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Unexpected Molecular Weight Dependence of Dynamics in Polymer Nanocomposites ADAM HOLT, Department of Physics and Astronomy, University of Tennessee, Knoxville, SHIWANG CHENG, Department of Chemistry, University of Tennessee, Knoxville, VERA BOCHAROVA, Chemical Sciences Division, Oak Ridge National Laboratory, PHILIP GRIFFIN, Department of Materials Science and Engineering, University of Pennsylvania, ADAM IMEL, MARK DADMUN, ALEXEI SOKOLOV, Department of Chemistry, University of Tennessee, Knoxville — The impact of nanoscale confinement in polymer nanocomposites has invoked tremendous interest ever since the reports of dramatic changes in polymer dynamics with relatively low nanoparticle concentrations. It has been shown that the segmental dynamics at an attractive polymer/nanoparticle interface slows down significantly due to formation of an interfacial layer. The general expectation is that the length scale of this layer and its influence will grow with increasing polymer molecular weight (MW). Our measurements reveal an opposite trend: the magnitude of the effect on segmental dynamics decreases with increasing MW. Based on detailed analysis of dielectric spectroscopy and small angle x-ray scattering measurements we provide a qualitative explanation of the unexpected observation.

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