

Effect of Uncarbonized and Carbonized Eggshell Powder on Mechanical and Thermal Properties of Recycled High Density Polyethylene/Ethylene Vinyl Acetate Blend Composites

Abstract

The blend composites of recycled high density polyethylene (rHDPE)/ethylene vinyl acetate (EVA) were prepared by melt blending technique at 160 °C with rotor speed of 50 rpm within 10 minutes. Based on Fatimah et al. study[1], the optimum ratio rHDPE/EVA at 70/30 were studied and prepared for different loading of uncarbonized (fresh) and carbonized eggshell powder (5 to 25 wt%). The ESP was collected, washed, crushed, and sieved to obtained size 63 µm by method Farahana et al.,[2]. But she founded that, the mechanical properties reduced with incorporation of ESP filler. Nowadays, carbonized natural filler are the focus of some researchers and the CESP was undergoing a combustion process for 3 hours at 700 °C with air combustion via muffle furnace. The result showed tensile properties decreased with increasing filler loading for both fillers. Then, the mass swell percentage after 46 hours soaked in dichloromethane, the results showed an increment of both fillers were increased the mass swell caused by the hydrophilic nature of fillers. The intensity ratio, interlayer spacing, and crystallinity percentage value decrease with increasing filler loading for both filler give better interaction between matrix and filler. The thermal stability increase for both filler with increasing filler loading. Overall, rHDPE/EVA/CESP blend composites had excellent properties with the addition of carbonized filler.

Keywords

Electrical conductivity, Crystal orientation, Crystal structure, Materials properties, Scanning electron microscopy, X-ray diffraction