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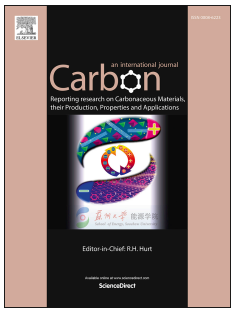

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High-Performance Thermal Interface Materials Consisting of Vertically Aligned Graphene Film and Polymer

Ya-Fei Zhang, Dong Han, Yun-Hong Zhao and Shu-Lin Bai*

Department of Materials Science and Engineering, HEDPS/CAPT/LTCS, Key Laboratory of Polymer Chemistry and Physics of Ministry of Education, College of Engineering, Peking University
100871 Beijing, China

ABSTRACT: Owing to the unique thermal transfer property, graphene attracts great attention as heat dissipation material. Many works have been devoted to increase thermal conductivity of graphene filled polymer composite by increasing the graphene loading. In this work, a novel composite was fabricated by rolling graphene sheets into vertically aligned graphene film (VAGF) and then penetrating liquid polydimethylsiloxane (PDMS) into it. The thermal conductivity of the VAGF/ PDMS composite is up to 614.85 Wm^{-1} K^{-1}, i.e. an enhancement per wt% of as high as 3329% compared to pure PDMS. This enhancement is due to the vertical alignment of graphene films with high in-plane thermal conductivity, which form a rapid and effective heat-transfer path. The heat dissipation performance of VAGF/PDMS composite is further confirmed by infrared thermal imaging technology. The temperature of the VAGF/PDMS composite rises fastest under the same heating condition, compared with PDMS and copper. The results prove that the VAGF/PDMS composite most likely becomes a good candidate of high performance thermal interfacial materials.

* Corresponding author. E-mail: slbai@pku.edu.cn(Shu-Lin Bai); Tel: +86-10-6275-9379.