass transition temperature, no relaxation process was observed. The suppression of long-wavelength surface fluctuations on a molten homopolymer brush is consistent with the predictions of Fredrickson and co-workers.

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