VOLTAMMETRIC SENSORS AND SENSOR SYSTEMS BASED ON ELECTRODES MODIFIED BY "SMART POLYMERS": NEW POSSIBILITIES FOR INCREASING SELECTIVITY

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Voltammetric sensors and sensor systems based on electrically conductive polymer-modified electrodes are widely used to solve various analytical problems, such as detection of counterfeit medicines, beverages, technical fluids, etc. In this case, in general, sensors that are selective to one or another molecule of the analyte are used, which makes it impossible to recognize multicomponent mixtures containing various electroactive components, or multisensor systems from several electrodes must be used. The use of "smart" voltammetric sensors, the selectivity of which can be regulated in sity, allows to solve this problem quite simply. However, the voltammetric characteristics and properties of "smart" sensors have not been studied enough.

We developed sensors based on modified glass-carbon electrodes with polymeric polyarylenephthalide films with in-situ controlled stereoelectronic properties and different sizes of the chelate cycle. In this case, there is no need to use several electrodes, the analytical signals of which differ from each other, which allows using modern methods of chemometrics to obtain a computer "print" of the recognized component. In addition, there is a fundamental possibility of recognizing compounds containing optically active isomers.

We studied the electrochemical properties of the glassy carbon electrodes modified by these polymers, the structure and morphology of their surface, the adsorption characteristics and selectivity of the accumulation of analyte molecules, the effect on the selectivity and stereoelectronic properties of the polyarylene phthalide electrode potential. As the analyzed objects, antiarrhythmic drugs (propranolol, atenolol) and amino acids (tryptophan, cysteine, methionine) of various manufacturers were chosen. The effect on the magnitude of the analytical signal and its selectivity on the nature of the compounds and inert components studied, the composition of the matrix, the measurement conditions are optimized, and the methods for mathematical processing of experimental data are considered.

The use of chemometric methods (method of principal components (PCA), Simka-classification, projection on latent structures (PLS)) for the processing of voltammetric data makes it possible to recognize the investigated pharmaceutical preparations by the manufacturer with a probability of not less than 90 %.

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