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Editorial

Impetus in Fabrication of Biosensors

Editorial

A biosensor is an element employed for the detection of an analyte by combining a biological component with a physico-chemical detector component. Biological component can be microorganisms, cell receptors, enzymes, antibodies, nucleic acids. The detector works in a physico-chemical way like electrochemical, optical, piezoelectrical, electrochemical or thermal that transforms the signal resulting from the interaction of the analyte with the biological element into another signal that can be easily measured and quantified.

The aim of a biosensor is to produce digital electronic signals, which are proportional to a concentration of analytes. Different types of transducers have been used in the development of biosensors. Enzyme electrodes are employed for the detection of analyte as it has several advantages like simple, speedy results and performing analysis without pre-treatment of sample. Nanoparticles are the smallest dimension structures that can be used for efficient transport of electrons and are thus critical to the function and their high surface-to-volume ratio and tunable electron transport properties make them suitable for biosensing applications. Extensive research efforts have been focussed in the earlier period of the development of biomolecule–nanoparticle hybrid assemblies and their application to construct biosensors. Metal oxide nanoparticles such as cerium oxide (CeO_2), zinc oxide (ZnO), tin oxide (SnO_2), titanium oxide (TiO_2) and zirconium oxide (ZrO_2) have recently been used for fabrication of enzyme-based biosensors. Metal oxides nanoparticles have exceptional ability to promote faster electron transfer kinetics between electrode and the active site of desired enzyme. Amperometric sensors monitor currents generated, when electrons are exchanged either directly or indirectly between a biological system and an electrode. Nanoparticles modified electrodes have received extensive attention owing to their advantages such as high sensitivity, selectivity and stability over a wide range of solution composition, less prone to surface fouling and low over potential at which the electron transfer process occurs, compared with inert substrate electrodes. Enzymatic electrochemical biosensors based on disposable transducers, have become very attractive for environmental, clinical, and food analysis over the past 20 years 45. The current tendency is to develop miniaturized systems with known characteristics such as versatility, relatively low cost of electrochemical instrumentation, high sensitivity and selectivity that enable determination in situ. Nanotechnology has recently become one of the most exciting forefront fields in biosensors fabrication.

Conducting polymers have become the materials of choice for recent technological advances in biosensor and have been extensively reviewed by various researchers. The choice of polymer depends on its biocompatibility, better interaction of analytes that can produce significant amplified signal, shield electrodes from interfering material and have capacity for electropolymerisation on any surface of electrode.

Recently, special attention has been devoted to the nanoparticles as novel supports to immobilize and modify biomolecules. Thermal stability, irradiation resistance, electrochemical activity, high electron communication features and flexibility to form different nanostructures are the advantages that expedite their potential wide applications in biosensors.

The impetus for sensor technology came from health care area, where it is now generally recognized that measurements of blood gases, ions and metabolites are often essential and allow a better estimation of the metabolic state of a patient. In less severe patient handling, more successful treatment can be achieved by obtaining instant analysis In practice, these assays are performed by analytical laboratories, where discrete samples are analyzed, frequently using the more traditional analytical techniques.

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