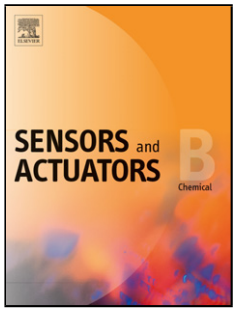

Title: Improved Glucose Label-Free Biosensor with Layer-by-Layer Architecture and Conducting Polymer poly(3,4-ethylenedioxythiophene)

Authors: Melinda David, Madalina M. Barsan, Christopher M.A. Brett, Monica Florescu

PII: S0925-4005(17)31815-4
DOI: http://dx.doi.org/10.1016/j.snb.2017.09.149
Reference: SNB 23240

To appear in: *Sensors and Actuators B*

Received date: 7-2-2017
Revised date: 30-8-2017
Accepted date: 21-9-2017

Please cite this article as: Melinda David, Madalina M.Barsan, Christopher M.A.Brett, Monica Florescu, Improved Glucose Label-Free Biosensor with Layer-by-Layer Architecture and Conducting Polymer poly(3,4-ethylenedioxythiophene), Sensors and Actuators B: Chemicalhttp://dx.doi.org/10.1016/j.snb.2017.09.149

Improved Glucose Label-Free Biosensor with Layer-by-Layer Architecture and Conducting Polymer poly(3,4-ethylenedioxythiophene)

Melinda David[1,2,] Madalina M. Barsan[1], ,Christopher M.A. Brett[1],
Monica Florescu[2]*
[1]Department of Chemistry, Faculty of Sciences and Technology, University of Coimbra, 3004-535 Coimbra, Portugal
[2]Faculty of Medicine, Transilvania University of Brasov, 500019 Brasov, Romania

* Corresponding author:
Tel: +4 0742 663420
E-mail: florescum@unitbv.ro
Colina Universitatii nr 1, Building C, room CI30,
500068 Brasov, Romania

Research Highlights:

- Layer-by-layer (LbL) self-assembled multilayers as a mild entrapment method for enzyme immobilization
- PEDOT conductive polymer considerably improves biosensor sensitivity
- Monitoring of LbL film growth by Surface Plasmon Resonance Spectroscopy
- Successfully use of the biosensor for glucose detection in grape wines

Abstract:
Layer-by-layer (LbL) self-assembly has been used for the development of a new glucose label-free biosensor. Glucose oxidase (GOx) was incorporated in a multilayer film on a gold electrode, previously modified with a film of the conducting polymer poly(3,4-ethylenedioxythiophene) (PEDOT), by electropolymerization, for better conductivity. Multilayer films, containing the enzyme and nitrogen doped graphene (NG) dispersed in the biocompatible positively-charged polymer chitosan {$chit^+$(NG+GOx)}, together with the negatively charged polymer poly(styrene sulfonate), PSS^-, were assembled. Cyclic voltammetry and electrochemical impedance spectroscopy were used for characterization of the biosensor architectures. The LbL film growth was monitored by Surface Plasmon Resonance Spectroscopy in order to evaluate the interactions involved in the biomolecule immobilization. Atomic force microscopy and scanning electron