

Abstract Submitted
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Dynamics at the Polymer/Nanoparticle Interface in Poly(2-vinylpyridine) Nanocomposites ADAM HOLT, Univ of Tennessee, Knoxville, VERA BOCHAROVA, Oak Ridge National Lab, PHILIP GRIFFIN, ALEXANDER AGAPROV, ADAM IMEL, MARK DADMUN, JOSHUA SANGORO, ALEXEI SOKOLOV, Univ of Tennessee, Knoxville — The intriguing thermodynamic properties of polymer nanocomposites (PNCs) have often been attributed to the formation of an interfacial polymer region at the nanoparticle surface and a better understanding of how the interfacial region affects the PNC dynamics is desired. The static and dynamic properties of poly(2-vinylpyridine)/silica nanocomposites are investigated by temperature modulated differential scanning calorimetry, broadband dielectric spectroscopy (BDS), and small angle x-ray scattering (SAXS). The SAXS data revealed a core-shell structure formed in interfacial region and BDS data detected the slower relaxation process associated with the interfacial polymer layer. Both static and dynamic measurements estimated the layer thickness to be 4-6 nm. We also demonstrated that the presence of interfacial polymer layer has negligible influence on the glass transition temperature and segmental dynamics of the remaining polymer. These results potentially offer an explanation to recent controversies in studies of polymer nanocomposites due to different experimental techniques.

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