proceedings

MDPI

Proceedings

Nanocomposite-Based Electrochemical Platforms for Pharmaceutical and Environmental Applications †

Gheorghe Melinte [1,2], Andreea Cernat [1], Oana Hosu [1], Giovanna Marrazza [2], Cecilia Cristea [1]

[1] Department of Analytical Chemistry, Faculty of Pharmacy, "Iuliu Haţieganu" University of Medicine and Pharmacy, 4 Pasteur Street, 400349 Cluj-Napoca, Romania;

[2] Department of Chemistry "Ugo Schiff", University of Florence, Via della Lastruccia 3, 50019 Sesto Fiorentino (FI), Italy;

† Presented at the 1st International Electronic Conference on Biosensors, 2–17 November 2020; Available online: https://iecb2020.sciforum.net/.

Received: date; Accepted: date; Published: date

In the last decades, nanomaterials have been extensively used in biosensors design to enhance their electrochemical performance in terms of sensitivity, reproducibility and oftentimes selectivity. Polymers, nanoparticles, and carbon based-materials have attracted a lot of attention in this field. Three different electrochemical nano-platforms for pharmaceutical applications are described.

First, an electrochemical non-enzymatic sensor for glucose based on 3D copper nanostructures with Ni foams as promotor of the enhanced nanoporous morphology was developed. Detection of glucose was performed by means of chronoamperometry (0.55V) and the sensor was successfully tested in the presence of the designated target even in the presence of common interference agents found in biological samples.

A polycarboxipyrol based platform was developed by electrodiposing carboxylic pyrol (PyCOOH) at screen printed electrodes (SPCE) by means of CV from a mixture of PyCOOH/Polivinilpirolidone/LiClO4 solution in order to obtaind to obatin cone-like polycarboxipyrol shapes. The application of the platform was proven when a Folic acid oxidation peak (-0.55V) was triggered by Differential Pulse Voltammetry (DPV) from bulk solution and pharmaceutical tablets solution at the polymer-based electrode surface.

A hybrid composite material containing polyaniline (PANI) and bimetallic nanoparticles (Au-PtNPs) was synthesized at SPCE by means of electrochemical procedures as cyclic voltammetry (CV:-0.4-0.8V, 10 cycles, 50 mV/s from an aniline 2.5mM solution) and chronoamperometry (+0.2V for 130s from a HAuCl4/H2PtCl6 mixture solution). The sensor was succesfuly applied for arsenic detection.

Acknowledgments: This work was supported by grants of the Romanian National Authority for Scientific Research and Innovation, CCCDI-UEFISCDI, within PNCDI-III, ERANET-RUS-PLUS-PLASMON-ELECTROLIGHT/46/2018 and INTELMAT/39/2018 projects. Gheorghe Melinte thanks: UMF internal grant number 2462/37/17.01.2020.