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Yun Li[1], Xiaojuan Tian[1], Wang Yang, Qi Li, Liqiang Hou, Zhixin Zhu, Yushu Tang, Minjian Wang, Bing Zhang, Ting Pan and Yongfeng Li[*]

State Key Laboratory of Heavy Oil Processing, China University of Petroleum, Beijing, Changping 102249, P. R. China

Abstract

Dielectric composites with high thermal conductivity and mechanical strength have great potential in microelectronic packaging. However, conventional composites with excellent thermal conductivity generally possess high electrical conductivity which raises short-circuit problems and unsatisfactory mechanical properties which limits their applications. In this work, dielectric composites with superior thermal and mechanical performance are obtained by fabricating a new type of fillers with three-dimensional (3D) nanostructure. Specially speaking, carbon nanotubes (CNTs) are grown on the surface of boron nitride nanosheets (BNNS) by chemical vapor deposition (CVD), and then utilized as fillers in epoxy resin (BNNS/CNT/Epoxy). The thermal, mechanical and dielectric properties of as-prepared composites are investigated in details. It is shown that the cross-plane thermal conductivity enhancement of the novel composite is as high as 615% compared with the pure epoxy, higher than that of BNNS/Epoxy (380%). Meanwhile, the BNNS/CNT/Epoxy remains a high electrical resistivity of more than 1 Mohm·cm, which is important to avoid

[*] Corresponding Author: Tel/Fax: +86-10-89733477. E-mail: yfli@cup.edu.cn.
[1] The first two authors contributed equally to this work.