

Construction and Evaluation of a Carbon Paste Electrode Modified with Polyaniline-co-poly(dithiodianiline) for Enhanced Stripping Voltammetric Determination of Metal Ions

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Abstract

A modified carbon paste electrodes (MCPE) have been prepared in this study as an alternative “mercury-free” electrochemical sensor for the determination of Pb(sup2+) and Cd(sup2+) metal ions in aqueous solutions. CPE containing a conducting copolymer of polyaniline-co-poly(2,2'-dithiodianiline) (PANI-co-PDTDA) was used as a modified substrate transducer to achieve enhanced selectivity in stripping voltammetric analysis. The experimental conditions optimised included the supporting electrolyte pH, deposition potential (E_{subd}) and time (t_{subd}), set at -0.6 V vs. ref. for Pb(sup2+) and -0.8 V for Cd(sup2+); both kept for $t_d = 120$ s. The results with the CPE/PANI-co-PDTDA sensor have revealed the linear range within the range of 0.15 – 0.5 $\mu\text{g/L}$ for Pb(sup2+) and the same interval for Cd(sup2+). Finally, the electrode of interest, CPE/PANI-co-PDTDA, can be characterised by the LODs of 0.03 and 0.09 $\mu\text{g/L}$ for Pb(sup2+) and Cd(sup2+) respectively.