Enzyme and Microbial Biosensors


5. Biopesticides: *Use and Delivery*, edited by Franklin R. Hall and Julius J. Menn, 1998


1. Immobilization of Enzymes and Cells, edited by Gordon F. Bickerstaff, 1997
Enzyme and Microbial Biosensors

Techniques and Protocols

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Preface

In 1962 Clark and Lyons pioneered the concept of a biosensor. They proposed immobilizing enzymes at electrochemical detectors to form “enzyme electrodes” in order to expand the analyte range of their base sensor. Since then, the field of biosensors has greatly expanded. Some of the reasons for the expansion include both advances in signal transduction technologies and the incorporation of different biological sensing elements (Table 1).

As a consequence, there are now a bewildering array of permutations of the biological sensing element and signal transducers that can be used to construct a biosensor. The purpose of the two volumes of Protocols and Techniques in Biosensors is to provide a basic reference tool and starting point for use by graduate students, postdoctoral and senior researchers, and technicians in academics, industry, and government research establishments, to enable rapid entry into the field of biosensors.

There are a variety of approaches that researchers employ to select a combination of bioaffinity elements and signal transducers. One commonly used approach is to identify the compound or compounds of interest; identify the biological molecule that yields an appropriate recognition/selectivity and dynamic concentration range for the assay; and choose an assay format and signal transduction technology that will meet the analytical requirements for the proposed application. This volume, Enzyme and Microbial Biosensors: Techniques and Protocols, describes a variety of transduction technologies that have been interfaced to enzymes and microorganisms. The volume, although not an exhaustive treatise, provides a detailed “step-by-step” description for a variety of enzyme- and microbial-based biosensor techniques that will allow the novice or experienced investigator to expand into new areas of research most appropriate for their analytical needs.

Enzyme and Microbial Biosensors: Techniques and Protocols is divided into two sections covering enzyme and microbial biosensors. Chapter 1 provides an overview of the principles relevant to the design and operational features of enzyme-based biosensors. The subsequent chapters in the first section provide detailed protocols for enzyme biosensors based on electrochemical, thermal, and optical techniques. Included in the second section are techniques, such as oxygen gas electrode and optical techniques, in which the microor-
ganism is interfaced to the signal transducer. Each chapter also includes notes that provide information not usually reported in journal articles that can be particularly useful for those not familiar with construction and operation of a specific device or technique.

We are fortunate to have assembled contributions from world-class authorities in this field and we sincerely thank them. In their enthusiasm for the field of biosensor research, they have produced articles that we believe will be of unusual help to the increasing number of researchers in this field. We are indebted to Prof. John Walker, the Series Editor for *Methods in Molecular Biology*™, for his careful attention in reviewing the manuscripts included in this volume. Last but not least, we warmly acknowledge the gracious support of our families.

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*Kim R. Rogers*
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