

Book Reviews

Batteries for Cordless Appliances

by Ralph J. Brodd, published by Research Studies Press Ltd., 1987; 190 pp.; £24.95.

This book is the second in a Battery Applications Series edited by M. Barak. Its author, Ralph J. Brodd, is widely experienced and well respected within the battery industry as well as in governmental and academic circles. The subject matter reflects the growing requirement for power sources for a wide range of portable, cordless, electric power appliances that now exist within domestic, industrial and military markets.

Chapter 1 provides a brief and easy to follow introduction to the physics and thermodynamics of battery technology, and describes the general performance requirements for a number of common applications including flashlights, buoys, and radiosondes. The following six chapters are then concerned with descriptions of the majority of cell chemistries which are currently available as commercial products. Primary batteries covered include the zinc-anode-based Leclanché, alkaline-manganese, and zinc-air technologies together with magnesium and, the increasingly important, lithium-anode-based systems. A chapter on rechargeable batteries includes nickel-cadmium, lead-acid, and nickel-hydrogen technologies.

In addition to the usual general description of cell chemistries and reaction schemes, the framework of each section is primarily directed towards the battery user. Included are lists of advantages and disadvantages of each cell, detailed drawings of cell construction, and plots of performance characteristics.

The final chapter contains some useful information regarding cell nomenclature and details of selected standard test regimes. Guidelines are given for battery selection criteria together with methods of predicting battery performance from known discharge curves.

The book will prove useful to a wide range of readers including students, potential battery users, and also researchers in the field who require an initial grounding in some different aspect of battery technology.

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Polymer Electrolyte Reviews - 1

Edited by J. R. MacCallum and C. A. Vincent, published by Elsevier Applied Science, Barking, U.K., 1987; x + 352 pp.; price £48.00; ISBN 1-85166-071-2.

This Review contains ten chapters each authored by active and well-respected workers in the field of polymer electrolytes.

Chapter 1, by Michel Armand, considers the current state-of-the-art surrounding the classical polymer electrolyte, poly(ethylene oxide). This encompasses both fundamental aspects of the chemistry and thermodynamics of alkali metal-salt complexed materials as well as their ionic conduction and electrochemical properties. Possible applications discussed include solid-state batteries and photoelectrochemical cells.

The thermodynamic theme is continued within a well-structured discussion of ion-ion interactions in Chapter 2, although this important aspect of the understanding of transport behaviour in polymer electrolytes could perhaps have been better located after the following few chapters. These deal with alternative materials to linear poly(ethylene oxide). Together they provide a comprehensive coverage of the classes of material currently or previously under investigation as potentially improved electrolytes, including co-polymers, networks, and comb-structures.

Chapter 7 by Mark Ratner provides a comprehensive and clear review of the theoretical treatment of polymer electrolytes. Particular emphasis is placed upon a dynamic bond percolation model of ionic transport in these materials. He concludes with a concise listing of the important advances in mechanistic/conceptual and theoretical ideas over the last decade.

Experimental techniques for the establishment of transport properties and polymer structure are reviewed in Chapters 8 and 9. Descriptions of a wide range of electrical methods, together with a theoretical treatment of their relevance to transport processes in ionically conducting polymers, are followed by a discussion of NMR, EXAFS and radiotracer measurements.

The book concludes with a chapter on electrode kinetics and electrochemical cells. Experimental data from a.c. impedance and cyclic voltametric studies are presented, together with a brief review of solid-state battery technology.

Overall, the book provides an excellent review of the current state-of-the-art in the field of polymer electrolytes and their applications. It will prove useful both to workers in the field and to those wishing to enter it.

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