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Microfabricated of polypyrrole biosensors based on immobilization of tyrosinase for phenolic compounds detection in strawberry

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Abstract – The basic conceptual design of a biosensor involves a biological receptor coupled to an electronic transducer in such a way that the transducer converts biochemical activity at one end into an electrical activity at the other. The aim of this work is to fabricate amperometric sensors for detection phenolic compounds in strawberry juices and the results shows the current-time curves obtained at different volumes of a commercial strawberry juice, wich notes an increase in current up to around 500 µL in Figure 1b.

In recent years, there has been a growing interest in the development of microfabricated electrochemical biosensors since they become very important analytical tools for no-site analysis of soils, waters, health care and products, clinical and self-diagnosis of diseases, and foodsso[1,2].

The aim of this study is to fabricate amperometric sensors aiming at the improvement of the electron transfer process between enzyme and electrode for detection of phenolic compounds in strawberry juices. The biosensors were prepared by electrosynthesis of overoxidized polypyrrole (PPY) on an electrode surface followed by immobilization of polyphenol oxidase (PPO) obtained from crude avocado (*Persea Americana*). The enzyme immobilization was carried out by physical adsorption.

Figure 1a displays a variation proportional to the volume of the analyte, wich is attributed to the enzymatic oxidation. Figure 1b shows the current-time curves obtained at different volumes of a commercial strawberry juice, wich notes an increase in current density up to around 500 µL. In regions where the amperometric response tends to be constant, occurs the saturation of the enzyme by the substrate controlled by the amount of enzyme immobilized on the electrode surface. Therefore a good performance of the biosensor for strawberry real samples can be observed.

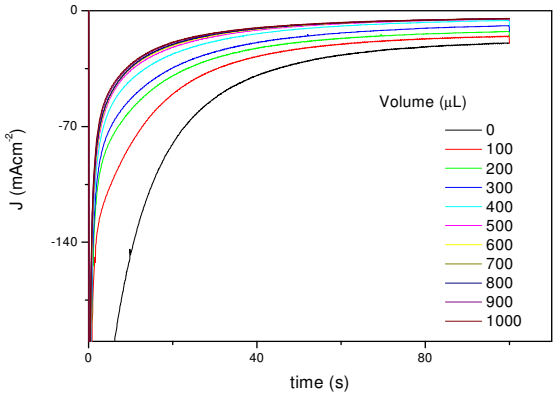

Figure 1a: Chronoamperogram the film in differents volume of strawberry juice

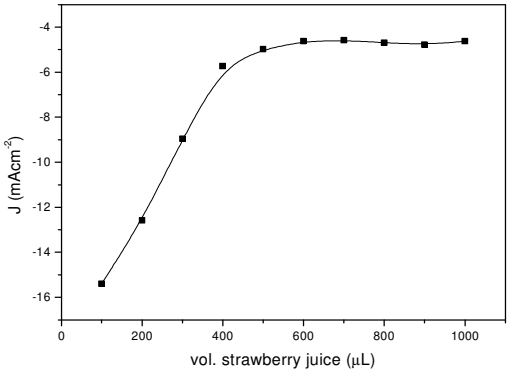

Figure 1b: Amperometric biosensor response at 0,3V *vs* SCE depending on the volume of the strawberry juice at 0,1 mol.L^{-1}, pH=7 and $NaClO_4$ phosphate buffer.

[1] B.D. Malhotra and A. Chaubey, Sensors and Actuators B, 91 (2003).
[2] Arslam, et.al., Biological Macromolecules, 35 (2005).