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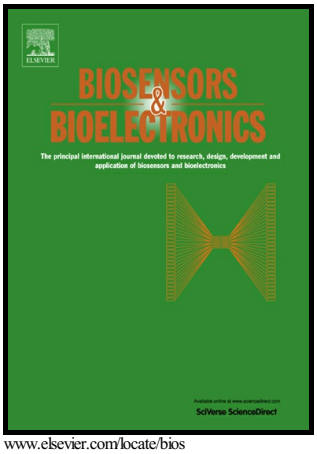

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Label-free attomolar detection of lactate based on radio frequency sputtered of nickel oxide thin film field effect transistor

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Abstract

The radio frequency sputtered nickel oxide thin film nanostructure deposited on glass substrate was used as a potential matrix for the realization of highly sensitive and selective field effect transistor-type lactate biosensor. Firstly, NiO-FET was tested for NADH detection showing a linear concentration range 1aM-1nM and a low detection limit of 0.2 aM. Then, NiO surface modified with chitosan and functionalized with glutaraldehyde and lactate dehydrogenase enzyme was immobilized on the aldehyde terminal. The biosensor is found to exhibit highly efficient sensing response characteristics with good linearity of 1 aM-1 pM and low limit of detection of 0.5 aM. The biosensor shows high stability without interferences from commonly interfering compounds in biological fluids, including uric acid, ascorbic acid, glucose and acetaminophen. Furthermore, the application of the proposed biosensor for analysis of lactate in artificial serum samples was evaluated with good satisfactory results. This