

Effect of nanostructured materials as electrode surface modifiers on the analytical capacity of amperometric biosensors

Medyantseva E., Brusnitsyn D., Varlamova R., Maksimov A., Fattakhova A., Konovalova O., Budnikov G.

Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© 2015 Pleiades Publishing, Ltd. Effect of multi-walled carbon nanotubes and silver nanoparticles as surface modifiers of screen-printed graphite electrodes, the basis of amperometric monoamine oxidase biosensors, on their analytical characteristics was studied. The presence of carbon nanotubes and silver nanoparticles was confirmed by UV spectroscopy and scanning electron microscopy. The use of the oxidation current of hydrogen peroxide, the product of oxidative deamination of biogenic amines in the presence of immobilized monoamine oxidase as a representative of the class of oxidoreductases, as the analytical signal made it possible to choose the synthesis method and to suggest ways to deposit the modifiers under study on the electrode surface. The curve of the inhibiting effect of tricyclic antidepressants on the catalytic activity of the immobilized enzyme on the solution pH and amount of modifiers was considered. It was found that the lower limit of the determinable concentrations decreases to a level of 4×10^{-9} M, the sensitivity coefficient is improved, and the range of determinable concentrations of amitryptiline and imipramine is extended to 1×10^{-4} - 1×10^{-8} M. It is shown that the suggested biosensors can be used to monitor the residual amounts of medical substances in urine.

<http://dx.doi.org/10.1134/S1070427215010073>
