Abstract Submitted
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Confinement Effects on the Swelling Behavior of Thin Polymer Films ALETA HAGMAN, Northwestern University & Argonne National Lab, KENNETH R. SHULL, Northwestern University, JIN WANG, MARTIN TOLKIEHN, XUEFA LI, SURESH NARAYANAN, Argonne National Lab — Marker motion can be used to measure polymer dynamics in polymer/metal nanocomposite thin films. In our current experiments, thermally evaporated gold particles (few nanometers in diameter) act as a marker layer between two polymer layers with different mobilities. To create the differing mobilities we are using a low molecular weight poly(2-vinyl pyridine) (PVP) on one side of the marker layer and a high molecular weight PVP on the other. The low molecular weight PVP will swell into the higher molecular weight polymer, when heated above the polymer glass transition temperature, creating a flux of the marker atoms in the opposite direction. We have used X-ray standing waves (XSWs), generated by total external reflection above a mirror surface, as a probe to monitor the time evolution of the gold nanoparticle distribution in the nanocomposite ultrathin films. Swelling kinetics are obtained from the measured time-dependence of the nanoparticle distribution. We will also discuss the effects the free surface and the mirror surface have on the amount of swelling observed.

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