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Highly Sensitive Amperometric Sensor for Eugenol Quantification Based on CeO2 Nanoparticles and Surfactants

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Abstract

© 2017 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim Amperometric sensor for eugenol based on glassy carbon electrode (GCE) modified with CeO 2 nanoparticles dispersed in surfactant was fabricated. The effect of surfactant nature (sodium dodecylsulfate, cetylpyridinium bromide (CPB) and Brij® 35) on eugenol voltammetric behaviour was tested. In comparison to CeO 2 -H 2 O/GCE, CeO 2 -CPB/GCE showed 2.8-fold increased current and 70 mV cathodic shift of potential in the diffusion-controlled irreversible electrooxidation. The electrodes were characterized with SEM and EIS. CeO 2 -CPB/GCE showed significantly lower charge transfer resistance (2.6±0.3 kΩ vs. 20±1 kΩ for CeO 2 -H 2 O/GCE and 173±9 kΩ for GCE). Under conditions of DPV, the sensor linear dynamic range is 0.075-75.0 μM of eugenol with the limits of detection (LOD) and quantification (LOQ) of 19.1 and 63.8 nM, respectively. The sensor exhibited high sensitivity, selectivity, good reproducibility and fast response and was applied for the real samples analysis (essential oils and clove spices). The results obtained correspond well to the data of spectrophotometric method.

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Keywords

Chemically modified electrodes, Eugenol, Metal oxide nanoparticles, Sensors, Surfactants

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