

Effects of silica addition and alkaline surface treatment of kenaf fibre on mechanical properties of hybrid epoxy/silica/kenaf composites using hand lay-up method

ABSTRACT

Epoxy/silica/kenaf composites were fabricated using a simple technique of hand lay-up method. The effects of silica addition on mechanical properties of epoxy/kenaf composites were studied by varying silica contents, ranging from 10 to 50 wt% while kenaf fibre was fixed at 24.5 wt%. Non-woven kenaf fibre used in this research was treated with 3 wt% NaOH to improve surface interaction between epoxy matrices. The composites were fabricated using hand lay-up method in metal mould and then they were pre-cured at 80 °C for 1 hour and post-cured at 110 °C for 1 hour. The mechanical properties of composites were examined by means of flexural and impact tests. It is found that silica content of 30 wt% has produced epoxy/silica composites with highest impact strength of 6.5 kJ/m². However, addition of treated kenaf fibre has given the strongest composite with the values of 54 MPa for flexural strength and 10.6 kJ/m² for impact strength. Field emission scanning electron microscope (FESEM) was applied to investigate the morphology of the fractured surface and it revealed the treated kenaf fibre improved the surface interaction within epoxy matrix, thus lead to the higher mechanical properties of composites. The composite produced from this research has potential to be used in household and domestic product applications.

Keyword: Kenaf fibre; Silica; Epoxy composites