

Comparisional Study of Succinylation and Glutarylation of Jute Fiber: Study of Mechanical Properties of Modified Fiber Reinforced Epoxy Composites

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Abstract : Due to several environmental concerns, natural fibers have greatly replaced the synthetic fibers as a reinforcing material in polymer matrix composites. Among the natural fibers, jute fibers are the most abundant plant fibers which are manufactured mainly in countries like India. In recent years, modification of plant fibers with range of chemicals to increase various mechanical and thermal properties has been focused greatly. Among that, some of the plant fibers were modified using succinic anhydride. In the present study, Jute fibers have been modified chemically by treatment with succinic anhydride and glutaric anhydride at different concentrations of 5%, 10%, 20%, 30% and 40%. The fiber modification was done under retting condition at various retention times of 3, 6, 12, 24, 36, and 48 hours. The modification of fiber structure in both the cases is confirmed with Infrared Spectroscopy. The degree of modification increases with increase in retention time, but higher retention time has damaged the fiber structure which is common in both the cases. Comparatively, treatment of fibers with glutaric anhydride has shown efficient output than that of succinic anhydride. The unmodified fibers, succinylated fibers and glutarylated fibers at different retention times are reinforced with epoxy matrix at various volume fractions of fiber under room temperature. The composite made using unmodified fiber is used as a standard material. The tensile strength and flexural strength of the composites are analyzed in detail. Among these, the composite made with glutarylated fiber has shown good mechanical properties when compared to those made of succinylated and unmodified fiber.

Keywords : flexural strength, glutarylation, jute fibers, succinylation, tensile strength

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