SENSITIVE DETECTION OF CAPSAICIN BY ADSORPTIVE STRIPPING VOLTAMMETRY AT A BORON-DOPED DIAMOND ELECTRODE IN THE PRESENCE OF SODIUM DODECYLSULFATE

Yavuz Yardım

Yüzüncü Yıl University, Faculty of Science, Department of Analytical Chemistry, 65080 Van
E-mail: yavuz@yyu.edu.tr

Capsaicin (8-methyl-N-vanillyl-trans-6-nonenamide) is the most abundant pungent molecule present in red peppers and it is widely used for food flavoring, for pepper spray in self-defense devices and more recently in ointments for the relief of neuropathic pain [1].

In the present paper, a sensitive electroanalytical methodology for the determination of capsaicin using adsorptive stripping voltammetry at a boron-doped diamond (BDD) electrode is presented.

In cyclic voltammetry, capsaicin shows one irreversible and adsorption-controlled oxidation peak on BDD electrode. The voltammetric results indicate that in the presence of sodium dodecylsulfate (SDS) the BDD electrode remarkably enhances the oxidation of capsaicin which leads to improvement of peak current with shift of peak potential to less negative values. Using square-wave stripping mode, the compound yielded a well-defined voltammetric response in Britton-Robinson buffer, pH 1.0 containing 800 µM SDS at +0.73 V (vs. Ag/AgCl) (after 90 s accumulation at open-circuit condition). A linear calibration graph was obtained in the concentration range of 0.05 to 6.0 µg mL⁻¹ (0.16-20 µM). A detection limit of 0.012 µg mL⁻¹ (0.034 µM), and relative standard deviation of 4.44% for a concentration level of 1.0 µg mL⁻¹ (n = 10) were calculated. As an example, the practical applicability of BDD electrode was tested with the measurement of capsaicin in the pepper products, such as Turkish hot pepper paste and red pepper flakes.

Figure 1. The repetitive cyclic voltammograms of 100 µg mL⁻¹ capsaicin solutions in Britton-Robinson buffer, pH 1.0 for BDD electrode. Scan rate, 100 mV s⁻¹. Dashed lines represent background current.

Reference