Synthesis of graphite oxide to prepare composites based on Acrylonitrile Butadiene Styrene (ABS) matrix

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Acrylonitrile-butadiene-styrene (ABS) is a terpolymer stiff, with good impact and abrasion resistance, used in automobile and household items [1]. Graphite oxide (GrO) has an interest due to its role as a precursor to produce graphene, which is attractive for mechanical, thermal and electrical properties. GrO has similar structure to graphite, but the plane of carbon atoms is decorated by oxygen groups, which expand the interlayer distance [2]. Graphene has been added into polymers to explore novel applications in mechanical reinforcement, flame retardant or conductive composites [3]. Thus, the composite ABS/graphene can be utilized in aerospace applications with the advantages of low weight and high resistance in high-performance structures. In this work, GrO was synthetized by Hummer's method and it was prepared ABS/graphite and ABS/GrO films by solution casting. XRD showed graphite with a single narrow peak at 26.6°. GrO showed a larger peak at 10.2° and two less intense at 24.8° and 26.4°, indicating the presence of oxygen groups. The interlayer distance for graphite is 0.335nm, while for GrO was 2.5 greater, indicating the success in obtaining GrO. In Raman, D band at 1354.2cm^{-1} is attributed to the mode of induced disorder due to the presence of less structural defects. The bands G at 1580.8cm^{-1} and G' at 2730.4cm^{-1} are characteristic of carbonaceous materials. There was an increase in the intensity of the D-band in GrO spectra, due to the incorporation of oxygenated groups. The disorder is determined by the ratio of intensity between the induced D band and the allowed G band (ID/IG). The increase in ID/IG of 0.04 in graphite to 0.92 in GrO confirms the grafting of oxygen groups to the graphitic planes. The ABS/graphite films were more distributed and less dispersed compared with ABS/GrO films.

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