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CHIRAL RECOGNITION AND DETERMINATION OF TYROSINE ENANTIOMERS USING VOLTAMMETRIC SENSORS

Tyrosine (Tyr) is a nonessential aromatic α-amino acid, which is part of the proteins of all living organisms. It exists in the two optically isomeric forms. This amino acid is involved in the synthesis of proteins and necessary for the formation of neurotransmitters dopamine and norepinephrine. It is also able to reduce stress, promote the production of melanin, reduce the accumulation of fat and suppress excessive appetite. The recognition and determination of tyrosine enantiomeric configurations is an actual problem because it is a biologically important substance.

There are HPLC, gas and liquid chromatography in combination with mass spectrometry, capillary electrophoresis to solve this problem. But these methods have many disadvantages, for example expensive reagents and equipment, long sample preparation, careful cleaning of samples and highly-qualified staff. Therefore, many researchers choose electrochemical methods for quickly and easily identification and determination of tyrosine enantiomers.

In this work the voltammetric sensor based on graphitized carbon black paste electrode modified by self-assembled supramolecules of cyanuric acid (CA) was proposed for determination of tyrosine enantiomers. Carbon paste electrodes (CPEs) have been widely used as voltammetric sensors for amino acid determination, due to the simplicity of fabrication, easy renewability of the surface, low cost, chemical inertness, small background currents, wide range of potential windows and possibility of modification by various types of modifiers. The experiments were carried out in an acidic media at pH equal to 2. At Figure 1 the differential pulse voltammograms (DPVs) of tyrosine enantiomers on CPE/CA are presented. The increase in current and a shift of the D-Tyr potential peak compared to L-Tyr indicates that the molecules of D-Tyr easier penetrate to the surface of the electrode through nanocavity in supramolecular of cyanuric acid.

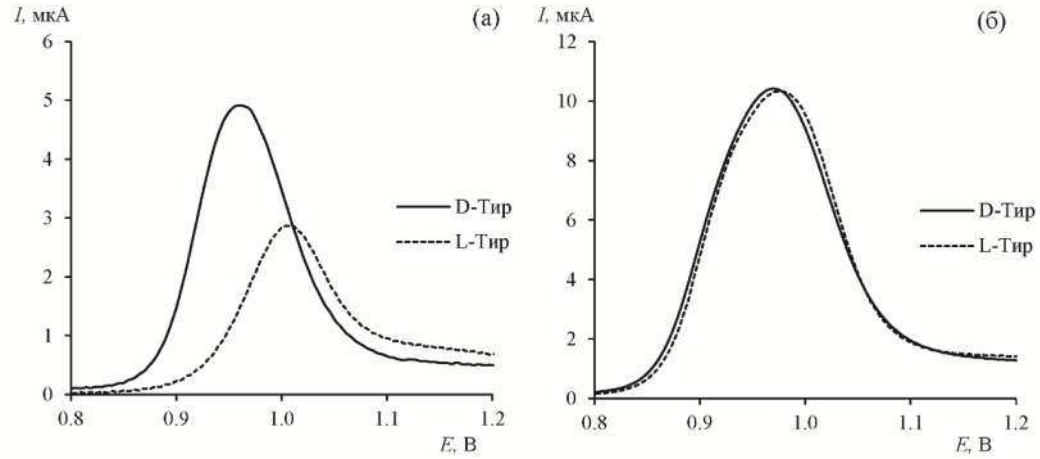

Fig. 1. DPVs of 1.0 mM solutions of D- and L-Tyr enantiomers in Britton-Robinson buffer solution of pH 2.10 on the CPE modified by CA (a) and the bare CPE (b) at a scan rate of 20 mVs^{-1}.

Thus the voltammetric sensor based on graphitized carbon black paste electrode modified by self-assembled supramolecules of cyanuric acid can use as chiral selector for tyrosine enantiomers.

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METHODS OF CONTROL AND MONITORING OF POLLUTANTS IN GROUNDWATERS

Pollution of water objects - sources of drinking water supply - due to the inefficient operation of water treatment plants entails deterioration of drinking water quality. Groundwater resources are less polluted than surface water resources. However, as a result of anthropogenic activities, pollution also occurs in groundwater resources. The most polluted areas are mainly located near large industrial and agricultural sites, as well as settlements.

In case of using groundwater as a drinking water source, it is necessary to treat it from compounds of iron, fluorine, manganese, ammonia, and also mineral salts, in particular, salts of hardness. Pesticides, nitrogen compounds, nitrates and nitrites reach the ground sources due to contamination with fertilizer residues and sewage of livestock farms.