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Guest Editor's Introduction

Editorial for “Biosensor Technologies”

The formal definition of biosensor by the International Union of Pure and Applied Chemistry (IUPAC) is a “device that uses specific biochemical reactions mediated by isolated enzymes, immunosystems, tissues, organelles or whole cells to detect chemical compounds usually by electrical, thermal or optical signals” [1]. As defined by IUPAC, biosensors are based on a two-component system: the biological element (ligand) that interacts with a target, and a signal conversion (transducer) component. While the “traditional” modes of biosensing “electrical, thermal or optical signals” are used today, biosensing is a fast-moving field and this publication describes several of the many new types of biosensors. All biosensors utilize biological components (ligands) for binding and the most commonly used ligands are antibodies, however in recent years other ligands including aptamers (protein-binding nucleic acids) and peptides are being developed.

One of the initial references to the concept of a biosensor from the early 1960's is from Dr. Leland C Clark [2] describing an “enzyme electrode” for glucose measurement with the enzyme Glucose Oxidase (GOD). This clinical application is important in the diagnosis and treatment of diabetes patients and even today glucose monitoring is the most common application for biosensors. However, in the intervening decades numerous applications for biosensors were developed.

In general there are two groups of biosensors based on their detection mode; direct recognition sensors, in which the biological interaction of the target-ligand is directly measured by the trans-

ducer and indirect detection sensors which rely on secondary elements that are often catalytic elements such as enzymes for measurements. In each group of biosensors, there are several modes of detection including optical, electrochemical and mechanical.

This special issue of “Methods” describes some of the recent biosensing technologies. We tried to bring manuscripts which represent some of the most promising new biosensing technologies and to include enough technical information so that the reader can both understand the technology and also be able to do similar experiments.

References

- [1] IUPAC Compendium of Chemical Terminology, 2nd ed., International Union of Pure and Applied Chemistry, Research Triangle Park, NC, U.S., 1992 (1997).
- [2] L.C. Clark Jr., C. Lyons, Electrode systems for continuous monitoring in cardiovascular surgery, *Ann. N. Y. Acad. Sci.* 102 (1962) 29–45.

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