

Effect of surface treatment on the mechanical properties of sugar palm/glass fiber-reinforced thermoplastic polyurethane hybrid composites

ABSTRACT

Effects of various surface modifications were evaluated relative to the mechanical properties of sugar palm fiber/glass fiber (SPF/GF) reinforced thermoplastic polyurethane (TPU) hybrid composites. The 6 wt.% alkaline, 2 wt.% silane, and combined 6 wt.% alkaline-2 wt.% silane treatment of SPF were carried out for 3 h to improve the fiber/matrix interaction of SPF/GF with TPU. The SPF and GF were fixed at 30 wt.% and 10 wt.% fiber loading, respectively, and were fabricated using the melt compounding method followed by hot compression in a moulding machine. Mechanical properties, such as tensile, flexural, and impact strength, were evaluated using a universal testing machine and an Izod impact tester. The untreated and treated hybrid composites were characterized by FTIR spectroscopy. The tensile, flexural, and impact strength of the combined 6 wt. % alkaline-2 wt. % silane treatment was improved 16%, 39%, and 18%, respectively, as compared to the untreated SPF/GF reinforced TPU hybrid composites. Moreover, the scanning electron microscopy (SEM) showed a good fiber and matrix interfacial bonding in the hybrid composites. Thus, this treated hybrid composites could be suitable for fabricating automotive parts.

Keyword: Sugar palm fibers; Thermoplastic polyurethane; Sugar palm composites; Mechanical properties; Silane treatment