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WELCOME

The aim of the conference is to overview and share information about the latest achievements in bioceramic nanotechnologies with the scientific community. Over the duration of the conference, scientists from the fields of chemistry, physics, technology, medicine and implantology will be able to acquaint themselves with synthesis methods, unique properties, and applications of bioceramic nanomaterials.

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A Poly(1,10-Phenanthroline-5,6-Dione), Poly(Pyrrole-2- Carboxylic Acid), Gold Nanoparticles and Glucose Oxidase Nanobiocomposite Based Graphite Electrode as a Potential Anode for Biofuel Cell Powered by Glucose

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ABSTRACT

Fuel cells (FC) have been in development for over 50 years and are still of great interest because has a potential application as alternative energy sources and as self-powered electrochemical biosensors whose main advantage is the use of simplified two electrode system, while external power source is not required for the operation. It is expected that in the future they will be used as implanted biosensors to measure various substances that cause heart disease or cancer, as well as blood glucose [1,2]. For this, they should be small and light, operate at body temperature, pH and salt concentration, and must be able to generate sufficient amount of energy. The use of gold nanoparticles (AuNP) allows for improving the efficiency of electron transfer, stability and sensitivity of biosensors. Conjugated polymers has good biocompatibility and may also improve electron transfer and provide stable matrix for enzyme immobilization. The goal of this work was to design an anode for FC powered by glucose with improved characteristics by exploiting unique properties of these nanomaterials. In order to accomplish this, 1,10-phenanthroline-5,6-dione (PD) was absorbed on the surface of the graphite rod (GR) and GR was immersed into electrochemical cell filled with buffer solution containing pyrrole-2-carboxylic acid (PCA) and colloidal AuNP (Fig. 1). Polymerization of PD and PCA was performed by cyclic voltammetry. AuND were encapsulated in a poly(pyrrole-2-carboxylic acid) (PPCA) layer during the polymerization. Finally, glucose oxidase (GOx) was covalently linked with the carboxyl groups of the PPCA layer. Immobilized GOx acted as a catalyst oxidizing glucose by molecular oxygen and converting chemical energy of this chemical reaction into a potentiometric signal.

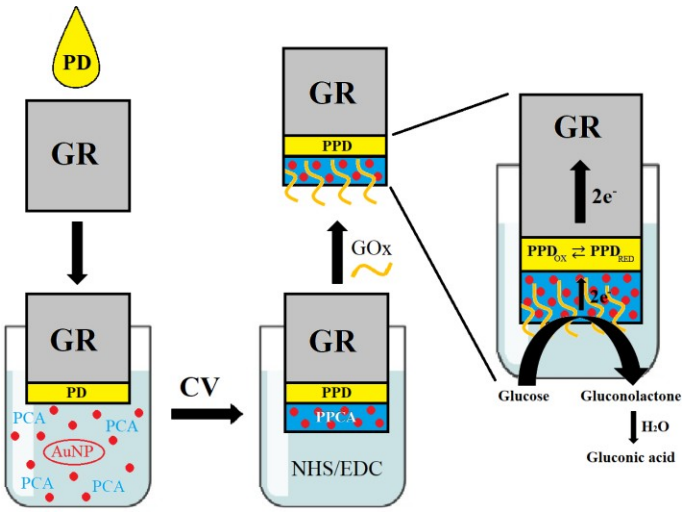

Fig. 1 Scheme of GE/PPD/(AuNP)PPCA-GOx electrode preparation and operation

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