

Impact of succinic anhydride on the properties of jute fiber/polypropylene biocomposites

ABSTRACT

Chemical treatment is an often-followed route to improve the physical and mechanical properties of natural fiber reinforced polymer matrix composites. In this study, the effect of chemical treatment on physical and mechanical properties of jute fiber reinforced polypropylene (PP) biocomposites with different fiber loading (5, 10, 15, and 20 wt%) were investigated. Before being manufactured jute fiber/PP composite, raw jute fiber was chemically treated with succinic anhydride for the chemical reaction with cellulose hydroxyl group of fiber and to increase adhesion and compatibility to the polymer matrix. Jute fiber/PP composites were fabricated using high voltage hot compression technique. Fourier Transform Infrared spectroscopy (FTIR) and Scanning Electron Microscopy (SEM) tests were employed to evaluate the morphological properties of composite. Succinic anhydride underwent a chemical reaction with raw jute fiber which was confirmed through FTIR results. SEM micrographs of the fractured surface area were taken to study the fiber/matrix interface adhesion and compatibility. Reduced fiber agglomeration and improved interfacial bonding was observed under SEM in the case of treated jute fiber/PP composites. The mechanical properties of jute/PP composite in terms of Tensile strength and Young's modulus was found to be increased with fiber loading up to 15 wt% and decreased at 20 wt%. Conversely, flexural strength and flexural modulus increased with fiber loading up to 10 wt% and start decreasing at 15 wt%. The treated jute/PP composite samples had higher hardness (Rockwell) and lower water absorption value compared to that of the untreated ones.

Keyword: Jute fiber/PP composite; Tensile strength; Young's modulus; FTIR; SEM