

Abstract

The aim of this paper is to study the effect of bis [3(triethoxysilyl) propyl] tetrasulfide (Si69) and 3-Glycidoxypropyl trimethoxy silane (GPS) on the properties of unidirectional enset fiber reinforced Polypropylene (PP) composite. For this purpose, enset fiber was weaved into the mat and treated with 1.5 wt% Si69 and 5 wt% GPS after which it was used to reinforce PP composites through the film stacking method followed by the compression molding. Fabricated composites were characterized by their tensile, thermal, water absorption, image of the fracture surface, and FTIR spectroscopy properties. Among the developed unidirectional reinforced PP composite, the surface-treated ensetwoven mat with 1.5wt% Si69 gave the highest tensile strength with an increase of 267.1%, and 36.9% from untreated enset random (EvRa) and unidirectional fiber-reinforced PP composite (EvUnt) respectively. Moreover, 1.5 wt% Si69-treated enset fiber unidirectional reinforced PP composite reduced equilibrium water uptake percentage by approximately two folds, and thermal performance also improved by 12.9% from EvUnt composite. Notably, both silane treatment of enset fibers and composites increased elongation at break compared to EvUnt. Altogether, 1.5wt% Si69-treated enset fiber unidirectional reinforced polypropylene composite achieved a remarkable improvement of property and can be used for high mechanical and long-term performance applications.