Abstract

Polymer blending has become a convenient route for the development of new polymeric materials over the past several decades. However, most polymers are immiscible due to the unfavourable enthalpy of mixing. To improve the miscibility in immiscible polymer blends, block or graft copolymers have been employed as compatibilizers that reduce the dispersed domain sizes by increasing the interfacial adhesion and lowering the interfacial tension in blends. On the other hand, polymer-clay nanocomposite has become an inseparable part of polymer research due to the realization that nanocomposites exhibit gain in structural, thermal, mechanical and barrier properties without significant loss in impact, or clarity. Considerable amount of research works have already been done on the preparation and characterization of polymer-clay nanocomposite. In most of these reported works clay has been used to increase the thermal and mechanical properties of the final composites. Very recently, clays are being used to modify the morphology of immiscible polymer blends. Although clays are used to modify the morphology of blends, the exact mechanism behind the effect of nanoclay in incompatible polymer blend is not yet clear.

The objective of the work is to elucidate the effect of nanoclay in various immiscible polymer blend systems and find out the most suitable mechanism behind its compatibilization effect in immiscible binary polymer blends. For this we have considered various immiscible binary polymer blend systems (without and with block or graft copolymer as compatibilizer) having different blend ratio where clay can intercalate or exfoliate either in the matrix or dispersed phases or in both the phases, depending on the polarity of the polymers. In our study we have considered (70/30 w/w) Nylon 6/PMMA ,(30/70 w/w) Nylon 6/PMMA , (70/30 w/w) Nylon 6/EPR , (70/30 w/w) Nylon 6/HDPE , (30/70 w/w) Nylon 6/HDPE, (70/30 w/w) PMMA/HDPE , (30/70 w/w) PMMA/HDPE the immiscible polymer blend systems and study the effect of clay on the morphology and properties of these binary polymer blends.

Key words: Nanocomposites, Nanoclay, Compatibilizer, Exfoliation, Intercalation.