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Editorial

Electrochemical biosensors for the detection of disease causing pathogens

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According to the International Union of Pure and Applied Chemistry (IUPAC) a biosensor is defined as "a self-contained integrated device that is capable of providing specific quantitative or semi-quantitative analytical information using a biological recognition element which is in direct spatial contact with a transduction element". A typical biosensor construct has three main features: i) Recognition element or a bioreceptor (enzyme, antibody, DNA, etc.), ii) Signal transducing structure (electrical, optical, mass or thermal), and iii) An amplification/signal processing element. Initially detected analytes were basic chemical compounds like glucose, urea, subsequently macromolecules like proteins, whole cells, viruses, bacteria and other pathogens. Recently, electrochemical biosensor techniques are also proved that a powerful tool for the measurement in pathogens detection by providing practical advantages, such as operation simplicity, low cost of fabrication and suitability for real-time monitoring, in addition with fast response, more sensitive and selective detection and determination. Combination of suitable immobilization methods with effective transducer gives rise to an efficient biosensor. Currently, it is possible to follow antigen-antibody interactions, detect tumour markers, DNA materials, *etc.* A wide range of biomarkers (enzymes, peptides, DNA, microorganisms, etc.) recognize various target analytes, starting from basic metabolism changes to serious infections caused by pathogens. Recent advancements in biosensors due to nanomaterials, current trends of electrochemical biosensors are also illustrated in the form of their applications in diversified fields, such as pharmaceutical, clinical, agriculture, food industry, metabolic engineering, defence, marine, and environmental sciences *etc.* These advances are especially exciting in the context of biosensing, where the demands are for low concentration detection, high sensitivity and selectivity.

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Integrated approaches provided a better perspective for developing specific and sensitive biosensors with high regenerative potentials. It is quite important to integrate multifaceted approaches to design biosensors that have the potential for diverse usage. Besides, 52 years of evolution in the area of biosensors, somehow, research in electrochemical biosensors is not translated to the commercialization in the market. Amongst all kinds of biosensors, electrochemical biosensors are known to be superior to many tedious, expensive and complicated techniques. Further, miniaturization, simplification and portability have made them user-friendly and available for large audience of non-specialists and patients.

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