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Effect of tunable styrene content on achieving high-performance poly(styrene-b-ethylene-ran-butylene-b-styrene)/graphene oxide nanocomposites

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**Effect of tunable styrene content on achieving high-performance****Poly(styrene-b-ethylene-ran-butylene-b-styrene)/graphene oxide nanocomposites**Jianfeng Wang<sup>1</sup>, Xiuxiu Jin<sup>3</sup>, Xiaomeng Zhang<sup>1</sup>, Hong Wu<sup>1,2\*</sup>, Shaoyun Guo<sup>1,\*</sup>*1 The State Key Laboratory of Polymer Materials Engineering, Polymer Research**Institute of Sichuan University, Chengdu 610065, China**2 Research Center for Application of Graphene, Sichuan University-WuXi, Wuxi, 214000, China**3 State Key Laboratory of Biotherapy, West China Hospital, Sichuan University Chengdu, 610065, China*

**Abstract:** In this paper, two poly(styrene-b-ethylene-ran-butylene-b-styrene) (SEBS) with different styrene segment content were adopted to explore the relationship between varying  $\pi$ - $\pi$  stacking interaction and the mechanical performance of polymer composites. The results showed that the high styrene content on SEBS (SEBS-30, 30 wt% styrene segment) endows SEBS a stronger  $\pi$ - $\pi$  stacking interaction with GO and a better dispersion of GO in the matrix than that in SEBS with low styrene content (SEBS-12, 12 wt% styrene segment), resulting in a high efficiency on enhancing the performance of SEBS. By adding 0.5 wt% GO, the tensile strength and modulus of SEBS-30 was increased by 44 % and 64 %, respectively, while that of SEBS-12 was increased by 24 % and 39 %. Furthermore, the GO also exhibited the ability to toughen SEBS via forming microcrack and GO-induced fibrillation of SEBS during the fracture process. The elongation at break and fracture toughness of SEBS-30 was increased by 10 % and 64 %, respectively. This study gives us a deep insight into the influence of varying  $\pi$ - $\pi$  stacking interaction between graphene oxide (GO) and polymer on achieving high-performance polymer nanocomposites.

**Keywords:** A. Polymer-matrix composites (PMCs); B. Interface; B. Surface treatments; B. Mechanical performance

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