EFFECT OF ADDITION OF BOEHMITE ALUMINA NANOFILLER ON THE THERMAL PROPERTIES OF FUNCTIONALIZED BLEND OF POLYPROPYLENE AND POLYAMIDE 12

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ABSTRACT

Polypropylene (PP), a commodity plastic, was blended with polyamide 12 (PA12), an engineering plastic. 5% by weight compatibilizer, maleic anhydride grafted polypropylene, was added to aid the blend (70/30/5). To further mediate better interfacial interactions between the two polymer matrices, nano-size boehmite alumina (AlO(OH)), was added in different weight percents of 1, 3, 5 and 7 to form a series of polymer blend based nanocomposite materials. The effect of the nanoparticle addition on the crystallization behavior of the compatibilized blends was investigated using wide angle X-ray diffraction (WAXD), differential scanning calorimetry (DSC) and thermogravimetric analysis (TGA). The WAXD results of the nanocomposites showed that there was a slight emergence of characteristic peaks peculiar to the nanoparticle (AlO(OH)) only after 3% weight composition, with the peaks becoming intense and visible at 5% and 7% compositions. For the DSC results, there appeared to be a significant increase in the crystallization temperature of the PP continuous phase in the blend with increasing nanoparticles addition, while that of the PA12 dispersed matrix only increased at 5% and 7% nanoparticle additions. Other significant observations were the heat of crystallization and the percentage crystallinity of the PA12 phase, which decreased for the 1% and 3% but suddenly increased at 5% and a tremendous increased at 7% weight nanoparticle addition. The thermo-oxidative property of the blends as revealed by the TGA result, showed that there is a significant increase in degradation temperature with the addition of the nanoparticle, especially the onset and final temperatures.

Keywords: *Polypropylene, polyamide 12, polymer blend, nanocomposite, boehmite alumina, crystallization, X-ray diffraction, thermo oxidative stability.*

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