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Adsorption of creatinine deiminase on silicalite for new biosensor creation

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A novel biosensor based on pH-sensitive field-effect transistors and immobilized creatinine deiminase has been developed. A possibility of efficient creatinine deiminase adsorption on surface of silicalite (size of nanoparticles was 450 nm) for the novel biosensor creation was investigation. The procedure of enzyme immobilization is simple, rapid and non-toxic. The present research is focused on optimization of working characteristics of the developed biosensor. The optimal conditions of creatinine deiminase adsorption on silicalite were investigated. The working parameters of the created creatinine biosensor were optimized. The detection range of the developed biosensor was determined to be 0.002-2 mM creatinine. The created biosensor with adsorbed creatinine deiminase was characterized by good intra-reproducibility (*RSD*=2.2) and storage stability (about 7 months). Also the developed method for enzyme adsorption on silicalite was compared with the widespread immobilization in glutaraldehyde vapor. It was shown that responses of biosensor based on creatinine deiminase immobilized in GA vapor are more slow and detection limit is more high. The produced biosensor was tested for creatinine determination in real samples (blood serum of patients with renal failure) in on-line mode. The results obtained were in good correlation with the data of analysis by control method.

It was concluded that the method of creatinine deiminase adsorption on silicalite is well-suited for creatinine-sensitive biosensor creation.