ABSTRACT

The polymer nanocomposite attracts the attention of researches in polymer science for their high performance at low cost. To achieve the better thermo-mechanical properties, nanofillers can be used in polymer base for development of nanocomposites. Naturally occurring aluminosilicate with molecular formula of $Al_2Si_2O_5(OH)_4.nH_2O$ is known as halloysite nanotubes (HNTs) are the newer type of filler materials for the fabrication of nanocomposites. These nanotubes are cost effective and nontoxic eco-friendly double layered minerals with hollow tubular structure having high aspect ratio (L/D). Because of their unique structure and superior properties, HNTs has been used as nanofillers for development of polymeric nanocomposites. Technical investigation associated with the HNTs based polymer nanocomposites can be distinguished as: nanotube-polymer matrix interfacial bonding strength; controlled dispersion and alignment of the nanotubes in polymer nanocomposites and applications of these nanocomposite. The primary target of this work is to develop different types of polymer based HNTs incorporated high performance nanocomposites. Modification of HNTs was done or some time compatibilizer had been used to get properly filler distributed nanocomposites. Modification hinders the interaction among the nanotubes and also decreases the surface energy, giving the better dispersion of it in polymer matrix. The hollow tubes exhibit very large surface area, which significantly enhances the polymer-filler interaction. Sometimes compatibilizer was required for polymer matrix to enhance the interfacial interaction. Compatibilizer polyphosphazene had a crucial role on dispersion of the HNTs in blend matrix. Better dispersion give rise better mechanical, dynamic mechanical, thermal and barrier properties of the polymeric nanocomposites. The high surface area of HNTs plays a vital role for in situ fibrillation of liquid crystalline polymer; these fibers along with the nanofillers play a important role in stress transfer mechanism from polymer phases to fillers or fibers. Effective stress transfer occurs afterwards when nanofillers bridges the polymer phases. Overall, the degree of filler dispersion and interfacial interactions are the main parameters to determining the final performance of polymeric nanocomposites.

Keywords: *Polymer blend; Compatibilizer; HNTs; Bridging effect; Nanocomposite*