

Preface

Dear Reader,

We are pleased that you have decided to use *Environmental Analysis by Electrochemical Sensors and Biosensors* either as a monograph or as a handbook for your scientific work. The manual comprises two volumes and represents an overview of an intersection of two scientific areas of essential importance: environmental chemistry and electrochemical sensing.

Since the invention of the glass electrode in 1906 by Max Cremer, electrochemical sensors represent the oldest type of chemical sensor and are ubiquitously present in all chemical labs, industries, as well as in many fields of our everyday life. The development of electrochemical sensors exploiting new measuring technologies makes them useful for chemical analysis and characterization of analytes in practically all physical phases - gases, liquids and solids - and in different matrices in industrial, food, biomedical, and environmental fields. They have become indispensable tools in analytical chemistry for reliable, precise, and inexpensive determination of many compounds, as single shot, repetitive, continuous, or even permanent analytical devices. Environmental analytical chemistry demands highly sensitive, robust, and reliable sensors, able to give fast responses even for analysis in the field and in real time, a requirement which can be fulfilled in many cases only by electrochemical sensing elements.

The idea for this manual was brought to us by Springer. The intention was to build up an introduction and a concise but exhaustive description of the state of the art in scientific and practical work on environmental analysis, focused on electrochemical sensors.

To manage the enormous extent of the topic, the manual is split into two volumes. The first one, covering the basic concepts and fundamentals of both environmental analysis and electrochemical sensors,

1. gives a short introduction and description of all environments which are subject to monitoring by electrochemical sensors, including extraterrestrial ones, as a particularly interesting and exciting topic;

2. provides essential background information on electroanalytical techniques and fundamental as well as advanced sensor technology;
3. supplies numerous examples of applications along with the concepts and strategies of environmental analysis in all the various spheres of the environment and with the principles and strategies of electrochemical sensor design.

The second volume is more focused on practical applications, mostly complementary to the examples given in volume I, and

1. overviews and critically comments on sensors proposed for the determination of inorganic and organic analytes and pollutants, including emerging contaminants, as well as for the measurement of global parameters of environmental importance;
2. reviews briefly the mathematical background of data evaluation.

We hope that we have succeeded in fulfilling all these objectives by supplying general and specific data as well as thorough background knowledge to make *Environmental Analysis with Electrochemical Sensors and Biosensors* more than a simple handbook but, rather, a desk reference manual.

It is obvious that a compilation of chapters dealing with so many different specialized areas in analytical and environmental chemistry requires the expertise of many scientists. Therefore, in the first place we would like to thank all the contributors to this book for all the time and effort spent in compiling and critically commenting on research, and the data and conclusions derived from it.

Of course, we would like to particularly acknowledge all the people from Springer who have been involved with the process of publication. Our cordial thanks are addressed to Kenneth Howell, who accompanied us during all the primary steps and, later during the process of revision and editing together with Abira Sengupta, was always available and supportive in the most professional and pleasant manner.

Furthermore, we are indebted to a number of our collaborators, colleagues, and friends for kindly providing us literature and ideas, and stimulating us with fruitful discussions. We would also like to thank all the coworkers who did research together with us and under our supervision, as well as all the scientific community working in the field of environmental sensing.

In particular, we would like to express our gratitude to all the persons, especially to our families, who supported us in the period of the preparation of the book.

Last but not least, we will be glad for comments from readers and others interested in this book, since we are aware that some contributions or useful details may have escaped our attention. Such feedback is always welcome and will also be reflected in our future work.

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