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عنوان مقاله:

Effect of nanoclay surface modifier chemical reactivity on the morphology and the rheological properties of the PP/PA6 blend nanocomposite

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خلاصه مقاله:

An attempt was made to explore the role of nanoclay surface modifier chemical reactivity on the morphology and the rheological properties of a polypropylene/polyamide6 (PP/PA6 75/25) nanocomposite blend. The Na-MMT surface was modified with two types of cations; a) diamine cation (D-Clay), and b) a combination of diamine and quaternary alkylammonium cations (A-Clay) via cation exchange reaction. The nanocomposites samples compatibilized with PP-g-MA were prepared by melt compounding in an internal mixer. The XRD patterns indicated the intercalated/exfoliated microstructure for both nanocomposite samples. The SEM results showed a significantly decreases in the PA6 droplet size, from 3.2 μm of the simple blend to the 0.4 μm in the D-Clay containing sample. Moreover, in the sample containing A-Clay the average droplet size was found to be 1 μm. The D-Clay containing sample showed the rheological properties similar to simple blend in high frequencies with a nonterminal behavior in low frequencies storage modulus. This was explained by locating of D-Clay layers in the interphase and hence, significantly reducing the effective interfacial tension, α/R. In contrast, the sample containing A-Clay showed an increased complex viscosity and storage modulus in whole range of frequencies, which was attributed to presence of a great amount of A-Clay layers in the PP matrix. These types of nanoclay partitioning were explained by possibility of chemical reaction between amine group of nanoclay surface modifier and maleic group of PP-g-MA compatibilizer or in-situ formed block copolymer. Consequently, the D-Clay layers bounded with PP-g-MA is preferentially located in the interphase, while, the non reactive nanoclay layers (containing alkylammonium cations) is dispersed in the PP matrix by assistance of PP-g-MA. These findings were also evidenced by TEM micrograph of both nanocomposite samples

کلمات کلیدی:

surface modification, morphology, blend nanocomposite, compatibilization

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