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The effect of chain rigidity on the interfacial layer thickness and dynamics of polymer nanocomposites. SHIWANG CHENG, JAN-MICHAEL Y. CARRILLO, Oak Ridge National Laboratory, BOBBY CARROLL, Department of Physics and Astronomy, University of Tennessee, BOBBY G. SUMPTER, Oak Ridge National Laboratory, ALEXEI P. SOKOLOV, Department of Chemistry, University of Tennessee — There are growing experimental evidences showing the existence of an interfacial layer that has a finite thickness with slowing down dynamics in polymer nanocomposites (PNCs). Moreover, it is believed that the interfacial layer plays a significant role on various macroscopic properties of PNCs. A thicker interfacial layer is found to have more pronounced effect on the macroscopic properties such as the mechanical enhancement. However, it is not clear what molecular parameter controls the interfacial layer thickness. Inspired by our recent computer simulations that showed the chain rigidity correlated well with the interfacial layer thickness,[1] we performed systematic experimental studies on different polymer nanocomposites by varying the chain stiffness. Combining small-angle X-ray scattering, broadband dielectric spectroscopy and temperature modulated differential scanning calorimetry, we find a good correlation between the polymer Kuhn length and the thickness of the interfacial layer, confirming the earlier computer simulations results. Our findings provide a direct guidance for the design of new PNCs with desired properties.
[1] Carrillo, J.-M. Y. *et al*; *Macromolecules* **2015,** *48*, (12), 4207-4219.

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