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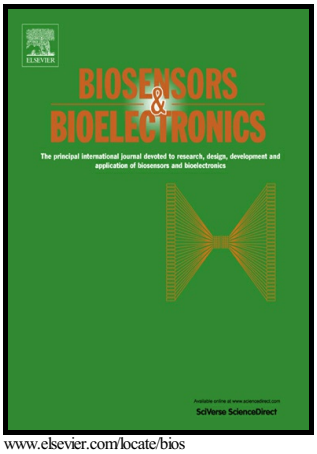

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Ultrasensitive detection of prostate specific antigen by electrochemical aptasensor using enzyme-free recycling amplification via target-induced catalytic hairpin assembly

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Abstract

Based on the target-induced catalytic hairpin assembly and bimetallic catalyst, the enzyme-free recycling amplification strategy for sensitive detection of prostate specific antigen (PSA) has been designed. The aptamer and its complementary DNA (C-apt) are modified on the magnetic particles. The aptamer-PSA binding event can release the C-apt that triggers the catalytic assembly between hairpin capture DNA and hairpin help DNA. Then the catalytic hairpin assembly leads to cyclic reuse the C-apt and the generation of many opened hairpin capture DNA, which can associate with the prepared Au/Pt-polymethylene blue (PMB) probes to yield electrochemical signal. Meanwhile, the Au/Pt-PMB probes exhibit excellent electrocatalytic ability for H_2O_2 to magnify the response current. The designed sensor possesses a wide dynamic range of 10 fg mL^{-1} to 100 ng mL^{-1} and ultra-low detection limit of 2.3 fg mL^{-1}. The present method has good performance in real serum sample analysis. This strategy is promising to be extended to provide a highly sensitive platform for various target analytes.

Keywords: prostate specific antigen, electrochemical aptasensor, signal amplification, catalytic hairpin assembly