One step synthesis and characterization of RGO/Au NPs nanocomposites

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Gold nanoparticles are widely used with an important role in medicine. Graphene has wide applications in electronics and in the creation and modeling of new batteries. Graphene-based materials show great potential for electrochemical biosensor electrode materials because they increase the sensing area and improve the electron transfer rate. With the increasing demand of contemporary technological solutions, it is expected that the combination between these two materials will find an increasingly wide application in practice. RGO-AuNP can overcome the barriers that limit the potential of currently available traditional materials due to its excellent properties, which include its high specific surface area. In the present study, a single step route for the synthesis of a composite based on Au nanoparticles and RGO is proposed. The process of synthesis of Au nanoparticles from chloroauric acid ($H[AuCl_4]$) and reduction using sodium citrate ($Na_3C_6H_5O_7$) takes place directly on the surface of the pre-synthesized GO layers. Through TEM and HRTEM analysis, the deposition of well-shaped spherical Au nanoparticles on the surface of the graphene layers is observed. In addition, the RGO sheets are well defined in the TEM images. The size of Au nanoparticles in the graphene composite has been determined to be in the range of 2 to 20 nm. The proposed explaination for the size difference is the formation of aggregates of different sized Au nanoparticles. The crystal lattice parameter of the obtained Au nanoparticles has been determined to be 4.07825 Å by Selected Area Electron Diffraction (SAED). Spherical gold nanoparticles with size 2-5 nm have been observed by High-resolution transmission electron microscopy (HRTEM).

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References

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Figures

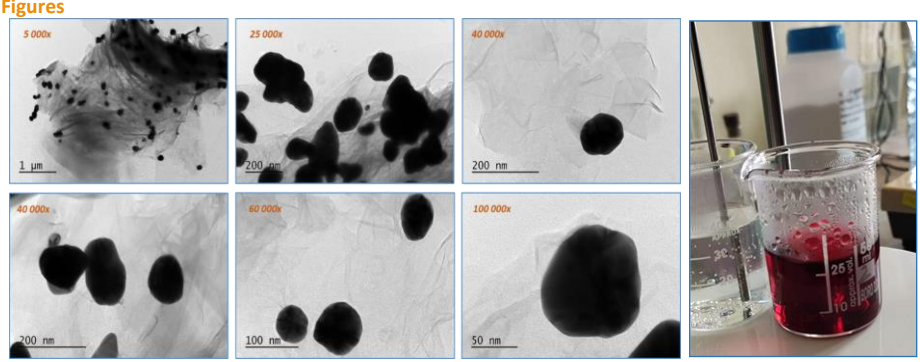

Figure 1: TEM analysis of AuNPs/RGO composite.

Figure 2: AuNPs/RGO composite.