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Material Characterization

New organophilic agents of montmorillonite used as reinforcing agent in epoxy nanocomposites

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Abstract

New nanocomposites based on epoxy polymer matrix and modified montmorillonite with different agents (quaternary ammonium salts and epoxy-amine adducts) were synthesized. The effect of the modified montmorillonite with different agents on the structure and properties of final hybrids was studied.

The thermal stability of modified montmorillonites with epoxy-amine adducts, as indicated by the initial decomposition temperatures, was substantially improved compared with that of modified montmorillonite with quaternary ammonium salts (Cloisite 10 A, Cloisite 15 A, Cloisite 20 A, Nanofil 2 and Nanofil 5). The intercalated and exfoliated structure of the nanocomposites was characterized by X-ray diffraction (XRD)

and transmission electron microscopy (TEM). The XRD and TEM results showed that the modified montmorillonite with epoxy-amine adducts exhibits a higher compatibility with epoxy polymer matrix than commercially modified montmorillonites.

The effect of modified montmorillonite's concentration on the glass transition temperature (T_g) of layered silicate epoxy nanocomposites and crosslinking process of epoxy matrix was investigated.

The DMA results showed that the T_g of epoxy systems which contain modified montmorillonite with epoxy-amine adducts as reinforcing agents decreased. The changes of the properties were correlated with FTIR and DSC analysis.



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Keywords

Epoxy; Nanocomposites; Montmorillonite; Compatibilization; Glass transition temperature

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