

Mechanical performance of roselle/sugar palm fiber hybrid reinforced polyurethane composites

ABSTRACT

The effect of sugar palm fiber (SPF) loading was studied relative to the mechanical properties of roselle (RF)/SPF/thermoplastic polyurethane (TPU) hybrid composites. RF/SPF/TPU hybrid composites were fabricated at different weight ratios (100:0, 75:25, 50:50, 25:75, and 0:100) by melt mixing and hot compression. The mechanical (tensile, flexural, and impact test) and morphological properties of tensile fractured samples were examined using a universal testing machine, impact machine, and scanning electron microscope. It was found that the hybridization of RF/SPF increased its impact strength corresponding to the increases in the SPF content of the composites. The tensile and flexural properties of the hybrid composites decreased due to poor interfacial bonding between the fiber and matrix. Scanning electron micrographs of the tensile fractured surface of the RF/SPF hybrid composites revealed fiber pullouts and poor adhesion bonding. In conclusion, the hybridization of SPF with RF/TPU composites enhanced its impact strength while decreasing the tensile and flexural strength.

Keyword: Roselle fibers; Sugar palm fibers; Thermoplastic Polyurethane; Mechanical properties; Hybrid composites.