

Nanochemistry and biotechnology

Electrochemical sensor with calixarene-based membrane for the arginine detection in aqueous samples

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Arginine (in the form of L-isomer) is an amino acid, which is a precursor in the biosynthesis of many biological substances. First of all, arginine is necessary for the protein biosynthesis, but also it is used in metabolic pathways which involve NO, polyamines, proline, creatine, ornithine etc. The determination of arginine in biological fluids can be used for diagnosis of various illnesses, i.e. argininemia, hypertension, and others. Application of the traditional methods of arginine detection (chromatography, spectrophotometry, electrophoresis) in biological liquids is quite complicated because of low selectivity of the methods and interference similar compounds like lysine and citrulline. These methods also require expensive equipment and qualified personnel. Thus, the creation of new sensor methods can facilitate arginine determination in medicine and food industry.

In the present work electrochemical sensors for the determination of arginine were developed. The sensors consisted of conductometric transducers based on gold interdigitated electrodes. The sensitive surface of transducers was functionalized with selective membranes based on calixarenes. Several variants of the arginine-binding calixarenes were synthesized and tested in the sensitive elements of sensors. Analytical characteristics of the sensors (sensitivity, linear range, reproducibility, response time) were evaluated. Possibility of application of the sensors for the arginine detection in biological fluids was evaluated.

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