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Voltammetric "electronic tongue" for recognition of methionine-containing pharmaceuticals

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Abstract

The possibilities of new voltammetric sensorsbased on the gold electrodes modified with chlorinated poly(phthalidylidenefluoren) and poly(phthalidylidene diphenyl) and brominated poly(phthalidylidene-diphenyl) for determination of methionine were studied. Electrochemical and analytical characteristics of methionine voltammograms on modified electrodes modified by "smart" polymers were obtained, optimal conditions for the registration of an analytical signal, the nature of electrode processes were established. The linear nature of the dependence of the peak current of methionine oxidation on its content in the solution is maintained in the concentration range from 2.5×10^{-5} to 1×10^{-3} M. It is shown that voltammograms of the gold electrode modified by the proposed modifiers in methionine solution differ in the form of voltammograms. This indicates that the proposed sensors, modified by "smart" polymers, have cross-sensitivity, which allows their use in a sensory system such as "electronic tongue". An "electronic tongue" based on the proposed sensors for recognition of methionine containing preparations from various manufacturers has been developed. To assess the possibility of recognizing methionine-containing pharmaceuticals with different composition of auxiliary componentschemometric processing of data was carried out. To establish the similarity and differences between methionine containing preparations from various manufacturers, the principal component analysis (PCA) was used. On the score plots of the PCA-modeling, voltammograms of the samples belong to different clusters on the plots, while the clusters intersect on the single sensors, which makes it difficult to recognize the samples. When using the sensory system, clusters of real samples do not intersect with each other; in 100% of cases, all samples are uniquely recognized. For a quantitative assessment of the correctness of recognition of methionine preparations from various manufacturers, the soft independent modeling of class analogies (SIMCA) was used. It is shown that the use of the sensory system such as "electronic tongue" significantly increases the percentage of correctly recognized samples compared to the registration of voltammograms on the single sensor.

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