

9th World Congress on

BIOSENSORS AND BIOELECTRONICS

August 29-30, 2018 Tokyo, Japan

Synthesis of highly sensitive molecular imprinted sensor for selective determination of glycerol in wastewater samples

Nezha El Bari, Soukaina Motia, Youssra Aghoutane and Benachir Bouchikhi
Moulay Ismail University, Morocco

The determination of glycerol has been gaining importance during the last decades because, its use has been growing in several industries such as pharmaceutical, automotive, alimentary and textile among others. In this work, a Molecular Imprinted Polymer (MIP) approach was used to develop, for the first time, an electrochemical sensor to potentially determine glycerol in wastewater samples. The MIP based screen printed gold electrode (Au-SPE) was prepared by an electrochemical polymerization of Acrylamide/Bis-Acrylamide (AAM/NNMBA) in the presence of glycerol as a template. Gold nanoparticles (Au-NPs) were also added to the MIP solution due to their benefit of enhancing the number of accessible complementary cavities, the catalytic activity of the surface and the fast equilibration with the analyte. Cyclic Voltammetry (CV), Differential Pulse Voltammetry (DPV) and Electrochemical Impedance Spectroscopy (EIS) techniques were used to monitor the Au-SPE surface modifications. Negligible responses have been recorded during the Non-Imprinted Polymer (NIP) test. High selectivity towards glycerol was achieved when compared to glycerol monostearate as interference. Some important parameters influencing the MIP sensor performances such as extraction, incubation time and number of CV cycles have been studied and optimized. The sensor exhibits a linear behavior from 20 to 227.85 $\mu\text{g/mL}$ with the detection (LOD) and quantification limits (LOQ) of 9.53 and 31.8 $\mu\text{g/mL}$, respectively. It was successfully applied to determine glycerol in wastewater samples with an RSD less than 3.88%. The proposed method has proven to be cheap, robust, sensitive and selective providing a further perspective for environmental applications.

Biography

Nezha El Bari has obtained her PhD in Biology Applied to Nutrition and Biotechnology in 1989 from the Henri Poincaré University, France. She has joined the University of Moulay Ismail in 1990 and obtained a Doctor of Sciences in 1995. She is the Head of Biotechnology Agroalimentary Biomedical Analysis Group from 2005 to till date. Her current research combines biotechnology, sensing technology, especially biosensors, molecular imprinted polymers, electronics tongue and nose in food, biomedical and environmental monitoring. She has published around 60 papers in reputed journals.

n_elbari@hotmail.com

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