Abstract

This bachelor thesis deals with the electrochemical behavior of estrone on a laboratory prepared boron doped diamant (BDD) electrode on silicon substrate (BDD_{LA}) and commercial BDD electrode, which was compared with the properties of a glassy carbon (GC) electrode.

By measuring the cyclic voltammetry of estrone in an environment of 0,5 mol l^{-1} H_2SO_4 was looking for cleaning with the best repeatability. Cathodic activation was insufficient. Surface polishing with a cotton swab and anodic pretreatment was proved to be most effective options for removing adsorbed estrone and products of the reaction on the electrode. For further work was chosen the technique of cleaning the electrode using polishing, because by using anodic activation fundamental changes are in the attribute of the electrode.

Furthermore, chronoamperometric curves were measured. Their subsequent recalculating to chronocoulometric curves and evaluation yielded the values of the charge required for the electrochemical reaction of adsorbed molecules (Q_{ads}) and the adsorption coverage of the electrode surface (Γ). Measurements were performed on a BDD_{LA} electrode, a commercial BDD electrode and, for comparison, also on a GC electrode in three concentrations of 4, 20 and 40 μmol l^{-1} in 0,5 mol l^{-1} H_2SO_4. The highest values of adsorption coverage of the electrode surface were measured on the GC electrode.

By repeating the measurements on different BDD_{LA} electrodes, Γ values were obtained more differed than was expected. Two electrodes matched the previous measurement, the other three showed a values more than half lower. Due to cyclic voltammetry, various properties of individual BDD_{LA} electrodes were confirmed.

Key words

Boron doped diamant electrode

Glassy carbon electrode

Polished surface

Cyclic voltammetry

Estrone

Adsorption