

Author's Accepted Manuscript

A single step electrochemical integration of gold nanoparticles, cholesterol oxidase, cholesterol esterase and mediator with polypyrrole films for fabrication of free and total cholesterol nanobiosensors

Mohd Zulkhairi Abdul Rahim, Gwen Govender-Hondros, Samuel. B. Adeloju



PII: S0039-9140(18)30648-9
DOI: <https://doi.org/10.1016/j.talanta.2018.06.041>
Reference: TAL18783

To appear in: *Talanta*

Received date: 3 March 2018
Revised date: 10 June 2018
Accepted date: 11 June 2018

Cite this article as: Mohd Zulkhairi Abdul Rahim, Gwen Govender-Hondros and Samuel. B. Adeloju, A single step electrochemical integration of gold nanoparticles, cholesterol oxidase, cholesterol esterase and mediator with polypyrrole films for fabrication of free and total cholesterol nanobiosensors, *Talanta*, <https://doi.org/10.1016/j.talanta.2018.06.041>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

A single step electrochemical integration of gold nanoparticles, cholesterol oxidase, cholesterol esterase and mediator with polypyrrole films for fabrication of free and total cholesterol nanobiosensors

Mohd Zulkhairi Abdul Rahim^a, Gwen Govender-Hondros^b, Samuel. B. Adeloju^{c*}

^aSection of Technical Foundation, UniKL-MICET, Alor Gajah, Melaka, Malaysia

^bDepartment of Chemistry, UWS, Penrith, NSW 2747, Australia

^cSchool of Chemistry, Monash University, Clayton, Victoria 3800, Australia

Abstract

The development of free and total cholesterol nanobiosensors based on a single step electrochemical integration of gold nanoparticles (AuNPs), cholesterol oxidase (COx), cholesterol esterase (CE) and a mediator with polypyrrole (PPy) films is described. The incorporation of the various components in the PPy films was confirmed by chronopotentiometry, cyclic voltammetry (CV), scanning electron microscopy, energy dispersive X-ray analysis (SEM-EDX), and Fourier transformed infrared (FTIR) spectroscopy. The free cholesterol, PPy-NO₃⁻-Fe(CN)₆⁴⁻-AuNPs-COx, nanobiosensor achieved a minimum detectable concentration of 5 μM, a linear concentration range of 5-25 μM and a sensitivity of 1.6 μA cm⁻² μM⁻¹ in 0.05 M phosphate buffer (pH 7.00). For the total cholesterol, PPy-NO₃⁻-Fe(CN)₆⁴⁻-AuNPs-COx-CE, nanobiosensor which also involved the co-incorporation of cholesterol esterase (CE) with the other components, the achieved performances include a minimum detectable total cholesterol concentration of 25 μM, a broader linear concentration range of 25-170 μM and a lower sensitivity of 0.1 μA μM⁻¹ cm⁻². Owing to its high selectivity, the presence of common interferants did not affect the total cholesterol measurement with the PPy-NO₃⁻-

Download English Version:

<https://daneshyari.com/en/article/7675726>

Download Persian Version:

<https://daneshyari.com/article/7675726>

[Daneshyari.com](https://daneshyari.com)