

## Author's Accepted Manuscript

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PII: S0956-5663(17)30773-X  
DOI: <https://doi.org/10.1016/j.bios.2017.11.044>  
Reference: BIOS10120

To appear in: *Biosensors and Bioelectronic*

Received date: 1 September 2017  
Revised date: 9 November 2017  
Accepted date: 13 November 2017

Cite this article as: Juncai Zhao and Zhanfang Ma, Ultrasensitive detection of prostate specific antigen by electrochemical aptasensor using enzyme-free recycling amplification via target-induced catalytic hairpin assembly, *Biosensors and Bioelectronic*, <https://doi.org/10.1016/j.bios.2017.11.044>

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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  $\text{H}_2\text{O}_2$  to magnify the response current. The designed sensor possesses a wide dynamic range of  $10 \text{ fg mL}^{-1}$  to  $100 \text{ ng mL}^{-1}$  and ultra-low detection limit of  $2.3 \text{ fg mL}^{-1}$ . 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

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