

Effects of the liquid natural rubber (LNR) on mechanical properties and microstructure of epoxy/silica/kenaf hybrid composite for potential automotive applications

ABSTRACT

The effects of rubber toughened epoxy/silica/kenaf composites on mechanical properties and microstructure were investigated. In this study, a combination of silica, liquid rubber, and epoxy was used to toughen epoxy/kenaf composite for potential automotive applications. The composites with various liquid rubber MG30 (LMG30) contents from 1 to 7 phr were fabricated by using hand lay-up method and tested according to ASTM standards by using mechanical testings, which were impact and flexural tests. The modified epoxy and fracture surfaces from the impact test were characterized using scanning electron microscopy (SEM) to study the surface interaction. The addition of 1 part per hundred of resin (phr) of LMG30 in epoxy/silica/kenaf composite exhibited the highest impact and flexural strength, which were 13.83 kJ/m² and 62.2 MPa, respectively. SEM analysis proved that the addition of LMG30 helped in lowering the stress transfer and resulted in optimum mechanical properties and the yielded composite has high potential to be used in automotive applications.

Keyword: Toughening agent; Liquid natural rubber; Hybrid composites; Void; Epoxy; Kenaf; Automotive