Prologue

Many researchers and research groups around the globe are dealing with interdisciplinary problems and multidisciplinary groups; but especially those that deal everyday with biosensors have the feeling of not having enough personnel with the sufficient background to cover all topics. With this feeling in our minds, we decided to invite wonderful researchers from different parts to design this book, not as a conventional biosensor's book, but as an interesting journey in the complex world of biosensors. A close look to some recent and key advances on the topic, but at the same time tips through novel mathematical modelling to improve our work, and last but not least, tricks to fool those undesired electrical disturbances that commonly messes our daily work can be found in these pages.

Feel free to navigate the book through its chapters, once in your hands you will feel eager to learn more about biosensors. It has been an experience to put all this together; but now, with the book ready, we can say that this trip has being a wonderful adventure. That is why want to thank all the authors for their great contributions, the Editorial and Irene for their constant input, and to you, the reader, for being part of this book.

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Introduction

The progress of the biotechnology and of the material science, associated with the modern principles of transduction of the chemical information initiated the development, during the 60th of the XX century, of new analytical devices called biosensors.

According to the IUPAC definition, "a biosensor is an integrated receptor-transducer device, which is capable of providing selective quantitative or semi-quantitative analytical information using biological recognition element".

Although of the large expansion of the biosensors dedicated research, some challenges still remain to fully exploit the biosensors potential. Therefore, this book is intended to provide an overview of the current state of the art and of the emerging trends in the field of the biosensors. It includes 10 chapters, organized in three sections.

The first book section "Recent advances in biosensors development and application" covers issues associated with the use of selected inorganic nanomaterials and their composites in biosensors (Chapter 1), the monitoring of the bacterial membrane formation and its surface characterization applying QCMD and AFM techniques (Chapter 2), and the thermodynamics of the whole cells-substrate interaction (Chapter 3). Chapters 4 and 5 deal with some specific applications of the electrochemical biosensors, namely for cyanotoxins and phenolics pollutants quantification. The electrochemical dopamine determination is the subject of Chapter 6. Nevertheless, in this case, a chemically modified electrode has been used.

The second book section "Mathematical methods for biosensors data analysis and response modeling" provides information related to the application of artificial neural network as a multivariate calibration tool for multianalyte determination (Chapter 7), and the application of machine learning methods for modeling the response of a glucose oxidase and of an acetylcholinesterase based sensors (Chapters 8 and 9).

The third book section addresses disturbances modeling in biomedical sensors systems, applying various methodologies to simulate the distortions and strategies to mitigate their influence.

The book provides significant and up-to-date information on the diverse aspects of the biosensors related researches. The multi-faceted approach and the multi-authored character of the edition enrich it and make it compelling for a large range of specialists.

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