

Abstract Submitted  
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**Probing gradient of dynamics in confined polymers with nanoparticles**<sup>1</sup> SIVASURENDER CHANDRAN, NAFISA BEGAM, JAYDEEP BASU, Department of Physics, Indian Institute of Science, Bangalore, India, MRINMAY MUKHOPADHYAY, Applied materials science division, Saha Institute of Nuclear Physics, Kolkata, India — We report [1] the evidence of gradient in dynamics by probing the diffusion coefficient of polymer grafted nanoparticles (PGNP) in polymer thin films of different thickness ( $2.5 R_g$  and  $8R_g$  of the matrix). Using surface x-ray scattering, we observe a systematic vertical dispersion of PGNP from a pinned in substrate interface layer to the surface on thermal annealing. Even after annealing at high temperature ( $T \gg T_g$ ) and longer times, a fraction of PGNP pertain to stay at the substrate forming a stable interface layer. This hints about the low mobility of particles at the substrate interface and also emphasizes the presence of high viscous/gel-like interfacial layer. Real space microscopic images show the formation of lateral domains of the particles at air surface suggesting the higher surface mobility. In addition, it is also observed that the fraction of particles in the air surface is more in annealed thinner films compared to the thicker ones. Thus, we have correlated the observed lateral and vertical dispersion and its evolution with annealing, to the gradient in dynamics along the thickness of the thin films. [1] *Sivasurender Chandran, J. K. Basu and M. K. Mukhopadhyay, in communication*

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