

Electrochemical DNA sensors based on nanostructured organic dyes/DNA/polyelectrolyte complexes

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Abstract

© 2014 American Scientific Publishers All rights reserved. Polyelectrolyte complexes based on electropolymerized phenothiazine dyes (Methylene Blue and Methylene Green), poly(allylamine hydrochloride), polystyrene sulfonate and native DNA from salmon sperm have been for the first time obtained by self-assembling on the glassy carbon electrode using the layer-by-layer assembly and characterized using direct current voltammetry and electrochemical impedance spectroscopy. The changes in the charge transfer resistance and capacitance are attributed to the charge separation and the regularity of the layers depending on the number of layers and the position of DNA within the complex. Fenton reagent increases the resistance of the outer interface of the modifier with the maximal effect for the coatings including polymeric form of Methylene Green based coatings and direct contact of the DNA and polyphenothiazines. Meanwhile the selectivity of the response was found higher for the coatings based on poly(Methylene Blue). The difference in the behavior of the polyelectrolyte complex including different components makes it possible to distinguish the response related to the DNA damage and changes in the redox status of polyphenothiazines. Copyright

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Keywords

DNA Damaging Factors, DNA Sensor, Nanostructured Materials, Polyelectrolyte Complexes, Self-Assembling