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Use of Blood Glucose Biosensors throughout the World for Diabetic Patients

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Description

The biosensors are based on the electrons movement, i.e. electronic current determination as a reaction of enzyme-catalyzed redox reaction. Generally a normal contact voltage passes through the electrodes to analyze. In the enzymatic reaction which produces the substrate or product can transfer the electrons with the surface of electrodes to be reduced. As a result an alternate current flow can be measured. The substrate concentration is directly proportional to the magnitude of the current. The reduction of oxygen is acquired through the oxygen electrodes and it is a simple way to from an amperometric biosensor.

Blood Glucose Biosensors

The blood glucose biosensors are used widely throughout the world for diabetic patients. It has single use disposable electrodes with glucose oxide and derivatives of a mediator (Ferrocence) and the shape of the blood glucose biosensor looks like a watch pen. With the help of hydrophilic mesh electrodes are converted. The blood glucose biosensor is a good example of amperometric biosensor. Swelling of the film and enzymatic reaction are followed by an electrochemical reaction. In these sensor films the active components are immobilized in a matrix consisting of various polymers and other additives. The example is the determination of glucose by glucose. The above description is about the first generation of amperometric biosensor and it has a direct transfer of electrons which are released from the electrodes are having some difficulties. The second generation amperometric biosensors are developed in a mediator takes the electrons and transfer to the electrodes.

The biosensor is used to detect the analyte so the biosensor is an analytical device and it gathers the biological components with a physicochemical detector. The sensing biological elements are biometric components interact with the recognize and analyze the study and the components like tissue, microorganisms, antibodies, nucleic acids and etc. The sensitive elements of biological can also generate by the biological engineering. The detector elements transform the signals from the interface of analyte with the biochemical elements into other signals like transducer and it can be measured more easily and qualified. The biosensor devices are associated with the electronics and the signal processors and they are generally responsible for the display of the results and they are user-friendly. The biosensor research has a significant role in the development of modern electronics.

The oxidative current can be directly related to the ascorbic acid concentration. The sensor for amperometric detection of L-ascorbic acid could be operated at pH 5.0 (0.05 M phosphate buffer) and exhibited excellent reproducibility and stability. The concentration of MnO2 in the screen-printed electrode has a significant influence on the voltammetric signal. Presumably more MnO2 at the electrode surface reduces the amount of conductive areas (carbon particles). The sensor response showed that it is sensitive to L-ascorbic acid.

In the food industry, optics coated with antibodies is commonly used to detect pathogens and food toxins. Commonly, the light system in these biosensors is fluorescence, since this type of optical measurement can greatly amplify the signal. The sensitive biological element, e.g. tissue, microorganisms, organelles, cell receptors, enzymes, antibodies, nucleic acids, etc., is a biologically derived material or biomimetic component that interacts, binds, or recognizes with the analyte under study. The biologically sensitive elements can also be created by biological engineering. A biosensor typically consists of a bio-recognition site, biotransducer component, and electronic system which include a signal amplifier, processor, and display. Transducers and electronics can be combined, e.g., in CMOS-based microsensor systems.

For each working electrode we prepared different mixture of component. In experiment of amperometric detection of L-ascorbic acid we used modified carbon ink (5%). It was prepared by thoroughly mixing 4.75 g carbon ink (UK) with 0.25 g manganese dioxide (Merck). The MnO2 modified carbon ink was sonicated for 20 min and used immediately for electrode fabrication. The working electrodes were screen printed on inert laser preetched ceramic supports (Coors Ceramic GmBh, Chattanooga, TN, USA). The preparation consisted of applying thick layers (0.05 mm) of the ink onto the substrates through an etched stencil with the aid of a screen printing device (SP-200, MPM, Franklin, Ma, USA). The resulting plates were dried at 60°C for 1h. In experiment for amperometric detection of H2O2 we prepared biosensor based on the incorporation of glucose-oxidase as biocomponent and MnO2 as a mediator for carbon paste electrode. In experiment of amperometric detection of catechol from beer, the working electrode is prepared by mixing paraffin oil, carbon and bananas as a modifier.

Use of Biomolecules from Organisms

The recognition component, often called a bioreceptor, uses biomolecules from organisms or receptors modeled after biological systems to interact with the analyte of interest. This interaction is measured by the biotransducer which outputs a measurable signal proportional to the presence of the target analyte in the sample. The general aim of the design of a biosensor is to enable quick, convenient testing at the point of concern or care where the sample was procured. However, students tend to develop their understanding of science concepts in accordance with formal teaching as well as their everyday experience. Therefore, students could have conceptions that do not agree with scientific laws and theories, and teaching itself can be one cause for them. They can be caused by teachers who use inadequate instructional methods, by some representations of particulate nature of matter in existing textbooks.

Also, teachers without sound scientific background can introduce misconceptions to their students. Ausubel (1961) states that students' cognitive structure of knowledge impacts on interpretation of new knowledge. When students are exposed to new information, the misconceptions that are already incorporated in their cognitive of the structure affect the integration of new knowledge. This causes weak or wrong understanding of new concepts. One of the teaching strategies that showed good results in teaching science is conclusion based on own experiment.