Graphene-Gold Nanoparticles Nanohybrids for Electrochemical Detection of Malachite Green

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Malachite green (MG) was an important bactericide and is now banned in different countries due to its bad effect to human health. In this work, graphene-gold nanohybrids (Graphene-GNPs) were prepared by the chemical co-reduction of Au (III) and graphene oxide (GO) with sodium citrate. These Graphene-GNPs were characterized by TEM, SEM, XRD and EDS. After deposition on glassy carbon electrode (GCE), an electrochemical sensor was proposed for the electrochemical detection of MG. The electrocatalytic oxidation of MG on Graphene-GNPs modified GCE (Graphene-GNPs/GCE) was investigated by differential pulse voltammetry (DPV), cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The results showed that the Graphene-GNPs could enhance the electrochemical detection performance towards oxidation of MG. Under the optimized condition, the constructed MG electrochemical sensor showed linear dynamic range from 0.1 μM to 800 μM . Moreover, the proposed MG electrochemical sensor has also been successfully used for MG determination in real water samples with satisfied recoveries (97.5 % to 109.6 %) and precision (0.35 % to 5.57 %).

Keywords: Malachite green; MG; Graphene-Gold nanoparticles nanohybrids; Electrochemical detection; electrochemical sensor.

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