Title of Presentation: Electrochemical detection of H_2O_2 by means of gold foam-based electrode.

Author's Full Name: Salvatore Antonio Orlando[1]

Co-authours: Bernardo Patella[1], Nadia Moukri[1], Michele Russo[2], Giuseppe Aiello[1], Rosalinda Inguanta[1]

Affiliation: [1]Dipartimento di Ingnegneria, Università di Palermo, Italy; [2]Dipietro Group srl, Italy;

Category of Presentation: (Oral/Poster/Video presentation): Poster

Abstract: (300-350 words)

In this work, a low-cost electrochemical sensor was developed for the detection of hydrogen peroxide. Hydrogen peroxide is the most used biomarker in monitoring oxidative stress due to its stability and ability to diffuse across the cell membrane. Oxidative stress occurs when the concentration of reactive oxygen species (ROS) in biological fluids increases with respect to the physiological concentration; this condition is a risk factor for many diseases. Among ROS, hydrogen peroxide is the more stable and thus it can be used as a biomarker. Since oxidative stress is not associated with specific symptoms, it is important to monitor the concentration of hydrogen peroxide to prevent the onset of serious diseases or to slow down their progression. In this field, research aims to develop electrochemical sensors for hydrogen peroxide quantification as an alternative to time-consuming and expensive traditional techniques.
The proposed sensor was obtained using the common substrate of the printed circuit board (PCB) fabrication. A design consisting of three electrodes of copper was optimized to obtain a complete cell. The working electrode was modified by electrodeposition to obtain a gold foam. Before gold foam deposition, the copper surface was covered with a thin planar film of gold using sputtering. The foam was electrodeposited by potenziostatic deposition at - 2 V using a water solution containing gold precursor and sulfuric acid. The detection of hydrogen peroxide was carried out with a conventional three-electrode system using a homemade cell obtained by 3D printing. Electrochemical tests were carried out in phosphate buffer as blank and by chronoamperometry at – 0.1 V. To build the calibration line, different concentrations of hydrogen peroxide, ranging from 25 to 1000 μM, were tested. The obtained results showed that the current density was proportional to the concentration of hydrogen peroxide, so the sensor can quantify this analyte. Further study will be addressed to characterize the device in terms of selectivity, stability and reproducibility.

Biography:

Salvatore Antonio Orlando is graduated in chemistry in the University of Palermo, Italy. Currently he is a PhD student in the Department of Engineering, University of Palermo, Italy.

Presenting Authors Details:

Full Name: Salvatore Antonio Orlando

Email id: salvatoreantonio.orlando01@unipa.it

Phone Number: 3890434722