BOOK SECTION

ORGANIC INHIBITORS OF CORROSION OF METALS Yuriil Kuznetsov, *Plenum Press, N.Y.*, ISBN 0-306-45169-7 (1996) 282 pages

This monograph, dealing with inhibitors in the abatement of metallic corrosion, is a translation from Russian to English. Mechanisms of existing and new inhibtors are brought out lucidly along with review of recent achievements. Descriptions of combating corrosion of metallic parts and components during their assembly, storage, transport and conservation are given. There are six chapters dealing with electrochemical aspects of corrosion inhibition, the role of chemical composition of the medium, the effect of organic compounds, the role of complexing agents, organic inhibitors for cooling systems and the protection of metallic components during assembly, transport and storage. Electrochemical aspects are illustrated with respect to electrochemical kinetics including passivation phenomena. The effect of various organic inhibitors on metal passivation is brought out in the light of adsorption and break down of passivity. The influence of solution chemistry with respect to pH, solvent and types of anion is illustrated to portray the role of composition of the media in corrosion protection. Synergistic action of inhibitors as well as their adsorption behaviour are convincingly illustrated. The effect of complex forming reagents on corrosion is discussed with pertinent examples. From a practical stand point, organic inhibitors for cooling systems are presented with examples. Anticorrosion compositions for degreasing and cleaning of metal surfaces, inhibitors in cooling lubricants and protection from atmospheric corrosion are depicted from a practical angle with useful experimental data and test conditions.

The survey appears comprehensive and literature references are cited up-to-date. The topic is covered authoritatively and hence offers a critical insight into various aspects of inhibition phenomena. This monograph will be very useful to practising corrosion engineers as well as reserachers in the area.

Prof. K.S. Natarajan
Dept. of Metallurgy,
IISc., Bangalore-12.

ELECTROCHEMICAL PROCESS ENGINEERING - A Guide to the Design of Electrolytic Plant F.Goodridge and K.Scott, *Plenum Press, New York,* ISBN 0-306-44794-0 (1995) 372 pages

This book is like a **Handbook** for Industrial Designers. It is a ready reference material for Engineers already in the field and also for those entering the field. The authors have blended the important aspects of Applied Chemistry and Engieering in such a lucid manner that the text material forms a good interdisciplinary course. The advantage is that students of both Pure Chemistry and Engineering can understand the subject with ease. More stress is made on a quantitative analysis of processes occuring in various industries. The illustration of examples after every section gives an idea on the informations required and problems faced at the factory floor.

In the opening Chapter of the book, fundamental concepts and basic terminology of Electrochemical Processes have been introduced.

In Chapter II, a thermodynamic analysis of the Electrochemical Systems has been made. Important aspects of mass and heat transfer reactions at various cell designs and conditions have been detailed here. Significant emphasis

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is made on the polarization phenomenon which involves the charge transfer process. A combined affect of all these has made it possible to calculate the energetics of the electrolytic cells.

The third Chapter enables one to produce a reaction model and apply its prirnciples to any synthesis. A few representative reaction models are presented here. The difference between reaction mechanism and a reaction model has been highlighted. Setting-up of simple models helps us to select the variables which govern the performance of a plant. This minimizes the expensive experimentation and developmental costs.

Progressing from these reaction models, general description and construction of common reactor models like the batch reactors or the continuous reactors are represented in a small way in Chapter IV.

Chapter V includes the design and scale up of important electrolytic reactors. The dominant parameters needed for the design scale up have been explained in detail. Problems and limitations associated with the design of reactors and the need for managing time factors are described here.

A general consideration of models for actual process has been presented in Chapter VI. The costing procedures have been worked out and illustrated with a few examples. A brief mention is made on the profitability criteria for optimization. Finally in the last section of this chapter, parameters and data required for computational process modelling has been illustrated.

Dr.(Ms) Tanu Mimani,
Department of Chemistry,
Central College, Bangalore University,
BANGALORE -560 001

ELECTROACTIVE POLYMER ELECTROCHEMISTRY - Part 2: Methods and Applications (Ed.) Michael E.G.Lyons, *Plenum press, New york* ISBN 0-306-45158-1 (1996) 332 pages

The current trend in research and applications of "tailor made electrode surfaces using electroactive polymers films" has opened up an active and exciting area in electrochemistry: for example, a wide range of electrochemical techniques are used to prob the conductivity processes in these materials and a number of in situ spectroscopic techniques have been used to further elucidate the structure of these materials as well as to obtain correlations between structure and redox activity. The applications found range from thin film amperometric chemical and biological sensors, electrocatalytic systems, drug delivery devices and advanced battery systems through to molecular electronic devices.

The vast literature on chemically modified electrodes and electroactive polymers has compelled the author to a three part series rather than a single volume work originally envisaged. The first part (chapters 1 to 4) presents a survey of the fundamental principles underlying the electrochemical behaviour of electroactive polymer materials, ie the fundamentals of charge percolation and conductivity behaviour allied with the membrance properties of electroactive polymer - modified electrode is discussed. In part II (chapter 5 to 11), the topics of methodology and applications of electroactive polymer is addressed. Finally, in part III, the important topic of polymer ionics is discussed.

In this volume (Part II) methodology and applications are addressed. The volume begins (chapter 5) with a contribution by Morton-Blake and Corish on Atomistic Simulation

investigations of electroactive polymers. They describe in a lucid manner the methodology of atomistic simulation to quantify dopant transport processes in electroactive polymers. Cassidy in Chapter 6, continues this idea of simulation and carefully describes the application of digital simulation protocols to charge transport in electroactive polymer films. The novel feature is the inclusion of detailed FORTRAN computer codes for a number of specific problems often encountered in practice. The contribution by Simon J. Higgins, Paul A Christensen and Andrew Hamnett on "In Situ Ellipsometry and FTIR spectroscopy applied to Electroactive polymers - Modified electodes", is brief but timely and conveys many original insights into the nature of mobile carries and their strong interactions with the polymer backbone. With the upcoming advances in instrumentation and theory, this technique shold reveal a wealth of detail of the behaviour of simple conducting polymers. In chapter 8 authored by Keely and Vos, the electrochemical behaviour of Osmium and Ruthenium Poly (pyridyl) redox polymers as electrode coatings have been discussed in detail. These Red-Ox-active osmium-containing polymers find application in the area of biosensors including glucose sensors. The authors have discussed varied aspects including synthesis and characterization - Homogeneous and Heterogeneous charge transport properties - Electrochemical Quartz crystal microbalance and mediated Electrocatalysis at Red-Ox-Polymers.

Applications and advantages of electroactive polymers have been well dealtwith in chapter 9 titled "Applications of electroactive polymer in Bio-electrochemistry and Bio-electronics" contributed by Philip N. Bartlett and John Copper. Subjects such as - electrocatalysis - preconcentration and perm selectivity - molecular recognition have been handled by Donal Leech in Chpater 10, entitled, "Analytical applications of Polymer - modified electodes".

The last chpater by Emmanuel I. Iwuoha and Malcolm R. Smyth effectively describes Polymer - based Amperometric Biosensors in electroanalytical chemistry. They also highlight the advnaces made and future challenges. It is very well written chapter by these experienced practitioners in the field.

This book is a timely publication and is very useful for advanced undergraduate/ first year graduate courses in electrochemistry / materials science. Active research scientists will widely benefit from the well chosen references and practical applications. The book deserves to be on the shelves of all science libraries in universities as well as R&D centres in industries.

Prof. D.K. Padma
E.C.S.I.
BANGALORE - 12