Book Review

ELECTROPLATING AND OTHER SURFACE TREATMENTS - A PRACTICAL GUIDE: by C.D. Varghese; *Tata McGraw - Hill Publishing Co., Ltd., NEW DELHI* (1993) ISBN 0-07-460464-3

The presentation of the subject in this book is somewhat different compared to other metal finishing books. Utilising his practical experience in the field, the author has screened off excess of theoretical aspects in order to see that it is easy to grasp for beginners and to meet day to day requirement of electroplaters. At the same time, basic principles required are presented in simple manner. Selected reference books are cited in Bibliography at the end for the benifit of those requiring further knowledge.

The first four chapters cover Design, Modern Trends in Metal Finishing, Current Developments, Basic Principles & Pretreatment. The plating precesses are dealt with in chapter five under the title inorganic process. Painting is covered under organic coatings in chapter six. Quality control and testing are dealt with in chapter seven covering analysis of plating baths and testing on coatings. The rest of the chapters deal with plant layout, effluent treatment, Health & Safety and give useful information. Glossary at the end define metal finishing terms in simple words for easy understanding. Specifications related to metal finishing processes mentioned at the end are useful to electroplaters.

Presently, for accurate measurement of plating thickness - particularly precious metal films, non-distructive methods such as beta ray back-scatter, x-ray deffraction etc., are extensively used in electronic and space industries. Also tests for solderability, electrical contact resistance of coatings are important in electronic industry. Inclusion of the above under quality control would have further enriched the book. Electroforming is not covered ir the book except for a simple mention under modern trends.

Under plant layout it is proper to point out that drainages for cyanide bearings baths, chromium containing bath and rest to be separated. Though separate drainages are indicated under effluent treatment, it would have been proper to metnion the same under plant layout, as this aspect is overlooked in many small scale industries at the time of plant installation.

The book is useful as a practical guide to electroplaters for day to day use and the author deserves appreciation for writing an excellent book for the use fo electroplaters. Printing and the get up of the book are pleasing.

B.S. Satyanarayana
M/s. Pollu Tech Aids,
BANGALORE.

NEW DEVELOPMENTS IN ION EXCHANGE - MATERIALS, FUNDAMENTALS & APPLICATIONS (Ed) Mitsuo Abe, Takeshi Kataoka, Takashi Suzuki; *Elsevier, Amsterdam University, Osaka Tokyo Institute of Technology, Yamanashi Univerisity;* (1991)
ISBN 0-444-98688-X

This volume contains the papers presented at the International Conference on Ion Exchange (ICIE '91) which was held at the Tokyo Institute of Technology, Japan, during October 2-4, 1991. The Conference was sponsored by the Japan Association of Ion Exchange (JAIE), and supported by thirteen major Academic Japanese Societies.

The Proceedings include reviews and original papers on the following topics, marking recent progress in new branches of science and technology based on new ion-exchange materials and ion-exchange theory;

1. Fundamentals (Ion Exchange Theory and Process)
2. Synthesis of New Materials
3. Chromatography (Ion and Liquid Chromatography and Associated Techniques)

4. Water Purification
5. Environmental
6. Membrane
7. Hydrometallurgy
8. Separation Science & Technology (Food, Pharmaceutical, Biological and others).

This well designed book incorporating a little more than 100 papers, in well prepared camera ready format is well catagorized and edited by the editors and well printed by the publishers.

In the fundamentals section, about 21 papers are presented. To cite a few, Ion Exchange kinetics - The Maxwell - Stefan Discription ; Kinetic model for selective ion exchanges - Host - Guest Chemistry and catalytic properties of intercalated metal complexes on clays - studies on adsorption site in Ion Exchange.

The section on Synthesis of New Materials has 24 papers covering a wide spectrum of materials and novel synthetic methods adopted.

There are 8 papers in the section Chromatography and incorporates, a general theory of ion exchange chromatographic separation processes and use of Multi-wavelength detector as Analytical method in HPLC of Inorganic anions.

The section on water purifications and Envirnomental have 20 very interesting papers. New products and processes have also been presented.

Hydro metallurgy covered by 10 papers while the last interesting section, Separation Science and Technology has 14 papers.

On the whole, the book has done justice to the title and the references quoted at the end of each paper adds to the Scientific content and broadens the scope to the book. I recommend this hard bound book to all libraries as well as to research and application oriented scientists.

Prof. D.K. Padma
Department of I.P.C.,
I.I.Sc., Bangalore 560 012

SURFACE ELECTROCHEMISTRY - A Molecular Level Approach by John O'M. Bockris and Shahed U.M. Khan *Plenum Press (1993)* 1046 pages

Electrochemistry is a discipline, which according to some prophets of doom, has reached a dead end. But it continues to belie them and is, infact, advancing at a rapid rate. It is a truisum to say that Electrochemistry is interdisciplinary encompassing Chemistry, Physics, Biology, Metallugy, Electronics and Mathematics with it. Obviously a book which updates the prevailing knowledge of this field inspires and orients future directions in this area is a welcome addition to any library. If it happens to be from the doyen of Electrochemists, J.O.'M Bockris, it is inevitable that one sits and takes a closer look. " Modern Electrochemistry" the magnum opus of Bockris and Reddy, written about 20 years ago, has been introductory text book for all aspring Electrochemists for the last two decades and still continues to be in print and in demand. In the present book, the authors provide us glimpses of their own outstanding and pioneering contributions to the field during the period begining from the emergence of modern era of Electrochemistry right till the present day. This book provides a wealth of material for any aspiring reasearcher in Electrochemisty with extensive references and this by itself qualifies this book as a source of latest developments in the field.

The first chapter deals with the introductory material for experimental techniques. All the spectroscopic and other surface techniques have been discussed briefly. The second chapter explores the interphasial structure including basic concepts, the thrmodynamics of electrical interphase, potentials, work functions and this is followed by an excellent discussion of semiconductor solution interphase.

Chapter 3 discusses the phenomenological electrode kinetics. The usual derivation of Butler-Volmer expression found in the earlier generation of electrochemistry text books is absent. Instead, it is taken as a starting point for a more elaborate discussion on electron transfer kinetics. This is followed by electrocatalysis and hydrogen evolution reaction. A study of electrocrystallisation discusses kinetics of formation of monolayers and various stages in electrodeposition. This section traces various contributions of Bockris, Avrami, Fleischmann and Thirsk in an area which continues to attract the attention of various research workers till this day. One interesting feature of this chapter is that the recent developments in the semiconductor - solution interphase are ably reviewed. This is an area of fundamental importance in photoelectrochemistry which is more elaborately dealt with in a later chapter.

Quantum electrochemistry is a subject which attracts only a cursory attention by the authors of many standarded text books on electrochemistry. Starting from Gurney's pioneering treatment - on whose memory infact this book is dedicated, this area, has been deservedly paid greater attention in this work . The historical introduction to quantum electrode kinetics makes an interesting reading. Quantum mechanical interpretation of transmission coefficient and symmetry factor and molecular models in quantum oriented Electrochemistry are presented along with stochastic theory of electron transfer reactions.

Photoelectrochemistry has been discussed in chapter 5 with an introduction to several frequently measured quantities. This is followed by theories of photocurrent and surface states. Organic Electrochemistry and Bioelectrochemistry occupy an important position in modern electrochemistry. These aspects are discussed in chapter 6 and 7 complete with theories of electron transfer kinetics across the interphase. Chapter 8 looks into the stability of materials. A discussion on the mechanism of iron-dissolution reaction is included. Chapter 9 and 10 are significant from the point of view of energy generation and environment. The authors lament the fact that the research on fuel cells and development of hydrogen as a cleaner fuel have been neglected for want of funding by US Government agencies. The author's concern and commitment for society and its future is reflected in these chapters with numerous foot notes acting as catalyst for the reader's thoughts rather than as a distraction. Incidentally there are innumerable illustrations and good number of footnotes throughout the book. The printing is excellent and the format is eminently readable.

In summary, this is a book with a difference. The book is not written just to convey the recent developments but written with clear perception and a genuine concern for Electrochemistry as an interesting discipline that will enrich human life on this planet. If this is one of the goals of the authors, then I think it has been fulfilled to a large extent by this book.

Hats off to the authors for this magnificent work.

Dr. V. Lakshminarayanan
Raman Research Institute,
Bangalore