

Nanocomposites and nanomaterials

Improvement of the analytical characteristics of creatinine biosensor based on ISFET using micro and nanosized zeolites

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Creatinine is one of the most important analytes used for determination of kidney and muscular dysfunction as well as controlling of patients receiving hemodialysis. In this study, different zeolites including silicalite, BEA and nano BEA were adsorbed to the ion selective field effect transistor (ISFET) surfaces to immobilize creatinine deiminase for producing creatinine biosensor. For the control group, biosensor based on enzyme immobilization in glutaraldehyde vapor without zeolites was used.

The analytical characteristics of biosensors such as detection limit, sensitivity, response time, regeneration time, reproducibility and inter-reproducibility were studied. It was observed that all biosensors developed using zeolites showed increase in sensitivities, decrease in response time and regeneration time with improved inter-reproducibility and detection limit when compared to glutaraldehyde cross-linking. Finally, it was concluded that the method of enzyme immobilization using zeolites for creatinine determination can be a good alternative for biosensor creation.