J Solid State Electrochem (2002) 6: 502 – 503
DOI 10.1007/s100080100246

BOOK REVIEW

P. Gründler

Günter Henze: Polarographie und Voltammetrie. Grundlagen und analytische Praxis

Springer, Berlin Heidelberg New York, 2001. 261 pp (ISBN 3-540-41394-4) DM 199.90

Published online: 8 November 2001

Henze's new book (in German) closes a link in the row of monographs on instrumental analysis, so the editor points out. Is this statement too simple?

Is there a need for a highly specialised monograph on polarography and voltammetry? Are these traditional methods really practised to solve analytical tasks? Is there anyone who prefers to analyse chromium species by polarography instead of by ion chromatography, or to determine lead in urine by stripping analysis instead of by atomic absorption, for example? Is it far from reality to claim that voltammetry and polarography might achieve the same importance as other methods of instrumental analysis in university teaching, as pointed out by the author in his foreword?

If we analyse the international analytical literature, we find only a very small part dealing with real analytical applications of classical electroanalytical methods. Most of the methods are stripping determinations. We find, however, a constant or even growing number of articles which report the use of electroanalytical principles. Such principles play an important role in chemical sensors, preferentially in biosensors. Powerful innovations, such as new electrochemical microscopies or new electrode technologies such as self-assembled monolayers, renewed interest in electrochemical methods. Indeed, some new books about electroanalytical methods (Buchberger *Elektrochemische Analyseverfahren*, Brett/Oliveira-Brett *Electroanalysis* appeared, and last but not least the latest issue of J. Wangs *Analytical electrochemistry*). From this point of view, it might be a good idea to consider the fundamental classical techniques in a more traditional manner.

Henze's book is not modern, but it is written from a nostalgic viewpoint, glorifying the good old days of Heyrovský, when the dropping mercury electrode was not considered to be a harmful old-fashioned device that would soon be banned. It is somewhat confusing that the dropping mercury electrode is considered in full detail, whereas the rotating disk is hardly mentioned. Typically, older methods are described in more detail than newer ones. Because of this, classical direct current polarography appears to be the most important technique. Differential pulse polarography is given more volume than Osteryoung's square-wave voltammetry (which is introduced very briefly), and differential normal pulse technique is not mentioned at all. In the literature cited, older articles strongly predominate. Altogether, the book summarises techniques for which their development is more or less finished. The most important deficiency of the book is the lack of any link to future development, such as intelligent sensor arrays, micro–total analytical systems, sensor–actuator systems, or the laboratory on the chip.

Nevertheless, the book is very good in many points. Theoretical fundamentals are explained briefly, but precisely. Most of the figures are new, of very good quality, and extremely instructive. Typically, in the theoretical considerations, there is often no electrochemical reasoning, but simply a statement. This is useful, in my opinion, since it makes the discussion transparent. Electroanalysis is not theoretical electrochemistry. There are excellent chapters, especially when older and less popular techniques are discussed. One example is the chapter on alternating current techniques and tensammetry.

In some cases, the author's view is somewhat unbalanced. The definition of Nernst's diffusion layer is somewhat odd (p. 5). The explanation of electronic instrumentation (the potentiostat, p. 77) is insufficient. Some peripheral operations, such as purification procedures and sample preparation, are described up to the last details, although this is not a special matter of electroanalysis. The potentiometric stripping analysis method, especially Jagner's dt/dE procedure, seems to be undersized in volume when compared to other

P. Gründler
Universität Rostock, Fachbereich Chemie,
Buchbinderstrasse 9, 18051 Rostock, Germany
E-mail: peter.gruendler@chemie.uni-rostock.de
Tel.: +49-231-4981754

derivative stripping methods. Modified electrodes did not get the space they should have.

Generally, the book appears to be written very carefully, so errors do not occur frequently. There are some bad examples, however. The reason that platinum is not preferable as the basis for mercury layers is not that it is dissolved progressively by mercury (p. 83), but that is not wetted easily by mercury. Propylene is not a material for making columns (p. 74), but polypropylene. The symbol of the wall-jet electrode (p. 227) is oversimplified. The requirement for a very fine nozzle should be mentioned. The definition of hydrodynamic voltammograms (p. 235) is misleading. It suggests that such voltammograms exist only in connection with chromatography.

The book is valuable to all students or young scientists who are interested in learning the fundamentals of contemporary electroanalysis which proceeds mainly inside chemical sensors. What they get is a high-quality introduction to one of the most important techniques from a traditional point of view, with consideration of history and tradition. So, the book will find its place in libraries of universities and scientific institutions. Its high price, unfortunately, will not allow most students to put it in their private bookcases.