GOLD NANOPARTICLES - STRUCTURED ELECTROCHEMICAL BIOSENSORS FOR APPLICATIONS IN THE FOOD INDUSTRY

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The use of nanomaterials for the construction of biosensing devices is nowadays one of the most exciting features of modern bioanalytical chemistry. The extremely promising prospects of these devices accrue from the unique properties of the nanomaterials. In particular, the ability of gold nanoparticles to provide a stable surface for immobilization of biomolecules retaining their biological activity is a major advantage for the preparation of biosensors [1]. Moreover, gold nanoparticles permit direct electron transfer between redox proteins and bulk electrode materials, which allows electrochemical sensing to be performed with no need for electron transfer mediators. Besides this, gold nanoparticles have shown to constitute useful interfaces for electrocatalysis of redox processes of molecules involved in biochemical reactions with analytical significance.
On the other hand, biosensor technologies provide powerful analytical tools with numerous applications in agricultural and food chemistry. The more remarkable characteristics of biosensing devices which convert them in unique attractive options to compete with other technologies in the agricultural and food market are: high selectivity, high sensitivity, short time of analysis, ability to be included in integrated systems, automation easiness, capability of response in real time, versatility allowing the design of "à la carte" devices and low cost [2].

In this communication, several examples of electrochemical biosensors based on the use of gold nanoparticles-structured electrodes designed for specific applications in the agricultural and food industry will be reviewed. Both enzymatic sensors for the determination of analytes such as hypoxanthine or inuline [3, 4], and immunosensors for the quantification of progesterone in milk [5, 6] will be presented. Finally, the potentialities of hybrid gold nanoparticles/carbon nanotubes materials for the development of electrochemical biosensors will be also outlined [7].

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