Screen Graphene-printed Electrode for Trace Cadmium Detection in Rice Samples Combing with Portable Potentiostat

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A disposable screen graphene-printed electrode (SGPE) was developed by directly printing the prepared graphene paste on the surface of screen-printed carbon working electrode, and a differential pulse stripping voltammetry (DPV) method combining with portable potentiostat were introduced to the rapid detection of trace Cd^{2+} in rice samples. The surface morphology of SGPE was characterized by scanning electron microscope, and the graphene structure and its electrochemical activity were confirmed by Raman spectroscopy and cyclic voltammetry. Results showed that SGPE presents better conductivity than screen-printed carbon electrode or glass carbon electrode. The pre-concentration potential and time were optimized as -1.5 V and 500 s. And a pH 8.2 basic buffer was selected because OH^- did not pose an interference (K_{sp} of $\text{Cd}(\text{OH})_2 = 2.5 \times 10^{-14}$) and show a good stripping current signal. The obtained results from portable potentiostat were similar to the results obtained by inductively coupled plasma mass spectrometry (ICP-MS). Therefore, the proposed SGPE and its effectively analytical method could be further improved for the realization of an ideally rapid on-site detector for trace Cd^{2+} detection in rice samples.

Keywords: screen graphene-printed electrode; cadmium; portable potentiostat; differential pulse stripping voltammetry; rice samples

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