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SYNTHESIS AND CHARACTERIZATION OF GRAPHENE OXIDE FROM GRAPHITE NANOPLATELETS

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Nanotechnology has become a vast field of exploration, directly associated with the development of new nanomaterials with the potential to be applied in areas such as the environment, medicine, pharmaceuticals, textiles, among others. Different nanomaterials are being studied, but it is worth mentioning that 2D nanostructures, especially those based on carbon, stand out for having unique properties. Graphene oxide (GO), in particular, is a very versatile material to be explored, this is due to its constitution by a layer of graphene functionalized with epoxy, hydroxyl, carboxylic, and carbonyl groups, these functional groups that make interaction possible with other chemical structures, which is interesting for different applications. GO is usually done by oxidizing graphite flakes, many chemical reagents are used during synthesis, producing liquid residues to be treated, and with all this, this method can result in low yield. Based on this, the present work aimed to carry out the synthesis and characterization of graphene oxide, using a high performance chemical route, from graphite nanoplatelets as raw material. For this purpose, the oxidation method of these nanoplatelets was carried out, consequently obtaining graphite oxide, later exfoliated to graphene oxide, which was characterized by atomic force microscopy (AFM), Raman spectroscopy, in Fourier transform infrared (FTIR) and molecular fluorescence. The characterizations were essential to understand the GO structure. From the Raman, G bands were detected in 1606 cm^{-1} and D bands in 1355 cm^{-1}. Thus, it was possible to perform the I_D/I_G ratio, obtaining 0.79, a value less than 1, possibly indicating the characteristic of material with some degree of structural defects, but with a good graphitic network. The topographic profile of the AFM image indicated the obtaining of GO sheets mostly with a single layer and a side size of up to 2 micrometers. FTIR analysis revealed different oxygens functional groups, as -OH, -COOH, and -COC-. The fluorescence study was carried out by changing the emission wavelength for the optimization and choice of the peak with greater intensity, found at 450 nm emission, and approximately 540 nm excitation. Thus, the exposed data proved the obtaining of high quality graphene oxide. In this way, this study can serve to develop new materials and future research to understand the interaction at the molecular level of the GO with different molecules of environmental interest.

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