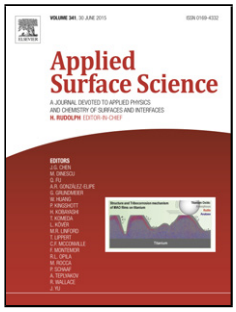

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PII: S0169-4332(16)32903-8
DOI: http://dx.doi.org/doi:10.1016/j.apsusc.2016.12.170
Reference: APSUSC 34717

To appear in: *APSUSC*

Received date: 15-10-2016
Revised date: 19-12-2016
Accepted date: 20-12-2016

Please cite this article as: Inês Marques, Gonçalo Magalhax303;es-Mota, Filipa Pires, Susana Sex301;rio, Paulo A.Ribeiro, Maria Raposo, Detection of traces of triclosan in water, Applied Surface Science http://dx.doi.org/10.1016/j.apsusc.2016.12.170

<AT>Detection of Traces of Triclosan in Water

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<ABS-Head><ABS-HEAD>Graphical abstract
<ABS-P>
<ABS-P><xps:span class="xps_Image">fx1</xps:span>

<ABS-HEAD>Highlights► - An array of sensor devices to detect triclosan was developed ► - That system allows to triclosan detection in aqueous solutions in the 10^{-12} M to 10^{-6} M concentrations. ► - PCA method discriminated the triclosan solutions and the methanol aqueous solutions used to triclosan solutions preparation.

<ABS-HEAD>Abstract

<ABS-P>Triclosan (TCS) is an antibacterial agent widely used in soaps, toothpastes and first-aid products, which presents several drawbacks related with its noxious effects on the biological systems. As this compound is stable and lipophilic, its consumption in large scale is a great deal of concern, particularly because it has been widely found in river water, lake water, sediments, fish and human milk. Therefore, it is urgent to produce an effective, economic, disposable sensor to detect TCS in complex matrixes. This work explores the electronic tongue sensor concept towards the detection of pico-molar concentrations of TCS in aqueous medium. For that an array of sensor devices consisting of bare interdigitaded electrodes (IEs) and covered with different layer-by-layer (LBL) films was developed being its response analyzed by impedance spectroscopy. The LbL films were prepared from poly(ethyleneimine) (PEI), graphene oxide (GO), chitosan (Chi), poly[1-[4-(3-carboxy-4-hydroxyphenylazo) benzene sulfonamido]-1,2-ethanediyl, sodium salt] (PAZO) and poly (allylamine hydrochloride) (PAH).
<ABS-P><ST>Results</ST> allowed to select an adequate sensor array to be used for TCS detection in aqueous solutions within the 10^{-12} M to 10^{-6} M concentrations range, either by using electrical resistance or electrical capacitance at fixed frequencies as key transducing variables. Principal Component Analysis (PCA) data treatment allowed the discrimination of triclosan solution and of methanol aqueous solutions used in TCS solutions preparation, suggesting that the methodology used in this work can be used to detect TCS in complex matrix solutions.
<KWD>Keywords: Triclosan; Layer-by-Layer; Impedance Spectroscopy; PCA; pico-molar concentration; Electronic Tongue.

<H1>1. Introduction

Given the relevance of water as natural resource, it is essential to continuously monitor and eliminate contaminants that affect its quality, safeguarding public health and welfare. Water treatment plants act in making drinking water proper for public consumption, but the detection methods are insufficient and ineffective with respect to some compounds, such as the so called Pharmaceutical and Personal Care Products (PPCPs) [1], whose consumption is taking place at a global scale, thus requiring special attention for their accumulation in the environment. These products have the ability to persist in the environment and in living beings with known harmful effects. One example of these products is the triclosan or 5-cloro-2-(2,4-diclorofenoxi)-fenol (TCS),