

Role of Nanoclay Shape and Surface Characteristics on the Morphology and Thermal Properties of Polystyrene Nanocomposites Synthesized via Emulsion Polymerization

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Abstract

This work evaluates the role of the surface properties and shape of clay type on the morphology, thermal, and thermo-mechanical properties of the polystyrene (PS)/clay nanocomposites prepared via free-radical emulsion polymerization. Attapulgite clay (ATT) with a needle-like morphology and montmorillonite clay (MMT) with a platelet-like structure were used in this study. The dispersed behavior of the clay particles in the PS matrix was studied using X-ray diffraction and transmission electron microscopy. Only intercalated structures were obtained with ATT at all of the clay loadings, whereas semiexfoliated structures were observed with MMT in the low clay loading. All of the composites obtained were found to be more thermally stable than neat PS. However, the composites prepared with the MMT exhibited greater thermal stability relative to those prepared using the ATT at similar clay loading. Furthermore, the composites prepared with MMT exhibited higher storage moduli than those prepared using ATT.