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Cholesterol Oxidase Immobilization on Carbon Nanofiber Electrode

IRG-IV
Carbon Based-Sensors and Bio-Sensors
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Cardiovascular diseases, caused by high level in cholesterol, are increasing day by day and cardiac arrest is the major cause of death. Cholesterol and its fatty acid esters are one of the main constituents of mammalian cell membranes. The development of a biosensor that integrates cholesterol oxidase for the detection of cholesterol is important as a diagnosis tool. We propose to use a method previously reported by the Nanotechnology group at NASA-Ames Research Center for the fabrication carbon nanofiber (CNF) electrodes. This will involve a direct growth of CNFs on a metallic surface. This approach not only improves the electrical contact between the active sensing material (CNFs) and the conducting substrate, but also ensures that the sensor is free of impurities. The advantage of this technique is that the tips of the nanofibers are exposed to the analytes and the CNFs are vertically aligned for the attachment of cholesterol oxidase. The CNFs serve as the immobilizer and the mediator, at the same time. To achieve this, the enzymes will be attached to the tips of the CNFs using 1-ethyl-3-(3-dimethylaminopropyl)carbodiimide(EDC) and N-hydroxy-sulfo-succinimide (sulfo-NHS) by forming amide linkage between their amine residues and the carboxylic acid groups on the CNFs tips.

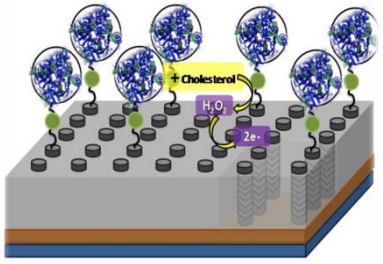

Fig. 1: Scheme for the protein immobilization and cholesterol detection on the electrode

Poster Presentations

ACS Senior Technical Meeting, Mayaguez Puerto Rico,2010

Graduate Student Research Program Symposium Poster Presentation, 2010