

Effect of fibre loading and heat treatment on RH-low density polyethylene composites

Abstract

Currently, an organic filler like RH (RH) is widely used in polymer matrix composite (in the filler such as light weight, low cost and environmentally friendly). However, the compatibility of the materials is low due to poor interfacial adhesion of matrix which is low density polyethylene (LDPE) and fibre. To overcome this issue, heat treatment on RH as an alternative to replacing chemical modification of chemical treatment has been used. Heat treatment on the fibre will eliminate the vulnerable components in RH structure and further increase the thermal stability of RH. This project focus on the effect of different filler loading of RH on the mechanical properties and morphology studies of polymer matrix composites (PMC). Two different fillers loading where 10wt% and 20wt% were used using twin screw extruder for compounding of matrix and fibre with addition of maleic anhydride polyethylene (MAPE) as compatibilizer. RH were undergoing heat treatment at three different temperatures which are 180°C, 200°C and 220°C before compounding process. Then, extruded composites were injected using injection molding machine to obtain dumbbell and rectangular shapes for tensile and flexural testing. From the testing, results showed that the properties of tensile and flexural were improved PMC due to variety of benefits contained with increasing of fibre loading. Furthermore, results obtained showed that heat treatment on 20wt% of RH at temperature 180°C exhibited better mechanical properties and interfacial bonding compared to other compositions. Fourier-transform infrared spectroscopy (FTIR) was applied to determine the functional group of heat treated and untreated composites. In term of application, this composites could fit in packaging product like eco-friendly food packaging and biodegradable straw.