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A review of fire properties of natural fibre reinforced polymeric composites

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Abstract

Susceptibility to damage from heat and flame is one of the major issues for utilisation of natural fibre reinforced polymeric composites in practical applications. Thus, the knowledge of thermal decomposition and flammability of the bio-based fibres, polymers and their composites is highly required for the materials selection and the development of composite products. Moreover, suitable flame retardant treatments on these composites have shown to effectively enhance their thermal stability and fire resistance. This article provides a review of research on thermal behaviour and flammability of natural fibres, such as cellulose and protein based fibres, and polymers along with composites filled with these materials. Furthermore, eco-friendly flame retardant treatments to overcome the environmental impact of conventional flame retardants are introduced with the combined effects of natural fibres on composites' fire performance. In addition, a review of studies on the predictive models regarding thermal response and structural damages of composites in fire is also included with their advantages and limitations.

Keywords: A. Fibres, Polymer-matrix composites B. Thermal properties; C. Modelling; Nominated: Flammability testing