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*Abstract*

# Fundamental Analytical Parameters of a Glucose Biosensor Based on $TiO_2$ Nanotube Arrays and Chitosan as Immobilization Matrix †

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Numerous analytical techniques are used for glucose determination, such as spectrophotometry, amperometry, HPLC, polarimetry and capillary electrophoresis. However, only electrochemical biosensors based on the use of glucose oxidase (GOx) have been able to combine the analytical power of electrochemical techniques with the specificity of biological recognition processes. Commonly, this combination of biological components with electrodes is used to produce low-cost, easy-to-use and compact devices for glucose quantification. Since the development of the first glucose biosensor, great efforts have been made in order to improve the response performances of these enzyme electrodes.

In the present work, we present the fundamental analytical parameters of an amperometric glucose biosensor based on GOx immobilization using a polymeric hydrogel (Chitosan) onto highly ordered titanium dioxide nanotube arrays ($TiO_2$NTAs). The biosensor optimal working potential was evaluated and then fixed at −0.4 V. After that, the fundamental analytical parameters of the biosensor (linear range, limit of detection, sensitivity) were determined, as well as its storage stability. This biosensor showed a linear range from 0.3 mM to 1.5 mM, low limit of detection (0.07 mM) and high sensitivity (5.46 $mA \cdot mM^{-1}$). Furthermore, its lifetime was evaluated. After 30 days, the biosensor retained 85% of its initial current response.