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**The structure and dynamics of polymer nanocomposites containing anisotropic nanoparticles** CHIA-CHUN LIN, University of Pennsylvania, KOHJI OHNO, Kyoto University, Japan, NIGEL CLARKE, University of Sheffield, KAREN WINEY, RUSSELL COMPOSTO, University of Pennsylvania, MICHAEL HORE, National Institute of Standards and Technology — The tracer diffusion of deuterated polystyrene (dPS; 49-532 kg/mol) is measured in polystyrene (PS: 270 kg/mol) nanocomposites containing PS-grafted (132 kg/mol) anisotropic nanoparticles (NP). The NP's are small aggregates containing iron oxide spheres (5nm). These NP's uniformly disperse in PS up to 100% loading. The structure of the polymer nanocomposites is probed using (ultra)small angle x-ray scattering (USAXS,SAXS). Peaks shift to high Q region with increasing NP loadings, indicating a decrease in spacing between particles. The interparticle distance for the pure NP case is 30nm, consistent with TEM, and a brush thickness of 15nm. The brush profile is also measured using SANS. The reduced tracer diffusion coefficient initially decreases as NP loadings increase and then reaches a minimum (35% reduction) near 0.25 vol% (core) for all dPS. With a further increase in NP loading, diffusion recovers to 90% of the unfilled case. Penetration of the tracer (i.e., wetting) into the brush will affect the effective interparticle distance. Diffusion of dPS (1866 kg/mol) will be examined to determine if the dry brush case influences the recovery at high loading. These experiments demonstrate that polymer brushes grafted to anisotropic nano particles can affect the tracer diffusion pathway and indicate that diffusion models should incorporate the interfacial structure between brush and matrix.

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