Polymer Nanocomposites: Polymer and Particle Dynamics

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Supplementary Information

\textbf{Supplementary Figure 1:} DSC thermograms of SiO\textsubscript{2}–PBD nanocomposites for PI316k, $\phi = 1\%$, $\phi = 3\%$, $\phi = 5\%$, and PBD3k-SiO\textsubscript{2}. Curves are shifted along vertical axis to enhance clarity.
Supplementary Figure 2: Normalized entanglement molecular weight, $M_e(\phi)/M_{e0}$ vs. $\phi$ for SiO$_2$–PBD nanocomposites obtained from oscillatory amplitude sweep measurement (diamonds). Also, $M_e(\phi)/M_{e0}$ estimates assuming (i) all PBD chains act as plasticizer (circles) and (ii) an effective amount of PBD calculated from $T_g$ measurement act as plasticizer (squares). $M_{e0}$ is the entanglement molecular weight for pure PI.
**Supplementary Figure 3:** $\varepsilon''(f) = \varepsilon''_d(f) + \varepsilon''_c(f)$ calculation for (a) PI316k and (b) $\phi = 5\%$ SiO$_2$–PBD nanocomposites. Circle symbol represents $\varepsilon''(f)$, dashed line represents $\varepsilon''_c(f)$ drawn from low frequency, and diamond symbol represents $\varepsilon''_d(f)$ which was used to find $\tau_p = (2\pi f_p)^{-1}$ where $f_p$ corresponds to maximum in the dielectric loss spectrum, $\varepsilon''_d(f)$. 