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Synthesis and characterization of graphene oxide/nickel nanoparticles using nanoparticle tracking analysis

Jacovone, R.M.S.(1); Soares, J.J.S.(1); Sakata, S.K.(1);

Instituto de Pesquisas Energéticas e Nucleares(1); Instituto de Pesquisas Energéticas e Nucleares(2); Instituto de Pesquisas Energéticas e Nucleares(3);

One of the graphene based compounds that has giving attention is graphene oxide (GO). This nanomaterial has oxygenated groups on its surface, which provide hydrophilicity and allow its exfoliation in several polar solvents. Moreover, these reactive sites can be further functionalized, yielding nanocomposites with many applications in electrochemistry and biomaterials fields. The objective of this study is to synthesize nickel / graphene oxide (GO-Ni) nanocomposite using electron beam in water /alcohol solution without stabilizers and to characterize GO and GO-Ni by Nanoparticle Tracking Analysis (NTA). The Nanoparticle Tracking Analysis utilizes the properties of both light scattering and Brownian motion in order to obtain the particle size distribution and to measure the diffusion coefficient. From the Stokes-Einstein equation it was possible to obtain the hydrodynamic diameter of the nanomaterials. The NTA result showed that GO and GO-Ni showed respectively 47 nm and 55nm. Both showed a low polydispersity index, indicating the homogeneity of the size distribution and the formation of a monodisperse system. The results showed that it is possible to obtain nanoparticles of graphene oxide incorporated with nickels smaller than 60 nm and with good distribution without the use of stabilizers.