chapters include many tables listing numerical data for various solvent and electrolyte properties. There is a good subject index affording detailed access to the contents of the book.

Thus, Kosuke Izutsu has produced here an excellent monograph and reference source, which will be a valuable aid in the daily work of every electrochemist engaged in experimental studies with nonaqueous solvents. Also, as the author writes in the introduction, the book will be helpful to non-electrochemists who need to use electrochemical methods. Those readers will perhaps find that there is not as much discussion about interpreting results as they would wish, but nevertheless the book will provide them with some sound background knowledge which is essential for the analysis of electrochemical experiments in nonaqueous systems.

Bernd Speiser
Institut für Organische Chemie
Universität Tübingen (Germany)

Electroanalytical Methods. Guide to Experiments and Applications. Edited by *Fritz Scholz*. Springer Verlag, Heidelberg 2002. 331 pp., hardcover € 49.95.—ISBN 3-540-42229-3

Electrochemical methods for qualitative, and especially quantitative, analysis, are unrivalled in their sensitivity and limits of detectability for many applications. They also have the advantages that the instruments are relatively cheap and the operating costs are modest. Analytical methods in which electrochemistry has only a supporting role (such as titrations using conductometric or potentiometric indicators) also have significant advantages. However, outside the circle of committed electrochemists, the capabilities of electrochemical methods do not always seem to be as fully appreciated as they deserve. Therefore, one welcomes a book which aims to overcome such reservations, to explain the proper and most effective use of these methods, and to give the potential user helpful advice that goes beyond the instrument manufacturer's handbook and operating instructions. For a single author to try to cover this broad field, which embraces such a wide variety of methods and principles, would be a bold and risky undertaking (although the book *Analytical Electrochemistry* by J. Wang, published by VCH in 1994, deserves a favorable mention here). The book reviewed here has been edited by an expert in this area, who has co-authored several of the chapters. All the other chapters have also been written by scientists who are leading experts on the particular methods that they describe. However, the choice of the word "Electroanalytical" in the title of the book is questionable. The reader expecting a book devoted to analytical methods in the original sense of that word may be rather disappointed. It rather overstretches the meaning of the word when methods for investigating the localization or the mechanism of complicated electrode reactions are included. However, as the word "analytical" appears in the titles of many journals, where it is given a meaning exactly like that in this book, it would be pointless to argue about their names. But that does not alter one's wish for a meaningful and appropriate book title.

The book begins with a chapter by Z. Stojek on the electrical double layer and its structure. The broadly worded title of this chapter might lead one to expect a textbook-style introduction to the topic, but that idea is soon dispelled on seeing that it consists of only six pages. On closer examination one is impressed at the start by the equivalent circuit diagram of an electrochemical cell. This is followed by a rather eclectic collection of discussions linking double-layer phenomena (specific adsorption, charging current) with electrochemical topics such as catalysis, peaks in voltammetry, and zero charge potential. A survey of theoretical models of the double layer is followed by a short section on the thickness of the double layer, but the reader is unlikely to be able to gain much from this. Although it ends with some indications of modern trends and new developments, that did not prevent me from wondering what was the purpose of this chapter. Also there is the closely related problem that applies to any multi-author work which includes practical aspects, namely that any editor finds it extremely difficult to impose a consistent pattern of structure, choice of content, and presentation. That problem applies especially to introductory chapters, which often do not draw specifically on the author's knowledge of his or her own speciality. As the book has obviously not been written for complete beginners in electrochemistry (since otherwise it would have had to begin with a well-structured survey of the various methods), it can be confidently assumed that the reader already has some knowledge about the electrical double layer.

In the following chapter on the thermodynamics of electrochemical reactions, F. Scholz gives a clear explanation of how observable electrochemical quantities, in particular electrode potentials and cell voltages, are related to thermodynamic parameters. Special attention is given to characteristic values measured when using electrochemical methods, such as half-wave potentials. The author answers some questions that many users will certainly have asked. His way of introducing the subject by describing a cyclic voltammogram may seem rather surprising, as it is hardly a typical approach in a discussion about thermodynamics, but it serves the author's intention very well. The next chapter, by G. Inzelt, is devoted to the kinetics of electrode reactions. After giving the derivation of the Butler–Volmer equation, which is no doubt already well known to many readers, the chapter goes on to discuss the effects of material transport and—with refreshing clarity—the concept of reversibility in electrochemical kinetics.

The following part of the book consists of nine chapters dealing with particular electrochemical methods or families of methods. By this stage the reader will have discovered that this is not a handbook of electrochemical analysis, so it will hardly come as a surprise that cyclic voltammetry is a dominant theme occupying much of the space, covered by F. Marken, A. Neudeck, and A. M. Bond. A short historical survey is followed by a description of an impressive example of the linking of chemical and electrochemical processes, in which cyclic voltammetry made a vital contribution to elucidating the mechanism. However, in aiming to link together the text, figures, and equations in a systematic way, the authors have gone a little too far: on page 52 there is a reference to

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some reaction equations that do not exist. However, the enquiring reader can easily solve that problem. But unfortunately, the many-level numbering scheme for the figures, text, and equations does not make it any easier for the reader. On page 92 fate overtakes the authors again: suddenly the axes are interchanged, and the labeling of the figure corresponds to a multiple of what is actually shown. The explanation of this figure in the text leaves much to be desired. This chapter contains a varied mixture of practical aspects, different variants of methods, and many simulated voltammograms. Unfortunately numerical simulation, which nowadays has an important role in this method of investigation, is not discussed anywhere in the chapter. Nor will the reader find any information about the computer programs that are available, where to obtain them, or their advantages and disadvantages. In the bibliography one gets the impression that the copy deadline was set well before the end of 1999.

Two short chapters are devoted to special variants of voltammetry, namely pulse voltammetry (by Z. Stojek) and square-wave voltammetry (by M. Lovric). Their important advantage—improved limits of detectability—is rightly emphasized. After also mentioning some other variants, one chapter discusses in detail the behavior of adsorbed reagents. Next G. Inzelt gives a brief description of chronocoulometry with some practical hints about the method. Electrochemical impedance measurements (referred to for no obvious reason as a form of spectroscopy) are described in a good concise chapter by U. Retter and H. Lohse. After a short overview of the method and the kinds of electrochemical information that it can yield, the authors discuss methods for analyzing the experimental data; unfortunately they limit their description of the methods to the popular device of equivalent circuit diagrams, and here again there is no information about available programs and their advantages and disadvantages.

The next chapter, by A. Neudeck, F. Marken, and R. G. Compton, is devoted to spectroelectrochemistry in the UV-Vis-NIR region. A short introduction explaining the need for nonelectrochemical data is followed by a brief overview of various methods. The reasons for choosing the group of methods described here are not explained, one can only guess. The chapter discusses spectroelectrochemical measurements in static and flowing solutions, and describes simple types of measurement cells which have already been in use for several decades and can be found in the literature. The authors are so enthusiastic about these that a simple cross-sectional diagram of one appears twice (in Figs. II.6.3 and II.6.4.a). However, there are some useful examples of special forms of construction and flow cells. Detailed and careful descriptions of alternative cell designs and measurements by a reflection method have been published elsewhere, for example by Salbeck, but surprisingly there are no references to that work. The seventh chapter, by M. Lovric, deals with stripping voltammetry, with particular attention to pre-enrichment of electrodes by electrochemical deposition. Electrochemical studies of solids are described by D. A. Fiedler and F. Scholz, in a chapter which impresses by its systematic and lucid treatment of both the theoretical and practical aspects. Many examples of combinations with nonelectrochemical methods are described with practical hints. This is followed by a chapter on potentiometry, certainly a typical example of electrochemical methods of analysis, by H. Kahlert, which deals systematically with the essential aspects and also discusses some finer details.

The third part is devoted to practical aspects of electroanalytical methods, including chapters on working electrodes (S. Komorsky-Lovric), reference electrodes (H. Kahlert), electrolytes (S. Komorsky-Lovric), and experimental setups (Z. Stojek). This wide-ranging mixture of practical hints, informative diagrams, and mathematical tools for calculating transport properties will be welcomed by users of these methods as a valuable source of information.

A short final chapter gives a brief historical outline of the development of electroanalytical methods in the context of electrochemistry, and lists some relevant books, journals, and Internet sites.

The publishers have produced the book with care to a high standard. It collects together much information that has already appeared elsewhere, and presents it in a clearer and more connected form in many cases, together with some useful advice and stimulating ideas. However, newcomers to the subject, such as beginners in electrochemistry or analytical chemists without previous electrochemical experience, will not find the book very helpful, while for those working in the area most of the material will already be familiar, and they will find relatively little in the way of new ideas. The book fills a gap with regard to some methods that have previously not been adequately covered in the literature, and it also provides many practical hints. The editor has devoted some care to subdividing the material systematically, resulting in a very detailed multilevel numbering system, but this fine structuring makes it rather difficult for the reader. Fortunately the detailed subject index compensates for that to some extent. The book is probably best regarded as supplementary reading. The reader's first resource is likely to be one of the existing works, such as *Electrochemical Methods*, by A. J. Bard and L. R. Faulkner (John Wiley & Sons, New York 2001).

Rudolf Holze
Institut für Chemie
Technische Universität Chemnitz
(Germany)

Communicating Chemistry: Textbooks and Their Audiences, 1789–1939. Edited by *Anders Lundgren* and *Bernadette Bensaude-Vincent.* (Series: European Studies in Science History and the Arts, Vol. 3). Science History Publications, Canton (Massachusetts) 2000. vii + 465 pp., hardcover $ 56.00.—ISBN 0-88135-274-8

The European Science Foundation (ESF), an association of 62 major national funding agencies devoted to basic scientific research in physical and engineering sciences, life and environmental sciences, medical sciences, humanities, and social sciences in 21 countries, brings together leading scientists and funding agencies to debate, plan, and implement pan-European scientific and science policy initiatives. In 1993 the ESF sponsored a scientific program, "The Evolution of Chemistry in Europe, 1789–1939", car-

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