

Thermal characterization of date palm/epoxy composites with fillers from different parts of the tree

ABSTRACT

Thermal expansion and viscoelastic properties of the date palm fibre (DPF)/epoxy composites were influenced by the type of filler from different parts of the date palm tree. The variation in properties is mainly due to the difference in fibre composition between the DPF from leaf stalk, leaf sheath, fruit bunch stalk, and tree trunk. Among the investigated composites, composite reinforced with the tree trunk fibre displayed higher thermal stability as visible from the lower weight loss, higher onset and inflection temperatures and maximum residue % from the thermogravimetric analysis (TGA). Lower coefficient of linear thermal expansion (CLTE) obtained from thermomechanical analysis (TMA) further provided supportive evidence for dimensional stability at elevated temperature. Based on the dynamic mechanical analysis (DMA) results, the DPF/epoxy composites with fruit bunch stalk fillers displayed a better property by showing higher storage modulus and lesser tan delta values. Hence, composite from the tree trunk and fruit bunch stalk fibres of date palm is recommended for applications requiring superior thermal resistance.

Keyword: Date palm fibre; Epoxy; Thermogravimetric analysis; Thermomechanical analysis; Dynamic mechanical analysis