

Abstract

This study investigates electrochemical oxidation of *m*-cresol on boron-doped diamond electrode using direct current voltammetry (DCV), differential pulse voltammetry (DPV) and cyclic voltammetry (CV). In aqueous media in pH range 2.0 – 12.0 *m*-cresol provides one oxidation peak. The electrode reaction is diffusion-controlled. Because of electrode passivation two types of pretreatment were applied for reactivation of electrode surface., *i.e.* alumina polishing and anodic activation using potential of +2400 mV. Peak heights and potentials are strongly depending on the type of pretreatment for DCV and DPV – the difference in peak potentials can reach 430 mV. Using optimal conditions for alumina polishing in 0.01 $\mu\text{mol}\cdot\text{L}^{-1}$ NaOH the linear dynamic range is 1.0 – 75 $\mu\text{mol}\cdot\text{L}^{-1}$ for DCV and 0.75 – 75 $\mu\text{mol}\cdot\text{L}^{-1}$ for DPV. And for anodic activation in BR buffer pH 2.0 the linear dynamic range is 0.75 – 75 $\mu\text{mol}\cdot\text{L}^{-1}$ for DCV and DPV. The influence of boron-doping level was investigated using a semiconductive and metallic-type BDD film. For the latter the sensitivity in DP voltammetry is two times higher and for both types the linear dynamic range is ca 1 – 25 $\mu\text{mol}\cdot\text{L}^{-1}$. The voltammetric response of *m*-cresol was further investigated in the presence of cationic surfactants. In the presence of CTAB and CPB the peak current of cyclic voltammograms of the redox marker $[\text{Fe}(\text{CN})_6]^{3-/4-}$ is decreasing, but has no influence on voltammetric response of $[\text{Ru}(\text{NH}_3)_6]^{3+/4+}$. For *m*-cresol the presence of these surfactants in 0.01 $\text{mol}\cdot\text{L}^{-1}$ NaOH has no influence on peak height and potential in DC and DP voltammetry when using mechanical activation, but cause a significant potential shift towards lower potentials and increase of peak current of *m*-cresol.

Key words

Boron-doped diamond electrode, *m*-cresol, oxidation, cationic surfactants, voltammetry