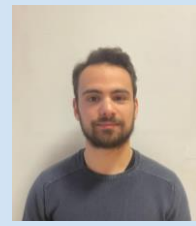
# Development of an electrochemical sensor for oxidative stress monitoring



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**Electrochemical sensors**

## Concept

Nowadays there is a growing interest in the development of innovative approaches to quantify a specific biomarker in biological fluids to monitor inflammatory diseases such as asthma or chronic obstructive pulmonary disease (COPD). Quantification of specific biomarkers could be useful for preventive diagnosis. Biomarkers for oxidative stress are reactive oxygen species (ROS) such as superoxide ion, hydroxyl radical and hydrogen peroxide. The latter is the only one that can cross the cell membrane so it can be detected outside the cell. ROS quantification requires laboratories, highly skilled personnel, high costs and long-time analysis. Therefore, it is necessary to identify novel, cheaper, faster and easy-to-use methods. Electrochemical sensors are a promising alternative in terms of detection time, accuracy, and cost. Hence, the research project aims to develop an electrochemical sensor

## Scientific approach

An electrochemical sensor is a device in which a specific analyte is detected by its reaction on the working electrode surface. This generates a measurable electrical signal given by a transducer. Home-made screen-printed electrodes (SPE), shown in Figure I, will be used. The electrodes are in copper and can be modified by different methods and with different materials to achieve specific goals and applications. The use of nanomaterials, such as nanofoam (Figure II) or nanoparticles with high surface area, will be exploited. Such materials are promising for the development of high-performance sensors.

## Research objectives

The research project aims to develop electrochemical sensors for the detection of biomarkers of inflammatory diseases such as asthma and COPD. To fabricate the electrode, different nanostructured shapes (nanofoam and nanoparticles) and materials (such as gold, graphene) will be used to obtain the electrochemical sensor. This study will lead to the fabrication of a cheap and fast device that could improve the life quality of patient.

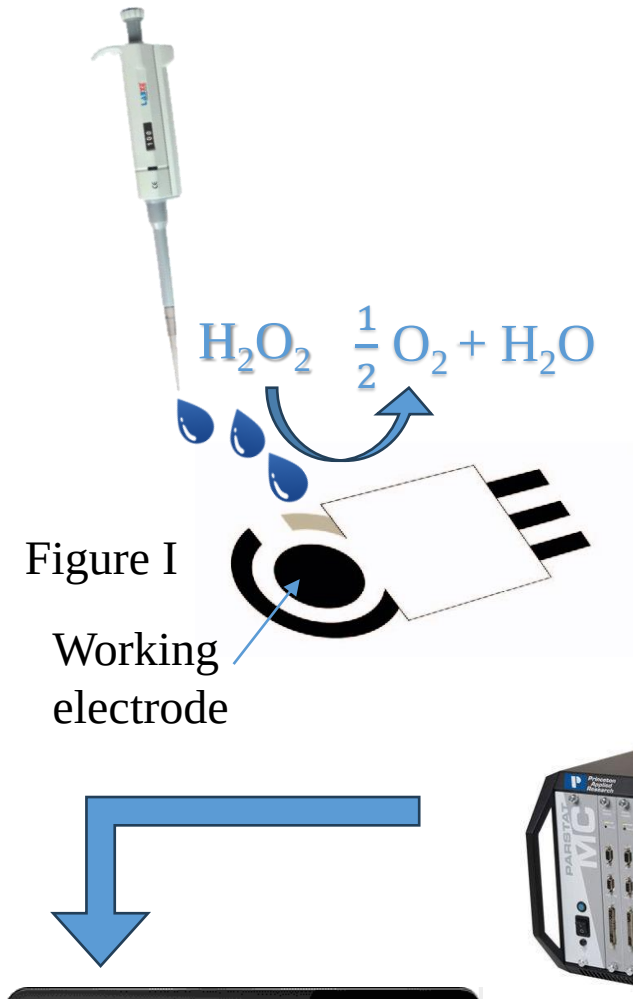
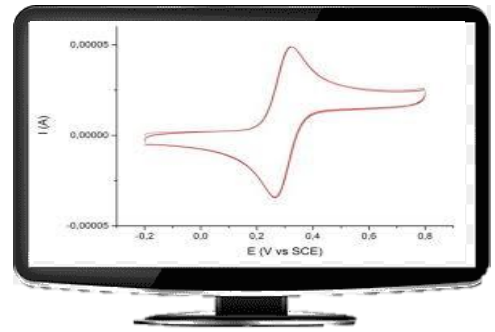
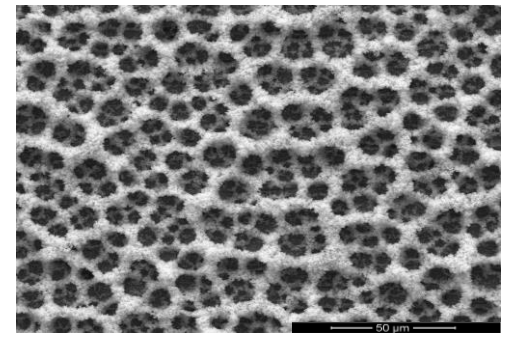



Figure I

Potentiostat



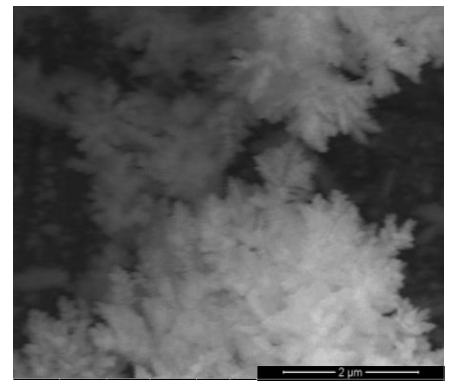


Figure II

SEM images of nanostructurated electrodes