

Electrochemical dictionary. Allen J. Bard, György Inzelt, Fritz Scholz (eds)

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Antonio Doménech Carbó

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Electrochemistry is a scientific field with a wide variety of research and application domains, ranging from molecular electrochemistry in solutions to solid state electrochemistry, from energy storage to corrosion science. The amplitude of these research domains and the role of electrochemical studies in significant parts of investigations in analytical, environmental, inorganic, organic, etc. chemistry are serious motivations for editing a dictionary clarifying electrochemical terms for researchers and students.

Inspired by an unambiguous encyclopedic vocation, this *Electrochemical Dictionary* contains, on its 723 pages, more than 2,770 entries accompanied by 469 figures (several in color) and 18 tables, covering terms used in electrochemistry or directly related with this scientific field. Prepared by 96 contributors, all top researchers in electrochemistry, the dictionary provides a clear and concise explanation of terms frequently used in current electrochemical literature but also includes those terms which have become obsolete and are discouraged to be used, but they are explained so that the dictionary can be used as a reliable help in reading the most modern literature and also older papers and books.

All entries are carefully referenced so that the reader gets the key to the most important literature. Additionally, each entry includes a list of related terms. References and links facilitate a more detailed examination of the significance of selected terms to the interested reader.

Theoretical derivations are given in an appropriate short way and allow considering the essential formulations in electrochemistry. The dictionary includes entries on fundamentals of techniques (cyclic voltammetry, chronoamperometry, etc.), theoretical formulations including, not only basic equations in electrochemistry (Tafel, Ilkovic, etc.) but also essential physical antecedents (Fermi–Dirac statistics, Fick’s laws, Maxwell equations, Navier–Stokes equations, Poisson equation, etc.) and mathematical tools (e.g., Laplace transformation). The dictionary pays particular attention to terms frequently used with a vague meaning even in research literature, such as reversibility/irreversibility, convolution/deconvolution, or interphase/interface. Such terms are clearly described, eventually discussing misinterpretations or alternative views.

Interestingly, several terms, dealing with important aspects of electrochemistry, have been grouped in entries and subentries. This is the case for the entry “Diffusion,” accompanied by 11 subentries, and for the entry “Nucleation,” for which a complete overview (atomistic theory of nucleation, exclusion zones, instantaneous nucleation, etc.) is given. In the case of “Electrode materials,” more than 20 different materials are monographically described. Entries like “Gas sensors,” “Impedance,” or “Passivation” are extensively treated with abundant graphical information. This encyclopedic intention, aided by cross-links, makes this dictionary of particular interest for the electrochemist because it offers a concise but complete view of topics and research fields.

It should be emphasized that this is the first comprehensive dictionary of electrochemical terms ever published with such depth of coverage, so that it provides a reference manual where the reader of electrochemical literature can access short explanations of technical terms. Additionally, the dictionary possesses an evident pedagogical value,

A. D. Carbó (✉)
Departamento de Química Analítica, Universitat de València,
C/Doctor Moliner, 50 46100-Burjassot,
València, Spain
e-mail: Antonio.Domenech@uv.es

in particular with regard to fundamentals of electrochemistry (e.g., boundary conditions for solving diffusion equations) which are presented with clarity. Links between terms, systematically included along the entries, offer the possibility of correlating terms and follow theoretical developments.

Remarkably, the dictionary can also be handled as a manual providing information of interest during electrochemical practice. For instance, diagnostic criteria for characterizing the most frequent mechanisms in molecular electrochemistry (EC, CE, ECE, etc.) can be found. Usual representations in electrochemistry and related fields also possess individual entries. This is the case for “Koutecký–Levich,” “Lineweaver–Burk,” and “Mott–Schottky” plots and “log c –pH” plots, respectively. Similarly, a number of entries deal with families of compounds and/or materials (fullerenes, polymer electrolytes) and specific substances (ferrocene, methylene blue, NADH) whose use is frequent in electrochemical studies, completed with polymers/electropolymers (polyacetylene, polyaniline).

The dictionary does not only cover the main “classical” terms from electrochemistry, but also terms corresponding to recent research, from fractals to nanoparticles, nanotubes, and nanowires. Terms dealing with less-known applications of electrochemistry (e.g., Nernst lamp) are also included. Remarkably, a large number of terms from other fields, which are, however, frequently found in electrochemical literature (e.g., terms from spectroscopies used in conjunction with electrochemistry, etc.) are included. For instance, analytical terms such as limit of detection, masking agent, indicator, titration (and linear and logarithmic titration curves) can be found.

Another remarkable aspect of the dictionary is that it gives also biographic entries of people who have contributed to

electrochemistry, again with a rather wide coverage. The dictionary publishes, for the first time, pictures of a number of people where the photos have been obtained from descendents, often the grandchildren. Thus, photos of the following people are, for the first time, published: Beutner, Breyer, Chapman, Crotogino, Foerster, Fredenhagen, Gokhshtein, Gouy, Gurney, Hasselbalch, Henderson, Ilkovic, Kalousek, Kucera, Luther, Luggin, Müller, Poggendorf, Quincke, Riesenfeld, Sollner, Stackelberg, Stromberg, Tubandt, Wiedemann, and others. Such entries provide to the reader not only a more direct knowledge of people who developed insights in electrochemistry, but also a historical overview of how electrochemical science has developed in the past. This is an important aspect, since orientation of current research will benefit from a detailed knowledge of the historical evolution of electrochemistry. Entries about electrochemical institutions (International Society of Electrochemistry, The Electrochemical Society) complete the historical issues.

The foregoing review allows considering this dictionary as an essential tool for aiding not only students and researchers systematically working in electrochemistry, but also for scientists working in materials science, organic and inorganic synthesis and characterization, analytical chemistry, environmental sciences, etc. where electrochemical studies are involved. The *Electrochemical Dictionary* represents, in summary, a fruitful editorial effort for completing and actualizing electrochemistry terms as well as providing a comprehensive view of the historical evolution of this field. This book will occupy a significant place in the scientific literature for many years to come. It is a must for any scientific library, and a personal purchase can be strongly suggested to anybody interested in electrochemistry.