Conference Abstract

Inspection of thermal conductivity of natural fiber reinforced composites (NFCs)

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Abstract

Composites are made from two or more constituent materials with significantly different physical or chemical properties, which exhibit enhanced properties than the constituent materials. Thermal insulation composite materials, especially those reinforced with synthetic fibers releases huge amount of CO_2 to the environment lead to global warming, and thus has led to find new green reinforced composites.

In this study, natural fiber reinforced composites (NFCs) were prepared by combining palmyra fiber with polyethylene matrix and the thermal conducting properties was studied. Polythene was obtained from waste recycling plant in Kilinochchi; hence it can be identified as a feasible way of recycling polythene. Palmyra fiber was extracted from leaf stem of palmyra tree. NFCs were prepared with different weight percentage (10 wt%, 30 wt%, 50 wt%, 70 wt% and 90 wt%) of fiber. NFCs with different weight percentage were cut into the shape of discs in order to examine their thermal conductivity using Lee's disc method with suitable dimensions. We found that the addition of 10 wt % of Palmyra fiber in the polyethylene matrix reduced the thermal conductivity from 0.7 $Wm^{-1}K^{-1}$ to 0.15 $Wm^{-1}K^{-1}$, and a There were a slight reduction in thermal conductivity was observed with further loading of Palmyra fiber. NFCs with 90 wt% fiber exhibited lowest thermal conductivity value of 0.07 $Wm^{-1}K^{-1}$. However, it is known that increasing fiber load can deteriorate the mechanical properties and studying the mechanical properties will help further to identfy the better thermal isolation material.

Keywords: Palmyra fiber, Composites, Thermal conductivity, Lee's disk