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Voltammetric Sensor with Replaceable Polyaniline-DNA Layer for Doxorubicin Determination

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Abstract

© 2018 Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim New voltammetric DNA sensor has been developed on the base of glassy carbon electrode covered with electropolymerized polyaniline with entrapped native DNA saturated with Methylene blue. The thickness and redox properties of the coating are easily regulated by the number of potential cycles and pH of the solution. Doxorubicin competes with Methylene blue for DNA binding sites and suppresses the electron transfer within the layer. The measurement of the decay of the cathodic peak current made it possible to determine down to 0.01 nM doxorubicin. After that, DNA can be replaced by consecutive treatment of the biosensor with concentrated HCl and fresh DNA solution. Second involvement of DNA was confirmed by electrochemical impedance spectroscopy. The DNA sensor developed was tested on artificial samples mimicking ionic content of human serum and on commercial drug formulation containing doxorubicin.

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Keywords

DNA sensor, doxorubicin determination, electrochemical sensor, electropolymerization, polyaniline; Methylene blue

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