Enhanced Thermal Conductivity in a Nanostructured Phase Change Composite due to Low Concentration Graphene Additives

By

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ABSTRACT

The solid state thermal conductivity of graphene/1-Octadecanol (stearyl alcohol) composite, a nanostructured phase change material, was investigated as a function of graphene content. The thermal conductivity (*K*) of the nanocomposite increased by nearly three-fold (approximately 140% increase) upon ~4% (by weight) graphene addition while the drop in the heat of fusion (i.e. storage capacity) was only ~15.4%. The enhancement in thermal properties of 1-Octadecanol obtained with the addition of graphene is noticeably superior to the effect of other nanofillers such as high thermal conductive metallic nanowires and carbon nanotubes reported previously in the literature. Improving the thermal conductivity of organic phase change materials without incurring a major loss in the heat of fusion is one of the key issues in enabling their practical application as latent heat storage/release units for thermal management and thermal protection.