Abstract Submitted
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Direct observation of enhanced mobility near the surface of polymer nanocomposite thin films[1] TADANORI KOGA, C. LIN, J. JIANG, J. KOO, M. RAFAILOVICH, J. SOKOLOV, Stony Brook University, S. NARAYANAN, D. LEE, Argonne National Lab., L. LURIO, Northern Illinois Univ., S. SINHA, UC San Diego — The x-ray photon correlation spectroscopy (XPCS) technique with grazing-incident geometry is currently being used to probe surface dynamics of a planer film on microscopic length scales. Sinha et al.[1] have shown that the viscosity of a polymer thin film could be derived from the relaxation rate of thermally induced surface roughness. As a further application of XPCS, we studied surface dynamics of polymer nanocomposite thin films. A combination of thiol-functionalized gold nanoparticles (4 nm in diameter, 4wt%) and polystyrene was chosen as a model system. The high x-ray contrast of Au nanoparticles enabled us to monitor their Brownian motion associated with polymer chain dynamics. In addition, making use of the advantage that the x-ray penetration depth can be tuned by varying the incidence angle of the incoming beam, we could measured the Brownian motion at the topmost 10 nm of the film and in the bulk separately. As a result, it was found that the diffusion coefficient for the Brownian motion was 50% greater at the surface than in the bulk. That is, the viscosity of the polymer is much lower at the surface. [1] H. Kim, et al. *Phys. Rev. Lett.*, 90, 683020 (2003).

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