

Feasibility study: Resin-based functionally graded material incorporated with carbonized waste rice husk

ABSTRACT

Feasibility study was conducted in exploring the fabrication and characterization of resin-based functionally graded material (FGM) incorporated with carbonized waste rice husk. The waste rice husks were converted into carbon materials through heat treatment under the presence of inert gas at 500°C for 2 hours. Then, they were incorporated into resin to form FGM by centrifugal method to achieve desired gradation. Sample B3 with 5 wt.% of carbonized rice husk (CRH) incorporated into polyester resin (including hardener and ethanol) was centrifugated at 4000 rpm for 30 minutes to form FGM. The fabricated samples were cut into three parts, namely upper, middle, and bottom layer to further characterize the properties at various gradation levels. The density of sample B3 increased gradually, 4.10%, 6.54%, and 6.93% when compared to bulk resin, from upper to bottom layer, respectively. The hardness of sample B3 increased gradually, 27.38%, 42.57%, and 47.08% in contrast to bulk resin, from upper to bottom layer, respectively. FGM proposed in this study can be further manipulated based on the centrifugal force and time, ratio of solvents/hardener, and weight percentage of CRH that indicate they can be exploited for specific of numerous appropriate applications.