

Thermal and mechanical properties of bamboo fiber reinforced composites

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ABSTRACT

This paper presents the thermal and mechanical properties of bamboo fiber reinforced composite (BFRC) derived from *Gigantochloa scortechinii*. The bamboo fibers were prepared through chemical treatment by sodium hydroxide (NaOH) followed by physical milling method. The thermal characteristics of the bamboo fiber and its polymer composite were analysed using a thermogravimetric analysis and differential scanning calorimetric. The functional groups and crystallinity of the fiber were analysed with Fourier transform infrared and x-ray diffraction spectroscopy. Meanwhile, the fiber morphology was examined using a scanning electron microscope. The BFRCs with fiber volume fractions ranging from 0 % to 40 % embedded in three thermoset resins (epoxy, polyester, vinyl ester) were subjected to tensile and flexural tests and the fracture pattern was examined. The NaOH concentration of 10 % with soaking duration of 48 h was found to produce a bamboo fiber with the highest ultimate tensile and modulus strength. The tensile and flexural properties of all the BFRCs were found to be directly proportional to the fiber volume fractions. It was found that the bamboo fiber reinforced epoxy composite (BFREC) with 40 % fiber volume fraction exhibited the highest tensile and flexural strength compared to polyester and vinyl ester composites. The method of bamboo fiber composite preparation in this work may serve as a useful guide to produce a strong BFRC for external strengthening of buildings and structures.

KEYWORDS

Bamboo fiber; Composite; External strengthening; Thermal properties; Mechanical properties

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the financial support of the Universiti Malaysia Pahang, Malaysia internal grant RDU180349 and RDU1803105. The authors would also like to thank the lab technicians for their assistance in preparing and testing the specimens. We acknowledge the collaborative fund from University of Greenwich, UK.