

## The ECS Battery Division: Putting Electrochemistry to Work in Energy Storage and Conversion Devices

by Curtis F. Holmes and  
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**B**atteries, those remarkable electrochemical devices that allow us to start our cars, listen to music while jogging, use laptop computers, keep our hearts beating, and a host of other important functions, are the focus of one of the largest and most active Divisions of The Electrochemical Society. This issue of *Interface* is intended to familiarize the members of the Society with the Battery Division, its purpose, and its activities. This issue also features three articles on batteries and fuel cells from Division members.

Since Count Alessandro Volta (1745-1827) constructed his well-known "voltaic pile" and developed the concept of electric current over 200 years ago, incredible progress has been made in the area of electrochemical energy storage. Indeed, Volta could not have dreamed of all the wonderful devices made possible by batteries today.

The progress since 1940 has been particularly dramatic. In David Linden's *Handbook of Batteries*, the point is made that in 1940 there were three basic battery systems: the Leclanché zinc-carbon primary cell, and the lead-acid and nickel-iron secondary systems. Today one can hardly count the number of different battery systems: a host of lithium primary cells, metal air cells, metal hydride cells, metal oxide cells, reserve cells, thermal cells, and lithium ion cells; and the list goes on. There are huge batteries (actually chemical engineering plants) that perform load leveling duties, tiny batteries that power implantable devices, and even tinier thin film batteries that can be put onto an electronic substrate. Today the battery market is measured in the billions of dollars, and battery scientists conduct research and development in academic institutions, research laboratories, government laboratories, and industry.

The Battery Division was established on October 17, 1947. The purpose of this Division was and is to

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## Our Featured Division

# Battery Division



## Our Featured Division

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stimulate research, publication, and the exchange of information relating to batteries and fuel cells. The Division also serves as a clearinghouse for the dissemination of information on batteries and fuel cells. The Battery Division activities directed toward these goals include: sponsoring symposia at international meetings; publishing proceedings volumes; publishing extended abstracts of all papers presented at Battery Division symposia; bestowing three annual awards based on research, technology, and student research; and sponsoring short courses on timely topics. The Battery Division also supports individuals that need financial support to attend Society meetings.

The membership of the Battery Division has grown significantly since its establishment in 1947, and the Battery Division has over 500 members who work in battery science, fuel cell development, capacitor technology, and other fields related to electrochemical energy storage. Elected officers of the

Division are the chairman, vice-chairman, secretary, and treasurer. Five members-at-large are also elected to serve on the executive committee. Officers and members-at-large are elected for two years during even numbered years.

The Division's regular business meeting is held annually during the Fall Society Meeting. The purpose of this meeting is to receive the reports of the officers and committees and transact any other business that may arise. Battery Division awards are also presented at this meeting. Election of officers and members-at-large are held during the business meeting of the even numbered years.

Division executive committee meetings are held at the Fall Society Meeting prior to the Division business meeting. The purpose of this meeting is to receive reports from the secretary, treasurer, and all Division committee chairmen, act on new and old business, plan symposia, approve awards, nominate officers, discuss other activities that promote the Division or the Society, and prepare for the Division business meeting.

The Battery Division has organized more than 120 symposia on focused topics, and 50 general sessions over the last 25 years. The symposia can be classified into ten broad categories: (1) lithium batteries, (2) alkaline batteries, (3) other battery systems, (4) fuel cells, (5) electrochemistry/electrode materials/electrodes for batteries and fuel cells, (6) battery applications, (7) cell testing and reliability, (8) design and modeling of batteries and fuel cells, (9) environmental aspects of batteries, and (10) other topics. Some of the symposia were organized jointly with other Divisions such as Energy and the Physical Chemistry Divisions. Proceedings of many of these symposia were published and are available from the Society.

During the last ten years, the Battery Division has sponsored five short courses: (1) Lithium Ion and Lithium Polymer Batteries, Fall 1999; (2) Lithium Ion Battery Technology, Fall 1997; (3) Battery Failure Analysis, Fall 1996; (4) Rechargeable Lithium-Ion Batteries for Consumer, Electronic, Military, and Aerospace Applications, Fall 1993; and (5) Lithium Battery Science and Technology, Fall 1990.

The Battery Division awards program is designed to recognize outstanding contributions to the science and technology of primary and secondary cells and batteries and fuel cells. The program presently contains three awards: the Research Award, the Technology Award, and the Student Research Award. These are presented annually at the Battery Division Fall business meeting.

The Research Award recognizes outstanding contributions to the science and technology of primary and secondary cells and batteries, as well as fuel cells. The award includes a scroll, a check for \$1,000, and membership in Battery Division for as long as the recipient remains a Society member. The following are the Research Award recipients: M. Armand (1988), J. Jorne (1989), A. N. Dey (1990), R. E. White (1991), D. N. Bennion (1992), E. Peled (1993), K. M. Abraham (1995), J. Dahn (1996), and B. Scrosati (1997). No Research Awards were made in 1994 and 1998.

The Technology Award, established in 1993, was intended to encourage the development of battery and fuel cell technology. The award includes a scroll, a check for \$1,000, and membership in the Battery Division as long as the recipient remains a Society member. Past recipients of this award

are: Y. Nishi (1994), K. Ozawa (1994), E. S. Takeuchi (1995), S. Gilman (1996), J. M. Tarascon (1997), and G. Blomgren (1998).

The Student Research Award, established in 1962, recognizes promising young engineers and scientists in the field of electrochemical power sources. The award includes a scroll, a check for \$1,000, and selected publications of the Society paid for by the Battery Division. Recipients of this award for the past ten years are: C. C. Streinz (1988), J. Weidner (1989), M. G. Lee (1990), E. J. Podlaha (1991), G. E. Gray (1992), P. De Vidts (1994), S. Motupally (1995), J. Xu (1996), S. Horn (1997), and Ian Courtney (1998).

Those of us who work in this field are attracted by the wide variety of interesting science and technology present in electrochemical storage devices. There are subjects of interest to inorganic chemists, organic chemists, physical chemists, environmental chemists, chemical engineers, physicists, material scientists, mathematicians, and a variety of other scientific areas. There seems to be something in an energy storage device that will interest almost any scientist. Moreover, the results of the work can be seen in practical useful devices.

We hope to share some of this interest with our fellow ECS members in the three articles contained in this

edition of *Interface*. The three feature articles in this issue describe the applications of batteries in three important areas: portable electronics, aerospace, and biomedical devices. We hope these articles help emphasize the importance of batteries and fuel cells in our modern society and that you find the articles of interest. ■

### About the Authors

**Curtis F. Holmes** is the immediate past Chairman of the Battery Division. He is Senior Vice President at Wilson Greatbatch Ltd. (WGL) in Clarence, NY, where he has responsibilities in research and quality. He will relocate to a WGL subsidiary (Greatbatch-Hittman) in Columbia, MD, in mid 1999, where he will become President of the company.

**Subbarao Surampudi Subbarao Surampudi**, Chairman of the Battery Division, has 25 years of experience in electrochemical technologies. He is currently Supervisor of the Electrochemical Technologies Group at the Jet Propulsion Laboratory.

## Battery Division Future Symposia Plans

### Hawaii — October 1999

*Heavy Duty Batteries for Electric Vehicles and Portable Devices* (co-sponsored by the Energy Technology Division); *Intercalation Compounds for Battery Materials* (co-sponsored by the Energy Technology Division); *Lithium Batteries* (co-sponsored by the Energy Technology Division); *Battery/Energy Technology Joint General Session* (co-sponsored by the Energy Technology Division); *Sixth International Symposium on Solid Oxide Fuel Cells (SOFC VI)* (co-sponsored by the High Temperature Materials Division); and *Fifth International Symposium on Molten Carbonate Fuel Cells* (co-sponsored by the Energy Technology and High Temperature Materials Divisions).

### Toronto — May 2000

*Micro-Power Sources* (co-sponsored by the Energy Technology Division); *Battery/Energy Technology Joint General Session* (co-sponsored by the Energy Technology Division); and *Tutorials in Energy Conversion Devices* (co-sponsored by the Energy Technology and the Industrial Electrolysis and Electrochemical Engineering Divisions).