Electrodeposited AuNPs/rGO Nanocomposite as sensor for Cr(VI) Determination in Water

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A facile two-step electrochemical deposition of gold nanoparticles (AuNPs)/reduced graphene oxide (rGO) (AuNPs/rGO) nanocomposite was developed for Cr(VI) determination in water. First, electrodeposition of rGO on GCE by electroreduction of GO using cyclic voltammetry (CV), and then AuNPs were electrodeposited on rGO sheets using CV to obtain as AuNPs/rGO/GCE. The AuNPs/rGO nanocomposite was characterized by scanning electron microscopy (SEM), transmission electron microscopy (TEM) and energy dispersive X-Ray spectroscopy (EDS) analysis. The deposition time, and concentration of HCl supporting electrolyte were respectively optimized for Cr(VI) determination. Square wave voltammetry (SWV) was applied for the detection of Cr(VI). The experimental results demonstrated the AuNPs/rGO/GCE has excellent electrocatalytic ability for Cr(VI) reduction, and a linear range of 0.1 μM -30 μM , with a high sensitivity of 0.79915 $\mu\text{A}/\mu\text{molL}^{-1}$, and a detection limit of 0.046 μM (S / N = 3) for Cr(VI) determination. The signal remained 92.98% after 12 h measurement suggested that the AuNPs/rGO nanocomposite has good stability for Cr(VI) determination. The common interfering ions of Mg^{2+} , Zn^{2+} , Cu^{2+} , Mn^{2+} and Cr^{3+} were separately investigated, and less than 2% deviation values were obtained, indicating that the proposed AuNPs/rGO nanocomposite has good selectivity for Cr(VI) determination.

Keywords: Cr(VI) determination; AuNPs/rGO nanocomposite; electrochemical deposition; square wave voltammetry

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