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**Surface Dynamics of Free PS Chains on Chemically Identical Polymer Brushes: An XPCS Study** GOKCE UGUR, Department of Polymer Science, The University of Akron, Akron, OH 44325-3909, BULENT AKGUN, Center for Neutron Research, National Institutes of Standards and Technology, Gaithersburg, Maryland 20899, ZHANG JIANG, SURESH NARAYANAN, Experimental Facilities Division, Argonne National Laboratory, Argonne, IL 60439, WILLIAM J. BRITTAIN, MARK D. FOSTER, Department of Polymer Science, The University of Akron, Akron, OH 44325-3909 — We found no relaxation of fluctuations of the brush surfaces within the range of time (0.2 -1100 s) and length scale (0.6-3 um) studied by X-ray photon correlation spectroscopy(XPCS). This is true for PS brushes of thicknesses of 9 - 101 nm and grafting density of 0.12-0.6 chains/nm$^2$ at temperatures up to 130C above bulk $T_g$. Results on the dynamics of a layer of untethered 2.2k PS chains on top of a PS brush surface show that placing the PS chains atop the brush dramatically slows down the surface relaxations of the film surface. As the ratio of the thickness of the layer of untethered chains to the thickness of the highly dense brush drops below $\sim$0.5, the surface relaxations become too slow to be observed readily with XPCS. Reducing grafting density of the underlying brush markedly slows the surface dynamics. The surface dynamics of the layer of "free" PS chains are coupled with those of the underlying brush.

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