METAL OXIDE NANOPARTICLES FOR POTENTIAL APPLICATION IN CHOLESTEROL DETECTION

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Abstract

Cardiovascular diseases are one of the leading causes of death worldwide. It has been demonstrated that the probability of suffering one of these illness is linked to high blood cholesterol levels. Therefore, the fast detection of this lipid would improve the clinical diagnosis of these diseases.

A system obtained on a glass graphite electrode with metal oxide nanoparticle, cholesterol oxidase and Nafion®, as a potential biosensor for the rapid detection of cholesterol, it was developing on this work. The nanoparticles were synthesized by chemical precipitation. SEM shows nanoflowers structures with cavities as possible adsorption sites, presenting the characteristic vibration band metal-oxide in the infrared spectrum, also an absorption band at 371 nm in the UV-Vis spectrum, characteristic of these materials. The X-ray diffractogram of the powder is characteristic of a crystalline material.

The modifications on the electrode were followed by SEM, showing the change in its surface after every step and corroborating the importance of adding Nafion® in the dispersion of the nanoparticles on the glass graphite electrode surface. Also, the cholesterol presence on the surface was confirmed using SEM-EDX, by the difference in the total carbon content.

The modified electrode responded linearly to successive additions of cholesterol, showing a sensitivity of 100 $\mu A \mu M^{-1} cm^{-1}$. The system obtained detects cholesterol up to a concentration of 150 μM, showing a potential as a biosensor for this biomolecule.