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Encyclopedia of electrochemistry (A.J. Bard and M. Stratmann eds), vol 3: instrumentation and electroanalytical chemistry (P.R. Unwin ed)

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Editing an encyclopedia has already been a formidable task in the not too distant past—it is an even more difficult task today. Thus it is not surprising to realize that an encyclopedia covering electrochemistry, an extremely diverse and multidisciplinary area of research and development, has not been published again after the “Encyclopedia of the Electrochemistry of the Elements” that has been finished decades ago by A.J. Bard—and this work actually covered only very selected and limited areas of the field. Thus the present volume, being a part of an eleven-book enterprise, attempts to be a building block of a work standing in the tradition of famous predecessors (e.g., *Encyclopédie* by D. Diderot and J. d’Alembert 1751–1775).

A certainly very challenging task is a complete overview of experimental methods including both traditional (classical) and nontraditional (e.g. spectroscopic or surface analytical) methods because of the extremely large number of methods in particular in the latter family, which is still growing at a rapid pace. Above the problem of sheer size and overwhelming numbers comes the question of selection of the really important and broadly applied methods (versus infrequently used or perhaps already outdated methods). Presumably no book with the broad scope of the present volume will ever satisfy these requirements. This problem becomes even more evident when in-depth treatments of selected methods are intended, which can only be provided by specialists who in turn tend to treat their subjects from individual points of view and not from an overlook shared by all participating contributors.

The book is organized in three sections. After a brief introductory chapter by the editor wherein he attempts to review some basics of electrochemistry and tries to introduce and explain the following selection of methods,

analog and digital instrumentation are reviewed with some selected examples serving as illustration. Finally the application of digital simulation as a tool for the evaluation of experimental results is thoroughly described.

The second chapter is simply called “Electroanalytical Methods”. The term seems to be misleading, which certainly does not refer exclusively to electrochemical methods applied in analytical chemistry. A closer look at the following chapters reveals that such a limitation indeed is not intended. Cyclic voltammetry is expertly covered. Step and pulse techniques receive short shrift and even galvanostatic methods are not mentioned. Stripping analysis is treated with respect to trace analysis. Microelectrodes, their theoretical aspects and their numerous applications are broadly covered. Impedance measurements are treated, some recent developments (local measurements) are included. A rather unknown method, scanning photo-induced impedance microscopy, is rather extensively described—but not a single successful application is mentioned. A brief look into the list of references may help: the author of this chapter seems to be the developer of this method, which can be traced back only to a single reference. A rather long chapter covering numerous fundamental aspects and examples of successful application is devoted to all aspects of quartz crystal microbalance. Somewhat surprisingly sonochemistry is covered in three chapters. The authors are the same in all cases—so why three chapters? The last deals with electrosynthesis, which hardly fits into this book and this section. Sonoelectroanalysis, the title of the second chapter, is basically the use of accelerating effect that ultrasound can provide. Perhaps not enough to justify a separate chapter—and this doubt is impressively manifested in subchapter titles like “Determination of Manganese in Instant Tea” or “Detection of Nitrite in Egg”. Finally biosensors are covered in all their aspects.

The third chapter of the book is devoted to methods summarily called “nontraditional methods”. It starts with a section on scanning tunneling microscopy, atomic force and scanning electrochemical microscopy follow. The numerous other scanning probe microscopies as

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well as other surface/interface sensitive and spatially resolved techniques (like e.g. pH-microscopy or scanning Kelvin probe force microscopy) are missing. Spectroelectrochemistry appears for the first time in the chapter on UV-Vis-spectroscopy, quite obviously this term applies also to infrared and Raman spectroscopy, which are covered in the final chapters. Once again personal interest and not a systematic approach seems to be a guiding principle. Despite the tremendous number of reports on surface enhanced infrared spectroscopy of electrochemical interfaces the subject is mentioned only briefly, and surface resonance Raman spectroscopy—although frequently employed—is not even mentioned.

As outlined above a book of the scope and width attempted here will certainly show gaps and omissions. In some cases the authors somehow seem to have employed modern search tools inappropriately. It is hard to understand why the method employing turbulent pipe flow developed by Vielstich et al. is missing in the contribution on hydrodynamic electrodes. Equally disturbing is the observation that neither X-ray diffraction nor absorption is even mentioned, and surface conductivity

measurements are nowhere to be found. This list could be extended for quite a while, some additional examples have been mentioned above. At first glance this might appear as a sign of personal disappointment, but this is obviously far from true. Instead, it supports the reviewers' doubts about the validity of this encyclopedic approach. Perhaps it is not sufficient to consider a collection of independently prepared—and in some cases fairly personal—review papers an encyclopedia. Taking into account the rather substantial price the book is presumably beyond the reach of most personal bookshelves. Institutions will most likely possess books or volumes of one of the many series devoted to electrochemistry, thus they might not actually need this book. Perhaps those entering into electrochemistry and establishing a new section of their library will be grateful customers; beyond this special situation the reviewer can only reluctantly recommend acquisition—not primarily because of a lack of quality (really not at all)—but because of a lack of added value and innovation.

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