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Flammability and thermal properties of polycarbonate /acrylonitrile-butadiene-styrene nanocomposites reinforced with multilayer graphene

Raheleh Heidar Pour [a], Mohammad Soheilmoghaddam [a] Azman Hassan [a,*], Serge Bourbigot [b]

[a] Enhanced Polymer Research Group, Department of Polymer Engineering, Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia, Johor, Malaysia

[b] Unité Matériaux et Transformations (UMET), CNRS UMR 8207, Equipe Ingénierie des Systèmes Polymères–Ecole Nationale Supérieure de Chimie de Lille, BP 90108, F-59652 Villeneuve d'Ascq, France

*Corresponding to: Department of Polymer Engineering, Faculty of Chemical and Natural Resources Engineering, Universiti Teknologi Malaysia, 81300 Skudai, Johor, Malaysia. Tel.: +60 7 5537835; fax: +60 7 5581 463.

E-mail address: azmanh@cheme.utm.my

Abstract

A series of polycarbonate (PC)/acrylonitrile butadiene styrene (ABS) (70/30 wt.%) nanocomposites with varying concentrations (0-5 wt.%) of multilayer graphene particles (GNP) were fabricated using melt extrusion process. The flammability, thermal, mechanical and morphological properties of the nanocomposites was investigated. Cone calorimeter analysis, limiting oxygen index (LOI) and UL94 flame rating tests revealed that addition of GNP to PC/ABS significantly improved the flame retardancy of PC/ABS/GNP nanocomposites. As much as 30.4 % reduction in peak heat release rate was observed for the 3 wt.% GNP loading. The maximum LOI value of 26% was observed for the nanocomposites with 3wt.% GNP content. UL-94 V-2 rating and less dripping was observed for the nanocomposites compared with the pure PC/ABS sample. TGA analysis showed that incorporation of GNP enhanced the thermal stability and char yield of the nanocomposites. Scanning electron microscopy revealed the GNP nanoplatelets were unidirectionally aligned in the PC/ABS parallel to the surface of the nanocomposites.

Keywords: Polycarbonate/acrylonitrile butadiene styrene (PC/ABS), Multilayer graphene, Nanocomposites, Flame retardancy, Thermal properties

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