

Effect of alkaline and benzoyl chloride treatments on the mechanical and morphological properties of sugar palm fiber-reinforced poly(lactic acid) composites

ABSTRACT

The present study deals with the effects of alkaline and benzoyl chloride treatments of sugar palm fibers (SPFs) on the mechanical and morphological properties of SPF-reinforced poly(lactic acid) (PLA) composites. Seven different parameters of SPFs were compared, which were untreated, three alkaline solution concentrations of 4%, 5%, and 6% for alkaline treatment, and 50 ml benzoyl chloride-treated SPFs at three different soaking durations of 10, 15, and 20 min. Composites of 30 wt.% SPF-reinforced 70 wt.% PLA were prepared by using a Brabender plastograph mixer and a hot press. The tensile, flexural, and impact properties of the SPF/PLA composites were improved after alkaline and benzoyl chloride treatments on the SPFs. However, the best tensile, flexural, and impact properties of the composites were observed at 6% alkaline treatment of SPF; the morphological analysis also supported this. The 6% alkaline treatment of the SPF/PLA composite demonstrated the highest tensile, flexural, and impact strength values of 17.08 MPa, 32.34 MPa, and 4.39 kJ/m², respectively. These treated SPF/PLA composites could be appropriate for automobile component applications.

Keyword: Sugar palm fiber; Poly(lactic acid); Alkaline treatment; Benzoyl chloride treatment; Fiber treatments