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Synthesis and characterization of magnetic graphene oxide nanocomposites

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Graphene oxide (GO) is a unique material that can be described as a single monomolecular layer of graphite containing various oxygen functionalities such as epoxide, carbonyl, carboxyl and hydroxyl groups. Chemical modifications at the surface of the graphene oxide through the incorporation of magnetite can provide magnetic properties to these nanomaterials. This work aims to synthesize and characterize graphene oxide/magnetite (GO/M) nanocomposites, evaluating the different proportions of incorporated magnetite. The synthesis of graphene oxide/magnetite nanocomposites was performed by co-precipitation of iron salts on the graphene oxide (GO) particles in alkaline medium. The characterization of the nanocomposites was performed by thermogravimetric analysis (TGA), infrared spectroscopy (FTIR), X-ray diffraction (XRD), nanoparticle tracking analysis (NTA) and scanning electron microscopy (SEM). The thermogravimetric results showed the incorporation of approximately 20, 50, 70 and 80% of magnetite to the graphene oxide. Regarding the hydrodynamic size, for the magnetite, mode values of 31.3 ± 1.3 nm were determined, whereas for the GO/M, the mode values of size ranged from 72.8 to 194 nm. The results of XRD and FTIR showed the respective characteristic diffraction and absorption peaks only for graphene oxide, magnetite and GO/M(20%). It was not observed characteristic peaks for the other samples of graphene oxide that have higher loads of magnetite incorporated.