PÔSTER - 2) INTELLIGENT MATERIALS AND DEVICES FOR HEALTH, SECURITY, ENVIRONMENT AND AGRICULTURE APPLICATIONS

SPECTROSCOPIC AND ELECTROCHEMICAL CHARACTERIZATION OF A NANOCOMPOSITE BASED ON GOLD NANOPARTICLES AND GRAPHENE QUANTUM DOTS.

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Nanoparticles of noble metals, such as gold (AuNPs), have electrical, optical and catalytic properties, being used in the modification of electrodes, due to their morphology, structure and shape, contributing to the improvement of the

electrical conductivity of the surface [1]. On the other hand, graphene Quantum Dots (GQDs) allow it to be modified and combined with other molecules to enhanced electrocatalytic attributed to their large surface-to-volume and their several molecule recognition sites. [2-3]. The combination of both nanomaterials has great advantages related to their properties and stability. In this regard, the objective of this work is to explore these nanomaterials to synthetize a nanocomposite electrocatalytic active formed by the stabilization with a silsesquioxane inorganic-organic polymer (SSQ), to be used to modify electrodes and evaluate their electrochemical responses. The synthesis of AuNPs was carried out using HAuCl4 and SSQ. The SSQ-AuNPs/GQD nanocomposite was prepared with GQD in a specific ratio. The characterization of the nanocomposite carried out by UV-Vis showed the bands relating to the Surface Plasmon Resonance and the disappearance of the HAuCl4 transition bands. The characteristic bands of SSQ and GQD are also observed. The Zeta Potential of the AuNPs precursor materials showed a positive surface charge due to the presence of SSQ and a large hydrodynamic diameter. In the nanocomposite, the surface charge is reduced. The electrochemical response of glassy carbon electrodes (GCE) modified by SSQ-AuNPs/GQD was also verified using Cyclic Voltammetry (CV) and Electrochemical Impedance Spectroscopy (EIS) techniques. In CV measurement, an increase in ipa and ipc values was observed, compared to the electrode GCE. A significant reduction in the Rct value was also observed after modifying the GCE/SSQ-AuNPs/GQD electrode. To analyze the relevance of GQD in the synthesis of the nanocomposite, a comparison was carried out replacing GQD by others carbonaceous materials. It was observed that the nanocomposite with GQD presented high ipa and ipc values, and a low Rct value, in relation to the others tested. An increase of the 74% on the electroactive area of the GCE/SSQ-AuNPs/GQD was also verified in comparison with GCE electrode. Regarding the heterogeneous electron transfer constant, a decrease of 38% for the GCE electrode was obtained in relation to GCE/SSQ-AuNPs/GQD electrode, indicating that the nanocomposite facilitates the transfer of electrons. electrons on the electrode surface.

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Palavras-chave: nanoparticles; graphene quantum dots; nanocomposite; silsesquioxane polymers.