Preparation of poly(styrene-co-acrylonitrile)-RGO composite (SAN-RGO) by in situ surfactant-free emulsion polymerization

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Graphene, a one-atom-thick two-dimensional graphitic carbon material, is one of the most fascinating materials today due to its outstanding mechanical, electrical, thermal, and optical properties, as well as its high specic surface areas. In this study, poly styrene acrylonitrle (SAN) was obtained by surfactant-free emulsion copolymerization of styrene and acrylonitrile using cationic initiator. By mixing SAN latex and graphene oxide (GO) dispersion, SAN particles were self-assembled with GO sheets through electrostatic interaction between positive charges on the surface of SAN particles with negative charges on surface of GO sheets. SAN-GO composite was then reduced by hydrazine to make highly conductive SAN-RGO composite. SAN-RGO composites exhibited highly excellent electrical properties with a percolation threshold at 0.25 vol % and electrical conductivity of 48.9 S/m at only 2.5 vol%. Moreover, the effect of content acrylonitrile on properties of SAN-RGO composite such as thermal properties and mechanical properties were also investigated.