An Electrochemical Sensor for Simultaneous Stripping Determination of Cd(II) and Pb(II) Based on Gold Nanoparticles Functionalized β -cyclodextrin-graphene Hybrids

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A simple and sensitive electrochemical sensor was reported for the simultaneous detection of Cd(II) and Pb(II) using gold nanoparticles functionalized β -cyclodextrin (β -CD)-graphene hybrids (AuNPs-CD-GS) as the sensing platform. The disperse AuNPs-CD-GS are fabricated by a simple one-pot synthesis using hydrazine and β -CD as reducing agents to reduce the graphene oxide and gold ions. A homogeneous AuNPs on the CD-GS was obtained and the concentration of HAuCl_4 was considered. This nanocomposite not only presents the excellent electrical properties of AuNPs and GS but also shows high capture capability due to the strong adsorption uptake of Cd^{2+} and Pb^{2+} on β -CD. Under the optimal conditions, the stripping peak currents are linearly related to the concentrations of Cd^{2+} and Pb^{2+} over the range from 40 - 1200 $\mu\text{g L}^{-1}$. The simultaneous and sensitive detection of Cd^{2+} and Pb^{2+} in real water samples was also conducted and the satisfactory results were obtained.

Keywords: Electrochemical sensor; Heavy metal ions; Gold nanoparticles; β -cyclodextrin; Graphene

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