

Thermal stability and dynamic mechanical behavior of functionalized graphene oxide-polystyrene nanocomposites

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Graphene is a rising star-material in various fields due to its superior properties. In a wide of its application, polymer nanocomposites based on graphene have been performed for improved mechanical, thermal, and gas barrier properties of polymers. However, a key challenge in the synthesis and processing of bulk-quantity graphene sheets is the prevention of aggregation. The solution is resulted from the modification of surface on graphene oxide (GO) which has been using as starting materials. The functionalized graphene oxide (FGO) is a promising way both the homogeneous dispersion and strong interfacial interaction in solution process, especially introduction of alkylamines as functional agents into low polar organic solvents or low polar polymers usually shows favorable results. We synthesized three types of FGOs by using different chain length of alkylamines and prepared FGO-polystyrene composites. During the solution blending, FGOs uniformly dispersed over PS matrix even at high weight percentage (~10 wt.%) in chloroform. The distinct improvements of the mechanical properties were observed with steric effect and aspect ratio of FGOs.