Influence of the Iron Oxide Nanoparticles on the Electro-optical Properties of Graphite and Few-layers Graphene ☆

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Abstract

Spherical iron oxide nanostructures (Fe_xO_y NPs) are obtained by laser ablation technique, which are formed primarily by α-hematite (α- Fe_2O_3), γ-hematite (γ-Fe_2O_3) and goethite (FeOOH) phases, the dimensions of which are among the 30-60 nm by using the Scanning Electronic Mycroscope (SEM) analysis. These were incorporated superficially on graphite microflakes (MFG, microflakes of graphite) and / or a few layers of graphene microflakes (FLG, few-layer graphene), through a thermal process, in order to observe their influence on the electro-optical properties on MFG and FLG, tested by Raman microspectroscopy, we detect a correlation of Raman shifts before and after doping. This is explained as a change in the dispersion of two phonons at the edges of the C-C chains forming the FLG against the formation of surface defects due to interaction with Fe_xO_y NPs after insertion. Finally, a study of the position, the FWHM, the ration between the intensities and the areas of the G and 2D bands was made in all samples with two Raman lasers (λ = 534 nm and 422 nm).

Keywords

iron oxides nanoparticles; graphite; few-layers graphene; EPR; Raman