## Abstract

Bile acids are the end products of cholesterol metabolism and are important biological surfactants. The curved shape of their chains allows the cyclization of molecules, and the formation of a supramolecular structure.

The goal of this thesis was to study the electrochemical and adsorption behavior of selected bile acids: lithocholic, deoxycholic and cholic acids. The measurements were carried out in the medium Brittonův-Robinson buffer:methanol in the ratio 9:1 using cyclic voltammetry and AC voltammetry methods and measuring the dependence of the differential capacitance $C_d$ on the applied potential $E$. A hanging mercury drop electrode was used as a working electrode.

The measurements showed that bile acids are adsorbed on the surface of the electrode and organizing themselves in self assembled monolayers (SAM). In our case we have observed formation of 2D condensed layers as specific form of SAM. Transfer techniques were used to demonstrate bile acid adsorption.

A study of the behavior of lithocholic acid as a function of different pH values showed that only at pH 10.0 to 12.0 2D 2D condensation occurs, i. e. that at pH values in the range of 2.0 to 9.0 it is another type of adsorption. On AC voltammograms, there are a maximum of two areas in which peaks occur: the first is around –0.2 V and the second is around –1.2 V to –1.4 V. Both peaks are comparable to the peaks on a cyclic voltammogram.

The measurement of the temperature dependence of the differential capacity on the potential was performed for three concentrations of bile acids ($c$ (mol $l^{-1}$) = $5 \cdot 10^{-5}$, $1 \cdot 10^{-4}$, $5 \cdot 10^{-4}$). 2D condensation in LCA occurs for both higher concentrations. At a concentration of $5 \cdot 10^{-5}$ mol $l^{-1}$, 2D condensation is only indicative at the lowest temperatures, but strong adsorption is still observable. DCA and CA are adsorbed on the electrode, but 2D condensation occurs only for lower temperatures at higher concentrations.

A study of the effect of the presence of anions in the basic electrolyte on the adsorption behavior of bile acids showed that the interaction of bile acids with the electrode surface and with each other is different from hydrogen bonds. Due to the structure of bile acids, it can be assumed that these are hydrophobic interactions.

All measurements showed that 2D condensation in LCA is more strong than in DCA and CA.