

Heat management by graphene-based composites

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Abstract

Since its invention, graphene has attracted great attention in the world both from academic and industrial fields. One of its astonishing properties is highest value of thermal conductivity among all existing materials, which is experimentally 5300W/mK. In this work, this superior property is investigated by using graphene as filler to enhance the thermal transfer ability of polymer composites. By rolling graphene sheets into vertically aligned graphene film (VAGF) and then penetrating liquid polydimethylsiloxane (PDMS) into it, a novel composite was obtained, its out-of-plane thermal conductivity reaches 614 W/mK, which is highest for polymer composites. Furthermore, by applying the composite as backplate to LED assembly, it is found that the temperature of LED lamp dropped about 15 °C compared to pure polymer plate case. So, the studied VAGF/PDMS composites have good potential to be used in the heat management of devices where temperature rising is severe.

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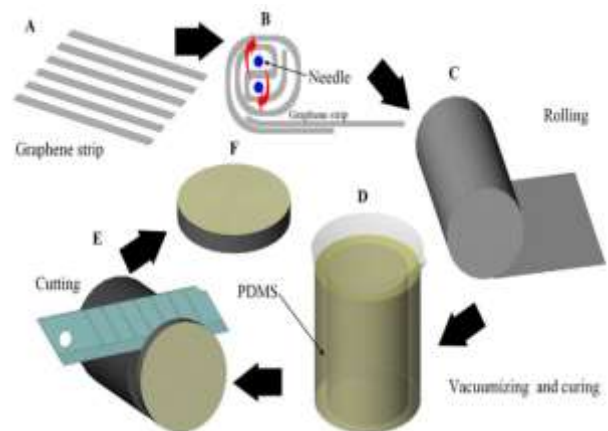


Figure 1: Schematic of composite sheets with high thermal conductivity

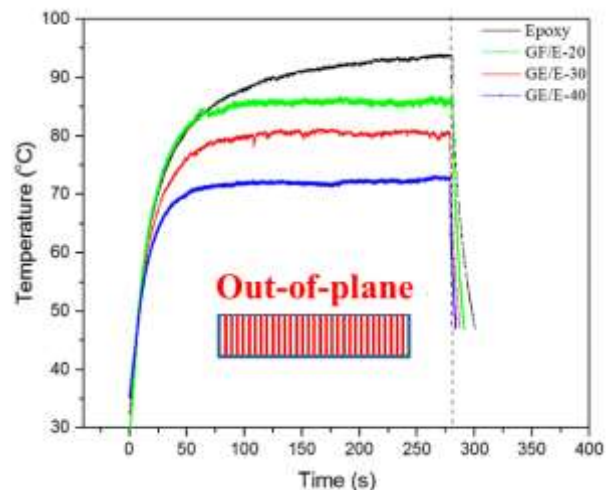


Figure 2: Temperature of LED lamp by applying composite back plate