Critical Effect of Segmental Dynamics in Polybutadiene / Clay Nanocomposites Characterized by Solid State 1H NMR Spectroscopy

XIAOLIANG WANG, Nanjing University, RONGCHUN ZHANG, PINGCHUAN SUN, Nankai University, H. HENNING WINTER, University of Massachusetts, Amherst, Massachusetts, GI XUE, Nanjing University — The segmental dynamics of rigid, intermediate, and mobile molecular components in end-functionalized polybutadiene (PB) / organo-clay systems was characterized by fully refocused 1H NMR FID. In addition, 1H DQ NMR experiments allowed to semi-quantitatively monitor changes in segmental dynamics near the interface. Both methods suggested a critical concentration of end-functionalized polybutadiene, indicating a saturation effect for the surface-adsorbed polymer. The critical concentration depended on molecular weight of PB and PB-clay interaction. Based on the 1H NMR results, a tentative model was proposed to illustrate the evolution of the structure and segmental dynamics in PB/organo-clay nanocomposites.

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