

Abstract Submitted
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Direct evidence of heterogeneous dynamics within ultrathin polystyrene melt films¹ TAD KOGA, NAISHENG JIANG, PETER GIN, MAYA ENDOH, Stony Brook University, SURESH NARAYANAN, Argonne National Laboratory, LARRY LURIO, Northern Illinois University, SUNIL SINHA, University of California San Diego — We report heterogeneous dynamics associated with cooperative motions of polymer chains within single polystyrene (PS) films at temperatures far above its glass transition temperature. The technique used was a marker x-ray photon correlation spectroscopy technique using “dilute” gold nanoparticles embedded in PS films in conjunction with resonance-enhanced x-rays scattering which intensifies the probing electrical field in the regions of interest within the films. We found that as the thickness decreased below around 60 nm, the diffusive motions of the markers were significantly suppressed both at the free surface and the center of the film relative to those for the thicker films (>100 nm thickness). It is attributed to the long-range effects on the polymer dynamics induced by an immobile layer at the substrate interface.

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