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Interface Roughness Correlations and Surface Fluctuations in Diblock Copolymer Brushes Synthesized by Atom Transfer Radical Polymerization MARK D. FOSTER, BULENT AKGUN, WILLIAM J. BRITTAIN, Maurice Morton Institute of Polymer Science, The University of Akron, Akron, OH, 44325, JIN WANG, XUEFA LI, Experimental Facilities Division, Argonne National Laboratory, Argonne, IL 60439 — Correlation between the interior interface and air surface of a diblock brush has been detected using longitudinal diffuse X-ray scattering and specular X-ray reflectivity. Polystyrene-b-polymethacrylate brushes were synthesized by sequential polymerization of first polystyrene and then polymethylacrylate using Atom Transfer Radical Polymerization. The amplitude of the fringes in the longitudinal diffuse scattering decreases with increasing thickness of the polymer brush, indicating the interactions between substrate and brush surface decrease as the thickness of the layers increases. Correlation of the roughnesses of the top and bottom interfaces of the brush is observed after annealing the brush at a temperature above the glass transition temperatures of both polymers. This correlation is lost after the brush is swollen in the vapor of a nonselective solvent, dichloromethane. Transverse diffuse X-ray scattering measurements have shown that long wavelength fluctuations are suppressed at the air interface.

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