Introduction to biosensors

Comprising a series of in-depth monographs on specific areas, this book seeks to provide a wide-ranging overview of some of the most important and recent developments in the area of biosensors for medical applications.

The book is organised into two parts with the first covering *Principles and transduction approaches* and the second *Applications of medical biosensors*.

Part I commences with a consideration of electrochemical biosensors, as these still comprise the largest single class of biosensors used within medicine and related fields; all of the major transduction approaches are discussed – as are contemporary developments such as the use of nanomaterials and nucleic acids as well, as of course the mainstay of enzymatic-based approaches.

The second chapter considers piezoelectric biosensors, which continue to be of particular interest to researchers in the field of biosensors; in a similar context nano-sized biosensors are considered in detail within Chapter 3.

Chapter 4 is focused towards impedance-based biosensors, which are gaining increasing interest as a class of biosensor suited both as a research tool and for practical applications as discussed within Part II. A range of receptor-based chemistries are reviewed in this chapter ranging from antibodies and aptamers through to whole cells.

The fifth and final chapter of Part I is rather different to the preceding contributions by providing a range of protocols to allow newcomers to the field access to some experimental protocols and practical demonstrations of the transduction principles discussed in the preceding four chapters.

Part II concentrates on applications for biosensors in medicine and related fields, commencing in Chapter 6 with a discussion of biosensors for DNA and other nucleic acid-based sensors – representing a maturing area of ever greater importance.

Chapter 7 is focussed towards biosensors for disease biomarker detection – again representing an area set to become ever more important for early diagnosis and personalised medicine; this chapter picks up on many of the principles first introduced in Part I of this book (for example within Chapter 4).

The theme towards biomarker detection is continued in Chapter 8 with the discussion of affibodies as alternatives to antibodies for cancer markers – again an area of ever increasing focus both for clinicians and researchers alike.

The use of biosensors for drug testing and drug discovery applications is considered within Chapter 9 along with all of the major approaches used.

The use of non-invasive measurement approaches has been sought since the inception of biosensors and Chapter 10 provides a coverage of a range of *in vitro* analyses on biological fluids and other non-invasive approaches for practical applications.

The book concludes (Chapter 11) with a review of wearable sensors for applications including simple physio- and chemical-based sensors through to devices for motioning parameters for facilitating the management of Parkinson's and a number of cardiovascular disorders.

It is the hoped that this book helps provides up-to-date coverage of many of the areas of research and applications of biosensors for medical applications as well as some pointers towards likely areas of future development and prominence for emerging areas. In this context, the book should be of interest to those with general interest in the field, researchers actively engaged in one or more areas covered within this book, clinicians and those such as research students just entering the field.

I would like to express my heartfelt appreciation to all of the authors within this book and the very high standard of all of the contributions here as well as the dedication and professionalism shown by all. I am also deeply grateful to all of the staff at Woodhead and their assistance throughout the preparation and compilation of this text – but would wish to mention in particular Lucy Beg, Laura Overend and Cathryn Freear without whose help this project would not have been possible.

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