Processing and characterisation of banana leaf fibre reinforced thermoplastic cassava starch composites

ABSTRACT

Increasing environmental concerns have led to greater attention to the development of biodegradable materials. The aim of this paper is to investigate the effect of banana leaf fibre (BLF) on the thermal and mechanical properties of thermoplastic cassava starch (TPCS). The biocomposites were prepared by incorporating 10 to 50 wt.% BLF into the TPCS matrix. The samples were characterised for their thermal and mechanical properties. The results showed that there were significant increments in the tensile and flexural properties of the materials, with the highest strength and modulus values obtained at 40 wt.% BLF content. Thermogravimetric analysis showed that the addition of BLF had increased the thermal stability of the material, indicated by higher-onset decomposition temperature and ash content. Morphological studies through scanning electron microscopy (SEM) exhibited a homogenous distribution of fibres and matrix with good adhesion, which is crucial in improving the mechanical properties of biocomposites. This was also attributed to the strong interaction of intermolecular hydrogen bonds between TPCS and fibre, proven by the FT-IR test that observed the presence of O–H bonding in the biocomposite.