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Self-Diffusion of Poly(isobutyl methacrylate) in Thin Films

JOSHUA KATZENSTEIN, DUSTIN JANES, HALEY HOCKER, JUSTIN CHANDLER, CHRISTOPHER ELLISON, The University of Texas at Austin — While relevant to a variety of applications, such as nanocomposite intercalation and molecular transfer printing, the diffusion of polymers parallel to their confining interfaces has received limited experimental attention to date. A refinement of fluorescence recovery after patterned photobleaching (FRAPP) has been developed by our group as a versatile platform for understanding nanoconfined diffusion. Poly(isobutyl methacrylate) (PiBMA) is an ideal candidate for these studies because (in quartz or silicon wafer supported thin films) it exhibits a film thickness independent glass transition temperature (T_g). This is important because, according to the Rouse model, the diffusion coefficient does not depend simply on the absolute temperature, but on the distance from T_g . Therefore, in our systems the origin of the diffusion coefficient is possibly decoupled from T_g changes that are present in other polymer systems. In this talk, the effect of a variety of parameters, such as film thickness, diffusion temperature, and confining interfaces, will be discussed.

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