

Preparation and properties of cellulose / tamarind nut powder green composites

ABSTRACT

Using biopolymer cellulose as the matrix and tamarind nut powder (TNP) obtained from agricultural waste of tamarind nuts as the filler, the green composites were made. Cellulose was dissolved in environmental friendly solvent of aq. 8 wt. % Lithium hydroxide and 15 wt. % urea which was precooled to -12°C . To the cellulose solutions, TNP was added in 5 wt. % to 25 wt. % of cellulose separately. Each solution was evenly spread on glass plates and the wet composites were prepared by regeneration method using ethyl alcohol coagulation bath. The wet films were dried in air at room temperature. The dried composite films were characterized by FTIR spectroscopy, X-ray diffraction, thermogravimetric analysis and also tested for their tensile properties. The tensile strength and the % elongation at break of the composites were higher than those of the matrix and increased with TNP content. While the matrix had a tensile strength of 111.8 MPa, the cellulose/TNP composite loaded with 25 wt.% TNP possessed a tensile strength of 125.4 MPa (12% increase). Though the thermal stability of the composites was lower than cellulose matrix, all the composites were stable up to a temperature of 350°C .

Keyword: Cellulose; Crystallinity; Tamarind nut powder; Tensile properties; Thermal stability