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ABSTRACT

Unplasticized and glycerol plasticized chitosan/graphene (CS/GS) nanocomposites were synthesized via in situ chemical reduction of graphene oxide sheets (GO) with L-ascorbic acid (L-AA) as reductant by solution casting. The reduction of GO with L-AA was investigated to establish the optimal amount of reductant required to produce chemically reduced graphene sheets (GS). The combine effect of both nanofiller and glycerol on the structure, thermal, mechanical, and electrical properties of CS/GS nanocomposite films was evaluated. Materials were characterized by FT-IR, NMR, UV-Vis, XPS, XRD, Raman, SEM, TEM, and TGA. The results showed that GS sheets were homogeneously dispersed throughout the CS matrix, and that interactions between CS and the surface of GS took place. When compared with neat CS, nanocomposites showed a decrease in the crystallinity, better thermal stability under oxidative atmosphere, and improved mechanical properties, while maintained the thermal properties of CS under inert conditions. Combined use of glycerol and GS led to substantially enhanced mechanical properties. The electrical conductivity was increased with increasing GS loading in nanocomposite. This study