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The Role of Secondary Filler on the Fracture Toughness of HDPE/Clay Nanocomposites

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Abstract : Oil Palm Fruit Bunch Fiber (OPEFB) was used as secondary filler in HDPE/clay nanocomposites. The composites were prepared by melt compounding which contains High Density Polyethylene (HDPE), OPEFB fibers, Maleic Anhydride Graft Polyethylene (MAPE) and four different clay loading (3, 5, 7 and 10 PE nanoclay pellets per hundred of HDPE pellets). Four OPEFB sizes (180 µm, 250 µm, 300 µm and 355 µm) were added in the composites to investigate their effects on fracture toughness. Fracture toughness of the composites were determined according to ASTM D5045 and Single Edge Notch Bending (SENB) been employed during the test. The effects of alkali treatment were also investigated in this study. The results indicate that the fracture toughness slightly increased as clay loading increased. The highest value of fracture toughness was 0.47 and 1.06 MPa.m1/2 at 5 phr for both types of clay loading. The presence of filler as reinforcement with the matrix indicates the enhancement of composites compared to those without the filler.

Keywords : oil palm empty fruit bunch, fiber, polyethylene, polymer nanocomposite, impact strength
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