

Comparative Study of Impact Strength and Fracture Morphological of Nano-CaCO₃ and Nanoclay Reinforced HDPE Nanocomposites

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Abstract : The present study investigated the impact strength and fracture mechanism of nano-CaCO₃ and nanoclay reinforced HDPE nanocomposites by using Charpy impact test. The nano-CaCO₃ and nanoclay reinforced HDPE granules were prepared by the melt blending method using a compounder system, which consists of industrial banbury mixer, single screw extruder and granule cutting in industrial-scale. The nano-CaCO₃ and nanoclay reinforced HDPE granules were molded using an injection-molding machine as plates, and then impact samples were cut by using punching die from the nanocomposite plates. As a result of impact experiments, nano-CaCO₃ and nanoclay reinforced HDPE nanocomposites were determined to have lower impact energy level than neat HDPE. Also, the impact strength of HDPE further decreased by addition nanoclay compared to nano-CaCO₃. The occurred fracture areas with the impact were detected by SEM examination. It is understood that fracture surface morphology changes when nano-CaCO₃ and nanoclay ratio increases. The fracture surface changes were examined to determine the fracture mechanism of nano-CaCO₃ and nanoclay reinforced HDPE nanocomposites.

Keywords : charpy, HDPE, industrial scale nano-CaCO₃, nanoclay, nanocomposite

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