

Preparation and characterization of cassava starch/peel composite film

ABSTRACT

This work is focused on the use of cassava peel as a natural fiber for thermoplastic starch (TPS) based on the cassava starch. Starch was extracted from the cassava tuber and the peel was used as a film fiber in order to obtain fully biodegradable composites. The composite films were prepared using casting technique. The addition of peel results in an increase in the thickness, water content, and water absorption of the films while decreasing the density and water solubility. Moreover, no significant effect was noticed on the thermal properties of the composite films. Scanning electron microscopy showed that the films containing a small size of peel had a better compact structure and a homogeneous surface without pores. The addition of 6% peel increased the elastic modulus and tensile stress up to 449.74 and 9.62 MPa, respectively, this being the most efficient reinforcing agent. Also the temperature variation of the dynamic-mechanical parameters of cassava starch/peel composites was investigated using DMA test. It was observed that the incorporation of peel increased the tensile strength and modulus. In conclusion, of all-plant composites can be prepared using cassava as both the matrix and the reinforcement, adding value to the residue of starch extraction. Based on its excellent properties, cassava starch/peel composite films are suitable for various purposes such as packaging, automotive and agro-industrial application, at lower cost.