

## **Thermal stability and dynamic mechanical properties of kenaf/bamboo fibre reinforced epoxy composites**

### **ABSTRACT**

An increased awareness of environmental concerns has increased the need for innovation to produce high performance engineering materials with natural renewable resources. In this study, 3 types of natural fibre (mat form) reinforced epoxy composites were prepared by the hand lay-up method, namely, kenaf (K)/Epoxy, bamboo (B)/Epoxy, and bamboo charcoal (BC)/Epoxy. The thermal stability of the specimens was investigated by thermogravimetric analysis (TGA) and the dynamic mechanical properties. Viscous elastic behaviour of the specimens was investigated via a dynamic mechanical analyzer (DMA). The TGA results revealed that the BC/Epoxy composite showed the highest thermal stability compared to K/Epoxy and B/Epoxy with the highest initial and final decomposition temperature at 348 °C and 463 °C, respectively. It also showed the highest charcoal content at 11.5%. From the DMA results, the K/Epoxy composite showed better dynamic mechanical properties with the highest complex modulus ( $E^*$ ) strength and the lowest damping behaviour (peak height of  $\text{Tan } \delta$ ). The DMA analysis also revealed that the glass transition temperature of the composites fell between 60 °C to 90 °C. This preliminary study may give a new path to develop a novel hybrid composite that offers unique properties unachievable in a single material system.

**Keyword:** Composite; Kenaf; Bamboo; Natural fibre polymer composite; Thermal stability; Dynamic mechanical properties