

Effect of alkali treatment on the physical, mechanical, and morphological properties of waste betel nut (Areca catechu) husk fibre

ABSTRACT

This study aims to determine the properties of waste betel nut husk (BNH) fiber as a potential alternative for reinforcement in polymer composites. The BNH fibres were subjected to alkali treatment using 5% sodium hydroxide. In this work, husk fibres extracted from betel nut fruit were characterized for its chemical composition, tensile properties, morphology, and interfacial shear strength. The cellulose content was increased with alkali treatment. Tensile strength and Young's modulus of BNH fibre dropped drastically with alkali treatment but with improvement in elongation at break of the fibre due to extraction of cementing materials of microfibrils in natural fibre, i.e. lignin and hemicellulose. SEM observations revealed that poor tensile strength and modulus were related to the cell wall thinning and deep pores in BNH fibre due to alkali treatment. Interfacial shear strength (IFSS) of alkali treated fibre was higher as compared to untreated BNH fibre due to the increase in fibre surface roughness with alkali treatment.

Keyword: Natural fibre; Alkali treatment; Fibre microstructure; Mechanical properties