

The Effect of Surface Modifiers on the Mechanical and Morphological Properties of Waste Silicon Carbide Filled High-Density Polyethylene

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Abstract : Waste silicon carbide (waste SiC) filled high-density polyethylene (HDPE) with and without surface modifiers were studied. Two types of surface modifiers namely; high-density polyethylene-grafted-maleic anhydride (HDPE-g-MA) and 3-aminopropyltriethoxysilane have been used in this study. The composites were produced using a two roll mill, extruder and shaped in a hydraulic compression molding machine. The mechanical properties of polymer composites such as flexural strength and modulus, impact strength, tensile strength, stiffness and hardness were investigated over a range of compositions. It was found that, flexural strength and modulus, tensile modulus and hardness increased, whereas impact strength and tensile strength decreased with the increasing in filler contents, compared to the neat HDPE. At similar filler content, the effect of both surface modifiers increased flexural modulus, impact strength, tensile strength and stiffness but reduced the flexural strength. Morphological investigation using SEM revealed that the improvement in mechanical properties was due to enhancement of the interfacial adhesion between waste SiC and HDPE.

Keywords : high-density polyethylene, HDPE-g-MA, mechanical properties, morphological properties, silicon carbide, waste silicon carbide

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