

Comparative study between PP-g-MAH and PP-methyl-POSS as compatibilizer for NanoSiO₂/PP composites: Mechanical and morphological properties

Abstract

The work presented in this paper discussed the effect of two types of compatibilizer such as polypropylene grafted maleic anhydride (PP-g-MAH) and polypropylene methyl polyhedral oligomeric silsesquioxane (PP-methyl-POSS) in nanosilica/polypropylene (nanoSiO₂/PP) composites on the mechanical behaviour. Nano-SiO₂/PP composites, containing 1, 2, 3, 4 and 5 wt% of fumed silica nanoparticles were prepared using a thermo Haake internal mixer with addition of 1 wt% compatibilizer according to the total composite weight. The purposed of using the compatibilizer was to reduce the size of particles agglomerates and improve filler dispersion in the polymeric matrix. The composites were characterized by tensile and impact testing as well as SEM studies. This study clearly demonstrated that the addition of compatibilizer into the composite systems modifies the mechanical properties. Results of the mechanical properties indicate that due to its characteristic, each compatibilizer gives rise to increase particular mechanical properties. At low filler concentration, PP-methyl-POSS showed better stiffness in the nanoSiO₂/PP composites. While, the addition of PP-g-MAH provided better tensile and impact properties compared to PP-methyl-POSS in the rage of filler content in this study.

Keywords — Comparative studies, composite systems, composite weight, mechanical behavior, morphological properties, mechanical properties