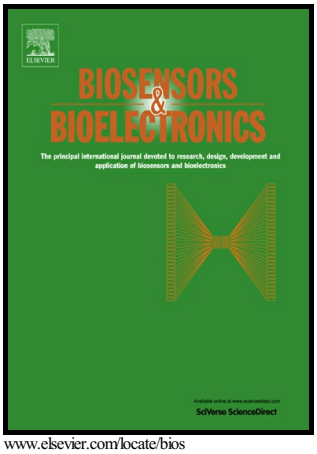

www.elsevier.com/locate/bios

Specific bioanalytical optical and photoelectrochemical assays for detection of methanol in alcoholic beverages

Javier Barroso, Beatriz Díez-Buitrago, Laura Saa, Marco Möller, Nerea Briz, Valeri Pavlov

PII: S0956-5663(17)30681-4
DOI: https://doi.org/10.1016/j.bios.2017.10.022
Reference: BIOS10047

To appear in: *Biosensors and Bioelectronic*

Received date: 4 August 2017
Revised date: 9 October 2017
Accepted date: 11 October 2017

Cite this article as: Javier Barroso, Beatriz Díez-Buitrago, Laura Saa, Marco Möller, Nerea Briz and Valeri Pavlov, Specific bioanalytical optical and photoelectrochemical assays for detection of methanol in alcoholic beverages, *Biosensors and Bioelectronic,* https://doi.org/10.1016/j.bios.2017.10.022

Specific bioanalytical optical and photoelectrochemical assays for detection of methanol in alcoholic beverages

Javier Barroso[a], Beatriz Díez-Buitrago[a,b], Laura Saa[a], Marco Möller[a], Nerea Briz[b,*]

Valeri Pavlov[a,*]

[a] Biosensing Laboratory. CIC biomaGUNE. Paseo Miramón 132, San Sebastián 20009, Spain

[b] Tecnalia, Paseo Mikeletegi, San Sebastián 20009, Spain

Email addresses: nerea.briz@tecnalia.com (N. Briz), vpavlov@cicbiomagune.es (V. Pavlov).

Abstract

Methanol is a poison which is frequently discovered in alcoholic beverages. Innovative methods to detect methanol in alcoholic beverages are being constantly developed. We report for the first time a new strategy for the detection of methanol using fluorescence spectroscopy and photoelectrochemical (PEC) analysis. The analytical system is based on the oxidation of cysteine (CSH) with hydrogen peroxide (H_2O_2) enzymatically generated by alcohol oxidase (AOx). H_2O_2 oxidizes capping agent CSH, modulating the growth of CSH-stabilized cadmium sulphide quantum dots (CdS QDs). Disposable screen-printed carbon electrodes (SPCEs) modified with a conductive osmium polymer (Os-PVP) complex were employed to quantify resulting CdS QDs. This polymer facilitates the "wiring" of *in situ* enzymatically generated CdS QDs, which photocatalyze oxidation of 1-thioglycerol (TG), generating photocurrent as the readout signal. Likewise, we proved that our systems did not suffer from interference by ethanol. The PEC assays showed better sensitivity than conventional methods, covering a wide range of potential applications for methanol quantification.

Keywords: Quantum dots, methanol, fluorescence, photoelectrochemistry, cysteine.