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Origin of dynamical properties in PMMA-C_{60} nanocomposites JAMIE KROPKA, The University of Texas at Austin, PETER GREEN, The University of Michigan — To develop further insight into the mechanism(s) by which nanoscale fillers influence the properties of polymer nanocomposites (PNCs), we evaluate the thermal and viscoelastic behavior of a model PNC, narrow molecular weight distribution PMMA into which C_{60} fullerene particles are incorporated. Differential scanning calorimetry and dynamic mechanical analysis measurements indicate systematic increases of the PNC T_g over the C_{60} composition range. Oscillatory shear rheological measurements reveal an increase in the longest relaxation time of the polymer chains accompanies this change in T_g. An assessment of particle dispersion within the polymer host suggests that the changes in the material properties are due to polymer-particle interfacial interactions, as confinement of polymer molecules between filler particles is unlikely. The interfacial interactions lead to an increase in the local friction of the system, which ultimately suppresses polymer dynamics. The suppression of local polymer dynamics is evaluated using incoherent neutron scattering.

Jamie Kropka
The University of Texas at Austin

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