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**Unexpected Thermal Annealing Effect on the Zero-shear Viscosity of Polymer Nanocomposites.**[1] FEI CHEN, Boston University, KOSHU TAKATSUJI, DAN ZHAO, Columbia University, XUANJI YU, Boston University, SANAT KUMAR, Columbia University, OPHELIA TSUI, Boston University — A comprehensive study was performed on the effect of thermal annealing above the glass transition temperature on the zero-shear viscosity, $\eta$, of polymer nanocomposites (PNCs) and their host polymers. For all the specimens studied, including neat and 4 wt% DOP plasticized PS and PMMA as well as PNCs containing bare and grafted silica nanoparticles (NP, core radii, $r_c$ = 7 and 13.3 nm), $\eta$ initially increased with annealing time then approached a steady-state value after ˜100 to ˜200 h. We found that this phenomenon held true regardless of the solvent used to prepare the sample, including THF and toluene for PS and chloroform for PMMA. Moreover, the PNCs without DOP showed larger $\delta\eta/\eta$ than their host polymers while the plasticized ones showed $\delta\eta/\eta \approx 0$. By correlating the viscosity measurements with the evolution of the solvent content and average NP aggregate size in the samples, we infer that the viscosity evolutions may originate from an out-of-equilibrium chain conformation that got locked in the samples upon preparation and relaxed only after extensive annealing.

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