DOMAIN SIZE AND MOLECULAR DYNAMICS OF POLY(BUTYLENE TEREPHTHALATE)/DECYLAMINE_C_{60} NANOCOMPOSITES

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The work presents the study of domain sizes and molecular dynamics in poly(butylene terephthalate)/decylamine_C_{60} nanocomposites by solid-state NMR and NMR off-resonance techniques. The ^{1}H NMR spin-diffusion experiment designed by Goldman-Shen was performed to determine the size of heterogeneities and to characterize the morphology of the nanocomposites. The measurements were carried out using a home made pulse spectrometer operating at the frequency of 30.2 MHz. The second moment ^{1}H NMR was measured by the continuous wave method. The poly(butylene terephthalate) PBT is a thermoplastic of industrial interest due to its excellent mechanical properties. The dispersion of nanoparticles C_{60} in polymer matrix is an effective way to improve some mechanical, barrier, thermal and in some cases fire properties of this material. In this paper the results of solid state ^{1}H NMR experiments were used to characterize diffusion lengths as well as molecular dynamics in the semicrystalline polymers. The correlation times and the activation energies of molecular motion in nanocomposites were also calculated. The results suggest that modification of PBT with fullerene C_{60} would give new attractive nanocomposite material with both improved chemical and physical properties.

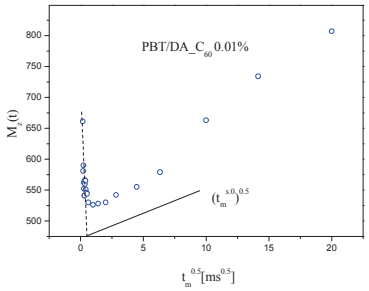

Fig.1. Spin diffusion curves plotted as the amplitude of the magnetization against the square root of the mixing time for PBT/DA_C_{60} 0.01% nanocomposites at 353K.

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