MORPHOLOGY AND PROPERTIES OF MELT INTERCALATED POLYSTYRENE/HALLOYSITE NANOTUBES NANOCOMPOSITES

Scarfato Paola, Acierno Domenico, Russo Pietro, Iannelli Pio

In the last decades, the development of nanocomposites through the incorporation of nanosized additives in polymer matrices has drawn much attention due to the peculiar properties as well as the successfully commercial applications of these systems. Polymer nanocomposites exhibit specific features even by the addition of low wt% of nanofillers essentially because of their very high interfacial area. Anyway, it is well established that valuable synergies between filler and matrix can occur only if an optimal dispersion of the included additives within the hosting matrix. In this regard, a key role is played by the filler geometry in terms of size, shape and aspect ratio. Recently, melt compounded polymer nanocomposites with inclusions of layered natural and organic montmorillonites (MMTs), having at least one nanometric dimension, have been intensively investigated for a lot of polymer matrices. However, only few papers have considered the possibility to use as nanofiller some type of tubular nanoclays (NTs), having two nanometric dimensions. Preparation of such nanocomposites was achieved either by melt intercalation or by the intercalation of the monomer followed by polymerization. Examples of the first approach were reported in the cases of PEG, PEO and PHB and the second in the case of PAN, PA6 and PS. The present work attempts to prepare, by melt intercalation, PS-nanotubular clay composites incorporating small amounts (£5 wt%) of halloysite nanotubes (HNTs). The produced samples will be analyzed by several methods (SAXD, rheological tests, FT-IR, DSC, TGA, DMTA) to investigate their morphology and thermo-mechanical properties. Moreover, to evaluate the effect of the filler geometry on the internal structure and physical properties of the resultant nanocomposite, the experimental results could be compared with those obtained on similar melt intercalated formulations incorporating same amounts of a layered MMT filler.