

Rudolf Holze

## A.J. Bard, I. Rubinstein (eds): *Electroanalytical chemistry*, vol 22

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As the most recent volume of a successful series established in 1966 and carefully continued since, this book provides a timely collection of review papers covering three aspects of experimental electrochemistry of considerable current interest.

V. Tsionsky, L. Daikhin, M. Urbakh and E. Gileadi present a look at the electrochemical interface using the quartz microbalance. The most recent reviews by M. Hepel (M. Hepel in: *Interfacial electrochemistry* (A. Wieckowski Ed.) Marcel Dekker, New York 1999, p 599) and K.A. Marx (K.A. Marx, *Biomacromolecules* 4 (2003) 1099) are either already somewhat dated (the former), or of only limited value to the electrochemist (the latter). Thus a new review is certainly justified. On top of this, the present contributions provide an additional angle by carefully studying the solid/solution interface beyond the mere assumption that a change in frequency always and directly corresponds to a change in mass of anything sticking solidly to the balance electrode surface. Consequently, studies not only of metal deposition, but also of physi- and chemisorption and electrode potential-induced changes in the composition of the double layer are subsequently reviewed. Suggestions for successful experimental applications provide valuable help to the potential user.

Studies of electrode kinetics, and in particular the development of new methods (including improvements on ones already established) have been shifted into the background of experimental electrochemistry for some time now, presumably because of the great interest caused by the advent of spectroelectrochemical and (later) scanning probe methods. The wide availability of computer software useful for extracting kinetic data from cyclic voltammograms has helped to establish this widely-applied method as a standard tool for kinetic investigations. For various reasons, the upper rate limit

that can be measured this way, as well as the selection of systems that can be studied with cyclic voltammetry are still somewhat limited. Temperature jump methods, initially suggested to be a suitable technique for kinetic studies in the pioneering work of M. Eigen, have only been used infrequently. Direct laser heating of the electrode surface—or more precisely the solid/solution interphase—has been used with some drawbacks, as convincingly described in the contribution by S.W. Feldberg, M.D. Newton and J.F. Smalley. The indirect heating of the solid side of the interface by a laser beam directed towards the titanium underlayer of the actual electrode deposited onto an optically transparent support has several advantages beyond the rapid thermalization of the light energy introduced: no photolysis of the solvent; no ejection of photoelectrons; no overheating of the solution; no interference between temperature-induced changes in the light absorption properties of the liquid and the actual efficiency of light absorption. Starting with a thorough derivation of the mathematical fundamentals, the study of redox systems strongly attached to the electrode surface (self-assembled monolayers or covalent attachment) is treated in detail. A careful description of experimental details and some experimental results as well as suggestions for further development conclude this chapter. The authors anticipate that rate constants up to  $10^9 \text{ s}^{-1}$  beyond currently-achieved values of around  $10^8 \text{ s}^{-1}$  may be measurable in the future.

Electrically conducting (strongly doped) diamond has attracted considerable interest in the electrochemical community due to the versatility of diamond electrodes combined with its extreme chemical stability. Its improved availability from various sources has added to their attraction. There are already several reviews covering parts of this topic, although they are of limited size only (R. Tenne and C. Levy-Clement, *Isr. J Chem* 38 (1998) 57; Y.V. Pleskov, *Russian J Electrochem* 38 (2002) 1275; R.G. Compton, J.S. Foord, and F. Marken, *Electroanal* 15 (2003) 1349). Thus an extensive overview of this topic, which shows high promise for

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R. Holze  
AG Elektrochemie, Institut für Chemie,  
TU Chemnitz, 09107 Chemnitz, Germany  
E-mail: Rudolf.holze@chemie.tu-chemnitz.de

commercialization, is certainly helpful. G.M. Swain starts his contribution with a look back on the commercial synthesis of industrial diamonds. A brief look at solid state and surface properties relevant for electrochemical applications guides the reader towards already established or at least feasible applications of diamond electrodes in electrochemical analysis (certainly the author's field of particular expertise), electrosynthesis, water purification, and its use in spectroelectrochemistry and electrocatalysis (mostly fuel cell applications).

The book (including the extensive author and subject index) is carefully prepared, and only a few microscope pictures were presumably converted with inadequate means resulting in some illegible details. Despite this absolutely minor weakness the book is a must for all libraries that own previous volumes; the contributions on the quartz microbalance, on kinetic studies with laser heating, and on diamond materials as electrodes alone justify its acquisition by anyone who has just entered these fields and is looking for a timely overview.