

Abstract Submitted
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Polymer diffusion in silica nanoparticle / polymer nanocomposites SANGAH GAM, University of Pennsylvania, JEFF METH, STEVE ZANE, Dupont Co., KAREN I. WIENY, University of Pennsylvania, NIGEL CLARKE, Durham University, RUSSELL J. COMPOSTO, University of Pennsylvania — Nanoparticles (NPs) added to polymers can enhance mechanical, electrical and thermal properties. Moreover, the polymer processing conditions (e.g., viscosity) can be changed by the addition of NPs because molecular relaxation is perturbed by the filler. Using elastic recoil detection, the tracer diffusion coefficient D^* of deuterated polystyrene (dPS) in polystyrene (PS): silica NP nanocomposites was measured for NP loadings up to 50 vol%. TEM studies show that the phenyl-capped silica NPs are well dispersed in the PS matrix. For low molecular weight dPS ($\sim 200k$), D^* decreases very slightly as NP loading increases. However, for high molecular weight dPS ($\sim 2M$), D^* decreases more strongly as NP concentration increases up to 30 vol% and then slightly increases at higher concentrations. The tracer diffusion studies are compared with DMA results as well as tracer diffusion in carbon nanotube nanocomposites that show a minimum in D^* near the percolation threshold followed by an increase in D^* .

Sangah Gam
University of Pennsylvania

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