Mechanical, morphological, structural and dynamic mechanical properties of alkali treated Ensete stem fibers reinforced unsaturated polyester composites

ABSTRACT

Present study deals the surface morphology and structural composition analysis of alkali (NaOH) treated 2.5% 5.0% and 7.5 wt% Ensete stem fiber obtained from the Ethiopian Ensete ventricosum plant. Treated Ensete fibers reinforced unsaturated polyester (UP) composites were characterized in terms of tensile, flexural, surface morphology and dynamic mechanical properties. Mechanical test results revealed that 5.0 wt% alkali treated Ensete fibers/UP composites showed 14.5% and 43.5% increase in flexural strength and Young's modulus respectively, with relative to untreated Ensete fibers/UP composites. Storage and loss modulus value also highest for 5.0 wt% alkali treated Ensete fibers/UP composites. Moreover, a positive shift in glass transition temperature (Tg) of composites after alkali treatment and tensile fracture surface morphology indicates better interfacial interaction in treated Ensete fibers/UP composites. Overall we concluded that 5.0 wt% treated Ensete fibers satisfactorily and effectively improved mechanical, morphological and dynamic properties of UP for various engineered and hi-tech applications.

Keyword: Ensetefibers; Alkali treatment; Unsaturated polyester resin; Mechanical test; Dynamic mechanical properties; Glass transition temperature