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Concentration, Interaction and Temperature Dependent Chain Dynamics in Polybutadiene / Clay Nanocomposites Characterized by Solid State 1H Double Quantum NMR Spectroscopy XIAOLIANG WANG, Nanjing University, PINGCHUAN SUN, Nankai University, H. HENNING WINTER, University of Massachusetts, Department of Chemical Engineering, GI XUE, Nanjing University — A concentration, interaction and temperature dependent multimode segmental chain dynamics of carboxyly terminated polybutadiene (CTPB) in CTPB/organo-clay (C18-clay) nanocomposite was investigated by solid state 1H double quantum (DQ) NMR spectroscopy. Here, the measurements were performed on a series of samples of CTPB physically attached to the surface of C18-clay. NMR results showed that the nanocomposite exhibit discrete dynamic component with stepwise increase in their motional freedom with decreasing clay content. A remarkable change of CTPB chain dynamics at organo-clay concentration of 40 wt% was found, indicating a saturation effect of the polymer adsorbed on the clay surface. The transverse magnetization relaxation experiment help us quantitatively analysis the rigid, intermediate, and mobile components. Removal of either the end-group of CTPB or of the modifier on the clay changed the polymer-clay interaction profoundly, and thus changed polymer chain dynamics, especially for chains in proximity to the clay surface. The measurement confirmed our earlier hypothesis that the strong polymer-clay interaction was the key to the synergy effect in polymer/clay nanocomposites.

Xiaoliang Wang
Nanjing University

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