

Abstract Submitted
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Unraveling the Interfacial Interactions in Poly (2-vinylpyridine)/Silica Nanocomposites¹

DMITRY VOYLOV, ADAM HOLT, Univ of Tennessee, Knoxville, BENJAMIN DOUGHTY, VERA BOCHAROVA, HARRY MEYER III, SHIWANG CHENG , Oak Ridge National Laboratory, HALIE MARTIN, MARK DADMUN, Univ of Tennessee, Knoxville, ALEXANDER KISLIUK , Oak Ridge National Laboratory, ALEXEI SOKOLOV , Univ of Tennessee, Knoxville — Polymer nanocomposites (PNCs) have attracted a wide interest over the last several decades and deeper understanding of microscopic parameters controlling their properties is one of the major goals. Several studies demonstrated that the interfacial layer formed around nanoparticles governs macroscopic properties of PNCs. However, microscopic parameters controlling structure and dynamics in the interfacial layer remains poorly understood. Recently, it was shown [1] that the structure and dynamics of the interfacial layer depend strongly on molecular weight of polymer matrix, while underlying mechanism of this dependence is unclear. Here we present XPS and SFG studies of the interfacial interactions in poly (2-vinylpyridine)/silica nanocomposites with different molecular weight of the polymer. Our results provide a clear experimental evidence that hydrogen bonding between polymer and nanoparticles decreases strongly with increase in molecular weight. We ascribe this observation to a frustration in packing of longer chains on the nanoparticles surface. This strongly affects dynamics and structure of the interfacial layer in the PNCs. 1. Cheng S. et al. Phys Rev Lett 116, 038302 (2016)

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