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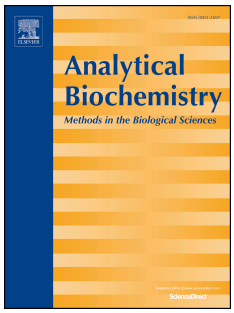

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PII: S0003-2697(18)30103-9

DOI: 10.1016/j.ab.2018.02.005

Reference: YABIO 12929

To appear in: *Analytical Biochemistry*

Received Date: 28 November 2017

Revised Date: 5 February 2018

Accepted Date: 7 February 2018

Please cite this article as: R. Aghajari, A. Azadbakht, Amplified detection of streptomycin using aptamer-conjugated palladium nanoparticles decorated on chitosan-carbon nanotube, *Analytical Biochemistry* (2018), doi: 10.1016/j.ab.2018.02.005.

Amplified detection of streptomycin using aptamer-conjugated palladium nanoparticles decorated on chitosan-carbon nanotube

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Abstract

A streptomycin-specific aptamer was used as a receptor molecule for ultrasensitive quantitation of streptomycin. The glassy carbon (GC) electrode was modified with palladium nanoparticles decorated on chitosan-carbon nanotube (PdNPs/CNT/Chi) and aminated aptamer against streptomycin. Modification of the sensing interface was characterized by scanning electron microscopy (SEM), energy-dispersive X-ray (EDS), wavelength-dispersive X-ray spectroscopy (WDX), cyclic voltammetry (CVs), and electrochemical impedance spectroscopy (EIS). The methodologies applied for designing the proposed biosensor are based on target-induced conformational changes of streptomycin-specific aptamer, leading to detectable signal change. Sensing experiments were performed in the streptomycin concentration range from 0.1 to 1500 nM in order to evaluate the sensor response as a function of streptomycin concentration. Based on the results, the charge transfer resistance (R_{ct}) values increased proportionally to enhanced streptomycin content. The limit of detection was found to be as low as 18 pM. The superior selectivity and affinity of aptamer/ PdNPs/CNT/Chi modified electrode for streptomycin recognition made it favorable for versatile applications such as streptomycin analysis in real samples.

Keywords: Aptasensor, Streptomycin, Palladium nanoparticles, Carbon nanotube.

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