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EFFECT OF NANOTUBULAR MORPHOLOGY AND SILVER DOPING ON THE CHARGE TRANSFER RESISTANCE OF A TiO2 NANOTUBE NANOSENSOR APPLIED IN ASCORBIC ACID DETECTION

Titanium oxide (TiO2) is a highly relevant multifunctional material due to its catalytic and semiconducting properties, low toxicity, and excellent chemical and mechanical stability. In a tubular nanostructured form, TiO_2 plays an important role in the development of nanosensors. This morphology is crucial for the sensitivity of detection, increasing the surface area, which has an effect on the charge transfer resistance (Rct). Another strategy to optimize charge transport in TiO_2 is to reduce electron-hole recombination by doping1. This study investigates the effect of nanotubular morphology and silver (Ag) doping on the charge transfer resistance of a TiO_2 nanotube nanosensor (TiO_2NTs) designed to detect ascorbic acid. The fabrication of TiO2NTs electrodes involved a simultaneous synthesis and doping process, whereby a titanium (Ti) foil was subjected to electrochemical anodization, followed by heat treatment. Morphological, compositional and elemental distribution characterizations were performed by scanning electron microscopy (SEM) and energy dispersive X-ray spectroscopy (EDS). The electrochemical properties were evaluated by electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV). The results demonstrated the formation of a highly ordered matrix of TiO2NTs, with the presence of Ag distributed uniformly. The EIS results were approximated to an equivalent circuit [Rs(RiCPEi(RctCPEdl(Wpb)))], resulting in Rct values of 909, 890, and 500 Ω for the Ti, TiO2NTs/Ti and Ag-TiO2NTs/Ti electrodes, respectively. In the voltammograms, a null response to ascorbic acid was observed in Ti electrode. In contrast, the TiO2NTs/Ti and Ag-TiO2NTs/Ti electrodes registered an oxidation peak, which was of higher intensity in the Ag-TiO2NTs/Ti electrode, this was attributed to higher sensitivity. Both tubular morphology and Ag doping have a favorable effect on sensitivity enhancement in TiO2 nanosensors

Keywords

TiO2-NTs impedance, Ag-doped TiO2, Electrosensing, ascorbic acid nanosensor, quality control

Reference

[1] S, Sharma, S.K. Ganeshan, S. Kundu and N. Chappanda. Effect of doping on TiO2 nanotubes based electrochemical sensors: Glucose sensing as a case study. IEEE Transactions on nanotechnology. 20 (2021) . Doi:10.1109/TNANO.2021.3060786

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