

Synthesis of PMMA/Clay Nanocomposite Particles with High Clay Content via Emulsion Polymerization

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PMMA/clay nanocomposite particles with high clay contents were successfully prepared using emulsion polymerization. The content of montmorillonite in the PMMA/clay nanocomposite was increased as high as 30 wt.% based on the methyl methacrylate monomer. Final particle size of nanocomposite was in the range of 275~300 nm in diameter. 2,2'-azobis(isobuthylamine hydrochloride) and n-dodecyl trimethylammonium chloride were used as an initiator and a surfactant in cationic emulsion system. Potassium persulfate and sodium lauryl sulfate were used as an initiator and a surfactant in anionic emulsion system. The evidence of intercalated and/or exfoliated structure of montmorillonite in the nanocomposite prepared in our experiment was confirmed by wide angle x-ray diffraction patterns of d_{001} plane. Thermal behavior of nanocomposite was traced using DSC and TGA. It was found that the nanocomposite particle prepared by the cationic emulsion system showed intercalated structure of montmorillonite. We also found that the nanocomposite particle obtained from anionic emulsion system resulted in the fully exfoliated structure of montmorillonite. Thermal properties of both nanocomposites showed significant enhancement.