J Solid State Electrochem (2007) 11:559
DOI 10.1007/s10008-006-0201-4

BOOK REVIEW

Modern Aspects of Electrochemistry, vol. 39.

C.G. Vayenas, R.E. White. M.E. Gamboa-Adelco (eds), Springer, New York 2006, 279 + XVI p., 109.95 €; ISBN 0-387-23371-7

Rudolf Holze

Published online: 6 September 2006

As the most recent volume of a successful series established in 1954 and carefully continued, this book, dedicated to the memory of B.E. Conway (a former coeditor of this series), provides a timely collection of review papers covering widely distributed aspects of electrochemistry in representative contributions. Memories of B.E. Conway are collected by J.O'M. Bockris (founder and longtime editor of this series himself) as a preface. His remarks include an illuminating background of the series reviewed here. The selection of topics in the present volume nicely illustrates the intention of the founder and his first coeditor.

The first contribution by Politzer and Murray reviews the state of the art of theoretical descriptions of solvent–solute interactions including ion–solvent interactions. Models based on Monte Carlo and molecular dynamics simulation and their advantages and limitations are reviewed with particular attention to the progress already achieved in predicting properties of molecular and ionic solutions.

The second chapter written by G.X. Zhang, a well-established expert on the electrochemistry of silicon (see a review in *Journal of Solid State Electrochemistry* 7:318, 2003), focuses on the formation mechanisms and morphology of porous silicon. The preparation via anodic dissolution, particularly relationships between oxidation conditions, kinetics, and morphological features, are discussed in great detail.

Fahidy provides an overview of the modeling of electrochemical phenomena via Markov chains and processes. The treated systems range from electrode kinetics to the performance of electrolyzers and electrochemical reactors, even the repair of failed cells is covered. The considerable (and obviously necessary) amount of mathematics is complemented by numerous instructive application examples.

Although the fractal approach toward the understanding and modeling of electrochemical interfaces has been around sometime already, particularly in the electrochemical impedance community, a review starting not from the need to interpret impedance data difficult to treat with conventional simple double-layer models but from the point of fractal geometries has not been published before. Go and Pyun take this more general road. Starting with the fundamentals of fractal geometry, they review carefully physical and electrochemical methods employed to characterize surfaces and interfaces showing fractal properties; special attention is paid to diffusion toward such interfaces. Porous electrodes, corroding surfaces, and partially blocked interfaces are treated as typical examples.

The final chapter by Vijh treats electrochemical treatment of tumors. At first glance, this approach might look somewhat dubious (and the current status in various countries ranging from being an integral part of clinical practice to being considered as a significant risk device might contribute to this first impression), but the available clinical evidence supports further systematic and broad study into a method that has shown promising results so far.

The book is carefully prepared; fortunately, the quality of figures has improved considerably in comparison with previous volumes. Typing errors are rare; they will hardly confuse the reader. The book is a must for all libraries already owning previous volumes. In addition the contributions themselves justify acquisition for those entering the respective fields.

R. Holze (✉)
Institut für Chemie, Technische Universität Chemnitz,
09107 Chemnitz, Germany
e-mail: Rudolf.holze@chemie.tu-chemnitz.de