Al-Doped Mesoporous Cellular Foam Modified Electrode as Sensor for the Detection of Parathion Pesticide

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Al-doped mesoporous cellular foam (Al-MCF) materials have been synthesized using “pH-adjusting” method and characterized by transmission electron microscopy (TEM), scanning electron microscopy coupled with energy dispersive X-ray spectrometry (SEM-EDS), X-ray diffraction (XRD), and nitrogen physisorption. The prepared Al-MCF was used to construct a carbon paste electrode (Al-MCF/CPE) for the electroanalysis of ethyl parathion (EP). Electrochemical behaviors of EP at the bare carbon paste electrode (CPE) and Al-MCF/CPE were studied. The results showed that the voltammetric response of EP at the Al-MCF/CPE sharply increased due to the high adsorption capacity, large surface area, and excellent electron transport properties of the Al-MCF. Some parameters, such as the content of Al-MCF, accumulation time, accumulation potential, and pH were optimized. Under optimal conditions, the oxidation peak current was proportional to EP concentration in the ranges of 0.010 to 0.10 mg/L and 0.10 to 1.0 mg/L, respectively, with a detection limit of 0.0050 mg/L (S/N = 3). The proposed method was applied for the determination of EP in vegetable samples with the recoveries of 94.4 – 110 %.

Keywords: Al-doped mesoporous cellular foam, Modified electrode, Ethyl parathion, Electroanalysis

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