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Mechanical properties and abrasive wear of white/brown coir epoxy composites

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Abstract.

A substitution of synthetic fillers by natural fillers decreases an environmental burden, namely both in terms of saving fossil sources, and of a minimization of energy demands on a preparation of a reinforcement for composite systems. Last but not least the natural fibres are available and so they decrease a price of a final product. Performed experiment describes strength characteristics of white and brown coir fibres and biocomposites with the synthetic matrix and these fibres prepared by a vacuum infusion. Water solution of NaOH (6%, 12h) was used for treating of the fibre surface. The strength characteristics of the fibres differ depending on time of their harvesting – the tensile strength of previously harvested white fibres reached 115 MPa, the tensile strength of brown coir fibres harvested in a full maturity of the coconuts reached 123 MPa. The chemical treatment of the fibres led to roughening of the surface and to an improvement of an interfacial interaction. The chemical treatment of the fibres also led to the increase of their tensile strength up of 58 MPa (brown fibres) and the modulus was increased of 1.87 GPa on average. Globular formations on the surface of the fibres were removed due to the alkali acting. Layers of lignin were reduced which led to an improvement of the interaction with used epoxy resin. The inclusion of chemically treated brown fibres increased the matrix strength of 28.64 MPa, the inclusion of white fibres of 20.22 MPa.

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