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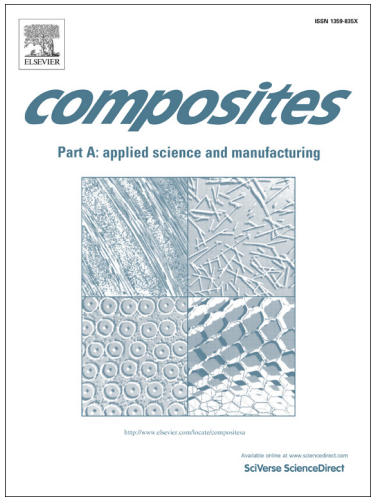

THERMOMECHANICAL PROPERTIES OF BIO-BASED COMPOSITES MADE FROM A LACTIC ACID THERMOSET RESIN AND FLAX AND FLAX/BASALT FIBRE REINFORCEMENTS

Fatimat O Bakare, Sunil Kumar Ramamoorthy, Dan Åkesson, Mikael Skrifvars

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Fatimat O Bakare, Sunil Kumar Ramamoorthy, Dan Åkesson, Mikael Skrifvars

Swedish Centre for Resource Recovery, University of Boras, 501 90 Borås, Sweden

ABSTRACT

Low viscosity thermoset bio-based resin was synthesised from lactic acid, allyl alcohol and pentaerythritol. The resin was impregnated into cellulosic fibre reinforcement from flax and basalt and then compression moulded at elevated temperature to produce thermoset composites. The mechanical properties of composites were characterised by flexural, tensile and Charpy impact testing whereas the thermal properties were analysed by dynamic mechanical thermal analysis (DMTA) and thermogravimetric analysis (TGA). The results showed a decrease in mechanical properties with increase in fibre load after 40 wt-% for the neat flax composite due to insufficient fibre wetting and an increase in mechanical properties with increase fibre load up to 60 wt-% for the flax/basalt composite. The results of the ageing test showed that the mechanical properties of the composites deteriorate with ageing; however, the flax/basalt composite had better mechanical properties after ageing than the flax composite before ageing.