

Book Notes

Solid State Batteries, NATO ASI Series E Applied Sciences 101

Edited by C A C Sequeira and A Hooper, published by Martinus Nijhoff, Dordrecht, The Netherlands, 1985, xv + 584 pp, price Dfl 215 00, U S \$80 00, £ 59 75, ISBN 90-247-3236 0

Advanced batteries, both secondary and primary, have a potentially important role to play in the development of many areas of technology, in both the late 20th century and beyond. Applications include stationary storage, vehicle traction, remote power sources, industrial and domestic cordless products, and consumer and military electronics. Recent developments of materials make the solid-state battery a real possibility in all of these sectors. Such batteries offer many attractive features over alternative present-day and advanced systems

From September 2 to 14, 1984, the International Symposium on Solid State Batteries, co-sponsored by NATO, the US Department of Energy, the US Army Research, Development and Standardization Group, and several Portuguese institutions, was held at Alcabideche, Portugal. The aims of the symposium were to forge stronger links between those already involved in the various aspects of this technology and also to educate those who may either be able to contribute to, or benefit from, its future development. The lecturing team, many of the members of which also formed a scientific committee, included forerunners in the field of solid-state ionics and representatives from the battery industry. In addition to the lecturing staff, approximately 80 individuals from 23 countries participated at the Symposium. These included representatives from industrial and military sectors together with university staff and students.

The general approach was to review the fundamental materials and experimental aspects of solid-state electrochemistry (Week 1) and then to focus on battery technology (Week 2) This included both an introduction to, and a review of, batteries in general, as well as details of solid-state systems and relevant technologies The aim was to provide comparative information for an assessment of the potential strengths and weaknesses of the solid-state approach.

Also included during the second week's activities were a number of general, but related, lectures These again helped to provide a perspective of the battery work.

To give both structure and continuity to the programme, the lectures were divided, on a roughly daily basis, into groups, each with a particular theme:

- Basic Concepts
- Solid Electrolytes

- Electrode Processes
- Electrode Materials
- Experimental Techniques
- Introduction to Batteries
- Solid-state Batteries
- New Technology

The basic concepts included thermodynamic, kinetic, and structural aspects of ionic transport in solid-state battery materials and cells. Solid electrolytes discussed included ionically conducting inorganic crystalline materials, glasses, polymers, and composites. The behaviour of selected solid electrolyte/electrode interfaces was examined and particular attention was paid to porous and composite electrodes. An overview of intercalation and insertion compounds which are of interest to high-energy-density secondary batteries was presented. D.c., a.c. and non-electrical techniques of cell characterization were described. Other subjects covered were an introduction to, and a review of, battery technology, and detailed accounts of solid-state batteries and competitive systems. These included descriptions of battery performance, fabrication techniques, and applications. A review of related technologies, including solid-state sensors, was also presented.

Participant involvement was encouraged by the provision of eight formal Discussion Groups. Their topics reflected the lecture themes with emphasis on future developments. Also, there were a number of short presentations by symposium delegates.

All the above important fundamental and technological aspects are discussed in the volume under consideration, thus providing an overview of the present state of knowledge and problems associated with solid-state batteries. The book will be of primary interest to workers in the fields of solid-state electrochemistry, battery science and technology, and ionically-conducting materials.