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Evolution of Polymer Brush Dynamics by X-ray Photon Correlation Spectroscopy. PINAR AKCORA, Columbia University, SURESH NARAYANAN, PAPPANNAN THIYAGARAJAN, Argonne National Laboratory, LINDA SCHADLER, Rensselaer Polytechnic Institute, SANAT KUMAR, Columbia University, COLUMBIA UNIVERSITY TEAM, ARGONNE NATIONAL LABORATORY COLLABORATION, RENSSELAER POLYTECHNIC INSTITUTE TEAM — We studied the dynamics of PS grafted silica particles dispersed in PS homopolymers of two molecular weights (44k and 150k) through x-ray photon correlation spectroscopy measurements. The particle motions were related to the traditional aging process and also to the wetting/dewetting behavior of polymer brushes controlled by changing the molecular weight of the matrix PS homopolymer. By increasing the particle concentration, relaxations slowed down in both wet and dry brushes. At 5% particle concentration, relaxations were independent of the matrix molecular weight. We observed that particle dynamics represented the features of structural relaxation in wet brush case which was not related directly to the aging. Two modes of relaxations were seen at early times (in the first 2 hours) for 5% particle loading. Slow relaxations were seen at low q 's where tau dependency of q was 0.8. Particles that were arranged at closer distances (below average interparticle spacing) showed diffusive motions. In the dry brush, particle motions were found to be ballistic similarly observed in the pure brush case.

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