

Effect of Hollow and Solid Recycled-Poly Fibers on the Mechanical and Morphological Properties of Short-Fiber-Reinforced Polypropylene Composites

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Abstract : The aim of this study is to give a comprehensive overview of the effect of short hollow and solid recycled polyethylene terephthalate (PET) fibers in different breaking tenacities reinforced isotactic polypropylene (iPP) composites on the mechanical and morphological properties. Composites of iPP/3, 7 and 10 wt% of solid and hollow recycled PET fibers were prepared by batched melt mixing in a Brabender. The incorporation of solid recycled-PET fibers in isotactic polypropylene increase Young's modulus of iPP relatively, meanwhile it increased proportionally with hollow fibers content. An improvement of the storage modulus, and a shift up in glass transition temperatures of hollow fibers/iPP composites was determined by DMA results. The morphology of composites was determined by scanning electron microscope (SEM) and optical polarized microscopy (OM) showing a good dispersion of the hollow fibers. Also, their flexible aspect (folding, bending) was observed. But, one weak interaction between the polymer/fibers phases was shown. Polymers can be effectively reinforced with short hollow recycled PET fibers due to their characteristics like recyclability, lightweight and the flexible aspect, which allows the absorbance of the energy of a striker with a minimum damage of the matrix. Aiming to improve the affinity matrix-recycled hollow PET fibers, it is suggested the addition of compatibilizers, as maleic anhydride.

Keywords : isotactic polypropylene, hollow recycled PET fibers, solid recycled-PET fibers, composites, short fiber, scanning electron microscope

Conference Title : ICCMREA 2018 : International Conference on Composite Materials and Renewable Energy Applications

Conference Location : London, United Kingdom

Conference Dates : February 15-16, 2018