

Modification of a Carbon Paste Electrode with a ZnO@ZIF-8 Nanocomposite and Fabrication of a Highly Sensitive Electrochemical Sensor for Sulfamethoxazole Detection

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Received: 2 March 2021 / Accepted: 14 April 2021 / Published: 10 August 2021

A highly sensitive electrochemical nanostructure sensor based on a ZnO@ZIF-8 nanocomposite-modified carbon paste (ZnO@ZIF-8/CPE) electrode was constructed for trace analysis of sulfamethoxazole (SMX). ZnO@ZIF-8 was synthesized by the hydrothermal method and characterized using scanning electron microscopy and X-ray diffraction. Electrochemical experiments demonstrated a synergistic effect of ZnO and ZIF-8 that endowed the prepared sensor with excellent electrocatalytic behavior towards SMX oxidation. Under optimal conditions, the ZnO@ZIF-8/CPE sensor demonstrated a wide linear range of 0.04-50 μM for SMX and a regression coefficient of 0.9914 and a limit of detection of 0.02 μM . The sensor possessed good stability, selectivity, anti-jamming ability and reproducibility and was successfully used for SMX determinations in egg samples. The proposed sensor is ready to use for biomedicine and environmental protection monitoring.

Keywords: carbon paste electrode; ZnO@ZIF-8 nanocomposite; sulfamethoxazole; electrochemical sensor

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