Fabrication of a Chitosan-Iron Oxide Nanocomposite for Electrochemical Detection of Trace Cadmium in Orchard Soil in the Loess Plateau

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In this work, a chitosan-iron oxide nanocomposite (CHIT-IO) film was deposited onto fluorine tin oxide (FTO) to yield an electrochemical sensor to detect trace level cadmium. UV–visible spectroscopy and Fourier transform infrared spectroscopy (FTIR) were used to measure the iron oxide nanoparticles (IONPs) prepared via a co-precipitation technique. The increased electron transportation rate and remarkable electrochemical behaviour were confirmed for the synthesized electrode. Under optimum conditions, the stripping peak currents were linearly related to the concentration of the Cd(II) (1.0–100.0 µg/L), and a limit of detection (LOD) of 0.15 µg/L was obtained. The proposed electrode was then used for Cd(II) detection in soil extracts, and the desirable results are provided herein. The results indicate the proposed electrochemical determination method shows a comparable performance compared with that of the ICP-MS method.

Keywords: Electrochemical sensor; Chitosan; Iron oxide; Fluorine tin oxide; Cadmium; Soil

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