

The effect of titanium dioxide to enhance physical properties of coconut shell reinforced unsaturated polyester composites

Abstract

This study aims to characterize the physical properties of kenaf fibre mat (KFM) reinforced unsaturated polyester (UPE) composites by introducing graphene as nano filler. The composites were prepared by using hand lay-up and compression moulding techniques. To improve the interfacial adhesion between fibre and matrix, the KFM was chemically treated with alkaline treatment (NaOH) and silane. Fourier transform infrared (FTIR) was used to investigate the changes of fibres chemical constituents after treatment. To further enhance the strength and stiffness properties, graphene at three different percentages (0.5, 1.0 and 1.5%) was also formulated into KFM reinforced UPE composites. Physical (water absorption) tests were carried out to study and compare that properties of untreated and alkaline treated KFM-UPE as well as the presence of graphene in the composites. The result showed that the introduction of both silane and alkalinized KFM significantly enhanced the mechanical and physical properties of UPE composites. On the other hand, the presence of graphene showed tremendous enhancement in physical properties of KFM-UPE composites. The morphological analysis of the rupture surface of samples has demonstrated the improvement in fibre/matrix interfacial adhesion after chemical treatment and addition of graphene, respectively.