Chapter 6 summarizes the results for adsorption on activated carbons and for latexes as examples of organic adsorbents.

To arrive at a verdict about this book, one must consider who are the readers likely to find it of interest. This is certainly not a book giving a general introduction to the topic or an overview for someone who only occasionally works in this area. But, as a result of its comprehensive and unique collection of theories and data on the adsorption of ions on inorganic solids, it is a valuable resource for everyone who is more deeply involved in the topic, whether from the viewpoint of basic science or that of applications. In addition the long lists of references at the end of each chapter give easy access to the literature for more detailed information.

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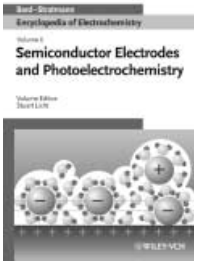
Encyclopedia of Electrochemistry. Vol. 6: Semiconductor Electrodes and Photoelectrochemistry. Edited by *Allen J. Bard, Martin Stratmann* and *Stuart Licht*. Wiley-VCH, Weinheim 2002. 597 pp., hardcover € 349.00.—ISBN 3-527-30398-7

Electron-transfer processes at the interface between a semiconductor and an electrolyte are of fundamental importance for the conversion of light energy into chemical energy. Until the late 1980s the study of such processes was essentially an academic research topic, but more recently the emphasis has shifted to the development of applications. Some examples of applications are self-cleaning surfaces and nanocrystalline solar cells based on titanium dioxide. This book describes the developments in the field, with six chapters that correspond to a roughly historical sequence.



In Chapter 1, K. Rajeswar describes the fundamentals of electrochemical and photoelectrochemical processes of semiconductors. This is a clear and easily readable chapter, but the comparison on page 6 between thermally induced charge transfer and the autoprotolysis of water seems inappropriate, and in Figure 5a the arrow indicating the band gap should end at the edge of the conduction band, not at the Fermi level as shown.

Chapter 2 begins with a contribution by J. J. Kelly, Z. Hens, D. Vanmaekelbergh, and Z. Hensalso, giving a very detailed description of methods for studying the structure of macroporous and nanoporous electrodes and a discussion of the fundamental processes of charge separation and charge transport. The chapter continues with articles on the construction and use of tandem solar cells (by T. Soga), on the "fine tuning" of electrical properties by adsorption of multifunctional organic compounds (R. Cohen, G. Ashkenasy, A. Shanzer, and D. Cahen), and on the characterization of the semiconductor–electrolyte interfacial contact by measuring capacitance and luminescence properties (Y. Nakato).

Chapter 3 is devoted to nanostructured electrodes. It consists of articles on general methods for preparing such electrodes (G. Hodes and Y. Mastai), the preparation and properties of macroporous silica (C. Lévy-Clement), and fullerene-like nanotubes of tungsten disulfide, molybdenum disulfide, boron nitride, and vanadium(v) oxide (R. Tenne).

Chapter 4 is titled "Solar Energy Conversion without Dye Sensitization". The first part, by M. Sharon, begins with a repetition of some fundamentals already covered earlier, but then continues with a description of regenerative photoelectrochemical cells. The following contribution on photoelectrochemical energy storage cells, by S. Licht, makes difficult reading in places because of the many unnecessary acronyms (e.g., in Table 1). The next article on the photoelectrolysis of water in simple and multiple cells (M. Sharon and S. Licht) is easier to read. The chapter ends with a contribution by S. Licht on the optimal design of photoelectrochemical cells; this contains much useful information but is again difficult to read, in this case because there are too many figures which also lack clarity.

Chapter 5, "Dye Sensitized Photoelectrochemistry", begins with a clear account of the historical development of dye-sensitized photoelectrochemical cells and the current state of knowledge (M. Grätzel). It is followed by a very detailed article (by M. K. Nazeeruddin and M. Grätzel) on the properties of the main sensitizers used with titanium dioxide, specifically ruthenium(ii) complexes with polypyridyl ligands, and also certain phthalocyanines. In Figure 2 of this article the ligand-field splitting in the octahedral field is rather inappropriately represented by the symbol ΔOh instead of Δ_O. The third article of this chapter (J. Nelson) is concerned with the mechanism of charge transport in sensitized titanium dioxide cells. The rate-determining step seems to be the diffusion of the electrons, but it has not yet been possible to describe the process quantitatively by a simple model. In the last article of this chapter U. Bach describes cells with a solid electrolyte, including organic polymer cells.

The title of the final chapter, "Non-solar Energy Applications", does not seem quite appropriate. It begins with a detailed and very informative article by A. Fujishima and D. A. Tryk on the mechanism of photocatalysis at a titanium dioxide surface. Unfortunately the literature references from number 30 onward have become rather mixed up, so that only experts in the field will be able to guess at the correct sequence. Also some of the figures (e.g., Fig. 11) are not explained in the text, and consequently do not convey much information. The second article, by T. N. Rao, D. A. Tryk, and A. Fujishima, is easier to read and deals with the many practical aspects of photocatalysis by titanium dioxide. In some places, however, it is difficult to distinguish between processes already in use and those still at the planning stage. Also it would have been useful to include a critical assessment of the present state of progress in the various projects.

To summarize, the book is a fairly well coordinated collection of review articles, which offer not only the specialist but also the beginner a description of the fundamental principles, applications,

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and latest research results, in a form that can be quickly assimilated. Therefore it can be recommended for everyone who is concerned in any way with the conversion and use of light energy in heterogeneous systems.

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Optical Sensors and Switches. Edited by *V. Ramamurthy* and *Kirk S. Schanze*. (Series: Molecular and Supramolecular Photochemistry, Vol. 7.) Marcel Dekker, New York 2001. 519 pp., hardcover $ 195.00.—ISBN 0-8247-0571-8

The comprehensive series *Molecular and Supramolecular Photochemistry*, edited by Prof. V. Ramamurthy (Tulane University) and Prof. K. S. Schanze (University of Florida), aims to provide updates on many different topics within the photochemistry area. Such topics are not usually treated in depth in general books on this area, so that the timely series allows researchers to keep abreast of recent advances through articles by competent authors in their respective subjects. Even though I was requested to classify the book under review in a single category (I chose "Physical Chemistry"), the interdisciplinary nature of the optical sensing topic makes the selection a rather restrictive one since, in addition to that discipline, the book's chapters span the domains of analytical, organic, and inorganic chemistry, spectroscopy, and materials science.

The subject of optical sensors has been treated in several modern texts (e.g., *Fiber Optic Chemical Sensors and Biosensors* (Ed.: O. S. Wolfbeis), CRC Press, **1991**; "Optical Sensors": E. Wagner, R. Dandliker, K. Spenner in *Sensors: A Comprehensive Survey, Vol. 6*, Wiley-VCH, **1991**; *Biosensors with Fiberoptics* (Eds.: D. L. Wise, L. B. Wingard), Humana, **1991**; G. Boisdé, A. Harmer, *Chemical and Biochemical Sensing with Optical Fibers and Waveguides*, Artech House, **1996**), most of them written from the *chemical analysis* point of view. This fact is not surprising, given the highly applied character of the sensor field. Therefore, being a photochemist trying to apply this discipline to chemical sensing, I was eager to read about my beloved topic from a more *fundamental* perspective. The book's contents are as varied as the optical sensing domain: the different chapters "switch" from the use of cyclodextrins or photoinduced electron transfer processes to detect chemical species by fluorescence methods, to holography with new types of liquid crystals (two chapters). In between the reader may learn how to build (bio)sensors with electrogenerated chemiluminescence, with fluorescent polyelectrolytes and quenching ligands, with luminescent $[XRe(CO)_3(\alpha\text{-diimine})]$ and $[W(CO)_4(\alpha\text{-diimine})]$ probes, with photorefractive polymers and molecular materials, or with photoswitchable supramolecular ion receptors. Polymers doped with organic salts and Langmuir–Blodgett films that display unique linear and nonlinear optical response, together with fluorescent triphenylmethane dyes to probe the structure of both organic polymers and silicon, are the subjects of two other chapters.

Well recognized authors in their respective fields have written the different chapters of the edited book. However, a certain degree of inhomogeneity in the presentation and scope of the chapters is noticeable: while some of them are comprehensive reviews in a particular area of the subject, others are too focused on a narrower specific topic, even including an Experimental section (particularly evident is the case of Chapter 4 on the use of fluorescent polyelectrolytes to build optical sensors, which is merely an enlarged version of a couple of interesting papers by the authors). There is also some overlap of information in different chapters (e.g., photoinduced electron transfer chemosensors are included in Chapters 1, 2, and 10, sometimes introducing the very same molecules, and holography with liquid crystals is dealt with in Chapters 7 and 8). This situation is probably difficult to avoid when the chapters have been written by many authors.

The table of contents is simply a collection of the chapter titles; inclusion of the chapter sub-headings would have helped the prospective reader to get a clearer idea of what can be found beneath some very general chapter titles such as "Buckets of Light" or "Luminescent Metal Complexes as Spectroscopic Probes of Monomer/Polymer Environments", among several others. The keyword index at the end of the book is also very meager: only a few terms are indexed, so that it neither reflects the breadth of the book nor leads the reader to find a particular piece of information. Inclusion of the full address and e-mail address in the list of contributors would allow readers to send comments or questions to the different authors scattered around the globe.

Nevertheless, these minor negative aspects do not significantly detract from the value of the book for prospective readers (graduate students, researchers in both applied and basic photochemistry, sensor technologists). Even if they are not directly interested in every single topic of the many that are covered by the book, they will find it stimulating (as I did) to learn about different aspects of optical sensing and switching, through the competent review chapters collected therein.

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