

Studies on the chemical resistance and mechanical properties of natural polyalthia cerasoides woven fabric/glass hybridized epoxy composites

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Abstract

In the present work, natural Polyalthiacerasoide woven fabrics were extracted from the bark of the tree and using these woven fabrics/glass fibre as reinforcements and epoxy as matrix the hybrid composites were prepared by the hand lay-up technique, at room temperature. The effect of alkali treatment of Polyalthiacerasoide fabrics on the chemical structure and morphology was examined using Fourier transforms infrared spectroscopic (FT-IR) and scanning electron microscopic techniques respectively. FT-IR analyses indicated the lowering of hemi-cellulose and lignin contents by alkali treatment of the woven fabric. The scanning electron micrographs indicated the removal of hemicelluloses layer on the surface of the fabric by alkali treatment. The effect of alkali treatment of the natural fabric on the mechanical properties, chemical resistance, and interfacial bonding of the hybrid composites was examined. The mechanical properties of the woven fabric/glass fiber hybrid composites with surface modified natural fabric were found to be higher than those with untreated fabric. The fractographs indicated a better interfacial bonding between the woven fabric/glass fibres and the matrix, particularly when the alkali-treated natural fabrics were used in the hybrid composites. Furthermore, these hybrid composites showed resistance to acids, alkalis and various solvents and also possessed lower water absorption. The natural fabric/glass fibre hybrid composites have the properties which advise their relevance for application in the building and construction industries.