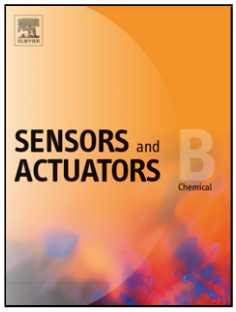

Title: Development of a microfluidic electrochemical biosensor: Prospect for point-of-care cholesterol monitoring

Authors: Gurpreet Kaur, Monika Tomar, Vinay Gupta

PII: S0925-4005(18)30160-6
DOI: https://doi.org/10.1016/j.snb.2018.01.144
Reference: SNB 23993

To appear in: *Sensors and Actuators B*

Received date: 21-10-2017
Revised date: 9-1-2018
Accepted date: 17-1-2018

Please cite this article as: Gurpreet Kaur, Monika Tomar, Vinay Gupta, Development of a microfluidic electrochemical biosensor: Prospect for point-of-care cholesterol monitoring, Sensors and Actuators B: Chemical https://doi.org/10.1016/j.snb.2018.01.144

Development of a microfluidic electrochemical biosensor: Prospect for point-of-care cholesterol monitoring

Gurpreet Kaur, [1] Monika Tomar, [2] and Vinay Gupta[1,a]
[1]*Department of Physics and Astrophysics, University of Delhi, Delhi-110007, India*

[2]*Physics Department, Miranda House, University of Delhi, Delhi-110007, India*

[a]*Corresponding author Email address:drguptavinay@gmail.com.*

Contact.: +91 9811563101

Highlights

- PDMS microchannels of dimensions 300 µm(w) x 40 µm(h) fabricated using SU8 lithography
- Integrated with biosensing chip having NiO thin film as working electrode
- Sensitive amperometric detection of cholesterol using cholesterol oxidase as bioreceptor

Abstract

Microfluidic devices offer a number of merits including reduced sample volume, fast turnaround time and highly sensitive real time measurements for lab-on-a-chip technology. Thus, we report the development of a microfluidic electrochemical biosensor for cholesterol monitoring. PDMS microchannels of dimensions 300 µm(w) x 40 µm(h) x 1 cm(l) have been fabricated using SU8 photolithography and replica molding technique. For the biosensing chip, platinum electrodes were fabricated by conventional photolithography process. The working electrode was modified by nickel oxide (NiO) thin film deposited using sputtering technique while bare platinum thin film served as the counter electrode. The microchannels were reversibly sealed with the chip by conformal contact. Cholesterol oxidase enzyme, immobilized over the NiO thin film, was employed as the specific bioreceptor for cholesterol. Highly sensitive detection of cholesterol in a wide range of concentration (0.12-10.23 mM) with a low detection limit of 0.10 mM was achieved using the fabricated microfluidic amperometric biosensor, thus demonstrating its ability for point-of-care diagnostics.

Keywords: Microfluidics; Nickel Oxide; Cholesterol; Biosensor