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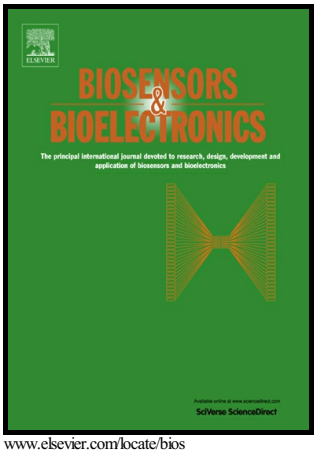

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In situ detection of microbial c-type cytochrome based on intrinsic peroxidase-like activity using screen-printed carbon electrode

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Abstract

C-type cytochromes (c-cyts) facilitate microbial extracellular electron transfer and play critical roles in biogeochemical cycling, bioelectricity generation and bioremediation. In this study, a simple and effective method has been developed to detect microbial c-type cytochrome (c-cyts) by means of peroxidase mimetic reaction on screen-printed carbon electrode (SPCE). To this end, bacteria cells were immobilized onto the working electrode surface of SPCE by a simple drop casting. After introducing 3,3',5,5'-tetramethylbenzidine (TMB) solution, microbial c-cyts with peroxidase-like activity catalyze the oxidation of TMB in the presence of hydrogen peroxide. The oxidized TMB was electrochemically determined and the current signal was employed to calculate the c-cyts content. This electrochemical method is highly sensitive for microbial c-cyts with a low detection limit of 40.78 fmol and a wide detection range between 51.70 fmol and 6.64 pmol. Moreover, the proposed technique can be universally