

**ADVANCE PROGRAM**

---

**41st**  
**Power**  
**Sources**  
**Conference**

---

*Sponsored by*  
**Power Sources Center of Excellence,**  
**U.S. Army Communications**  
**Electronics Command**  
*and*  
**Sensors and Electronics Devices Directorate,**  
**U.S. Army Research Laboratory**

**June 14 – 17, 2004**  
**Adams Mark Hotel**  
**Philadelphia, Pennsylvania**

# FOREWORD

You are cordially invited to attend the 41st Power Sources Conference which is being held at a new location, the Adam's Mark Hotel in Philadelphia, Pennsylvania. The conference is being co-sponsored this year by the U.S. Army Power Sources Center of Excellence, Communications Electronics Command, Fort Monmouth, New Jersey, and Ft. Belvoir, Virginia, and the Sensors and Electronic Devices Directorate, Army Research Laboratory, Adelphi, Maryland. As in the past, other elements of the Army, Navy, Air Force, DARPA, NASA, and DOE are participating in organizing and conducting the meeting. Also as usual, the technical program is strongly oriented toward technology that is relevant to Government applications.

This year's technical program reflects continued strong interest in high-energy batteries, fuel cells, and other portable and mobile power sources. We are confident that you will also enjoy the exhibition, hospitality suites, and social mixer.

We hope to see you in June. Please make your travel plans early. Pertinent information and forms appear in this brochure.

***Robert P. Hamlen, General Chair***  
***Sol Gilman, Technical Program Chair***  
***Sondra R. Thompson, Information Chair***

# 41st Power Sources Conference Organizing Committee

**General  
Conference Chair:** Robert P. Hamlen  
*U.S. Army CECOM  
Ft. Monmouth, NJ*

**Technical  
Program Chair:** Sol Gilman  
*U.S. Army Research Laboratory  
Adelphi, MD*

**Information  
chair:** Sandra R. Thompson  
*U.S. Army CECOM  
Ft. Monmouth, NJ*

**Conference  
Coordinator:** Ralph Nadell  
*Palisades Convention Management  
New York, NY*

**Technical Program  
Committee Members:** Michele L. Anderson  
ONR  
*Arlington, VA*

Terril B. Atwater  
*U.S. Army CERDEC  
Ft. Monmouth, NJ*

George Au  
*U.S. Army CECOM RDEC  
Ft. Monmouth, NJ*

Richard S. Baldwin  
*NASA/Glenn Research Center  
Cleveland, OH*

Julie A. Banner  
*Naval Surface Warfare Center  
Bethesda, MD*

James A. Barnes  
*Naval Surface Warfare Center  
College Park, MD*

Wishvender K. Behl  
*U.S. Army Research Laboratory  
Hyattsville, MD*

Valerie Browning  
*DARPA, Arlington, VA*

Michael T. Brundage  
*U.S. Army CECOM RDEC  
Fort Monmouth, NJ*

Ken Burt  
*Naval Surface Warfare Center  
Crane, IN*

Tracey L. Cheek  
*Naval Surface Warfare Center  
Bethesda, MD*

# 41st Power Sources Conference Organizing Committee

Deryn D. Chu  
*Army Research Laboratory  
Adelphi, MD*

Harold S. Coombe  
*CECOM RPEC/Army Power Division  
Fort Belvoir, VA*

Peter J. Cygan  
*U.S. Army CECOM RDEC/  
Army Power Division  
Fort Monmouth, NJ*

Michael S. Ding  
*U.S. Army Research Laboratory  
Adelphi, MD*

John K. Erbacher  
*Air Force Research Laboratory  
Dayton, OH*

Joseph P. Fellner  
*AFRL/PRDB  
Wright-Patterson AFB, OH*

Donald L. Foster  
*Army Research Laboratory  
Adelphi, MD*

James E. Francfort  
*INEEL  
Idaho Falls, ID*

Sol Gilman  
*Army Research Laboratory  
Adelphi, MD*

Allan B. Goldberg  
*Army Research Laboratory  
Adelphi, MD*

Justin Govar  
*NSWC/Carderock  
Bethesda, MD*

James A. Gucinski  
*Naval Surface Warfare Center  
Crane, IN*

Robert P. Hamlen  
*U. S. Army CECOM  
Fort Monmouth, NJ*

Mary A. Hendrickson  
*U.S. Army CECOM  
Ft. Monmouth, NJ*

# 41st Power Sources Conference Organizing Committee

T. Richard Jow  
*Army Research Laboratory  
Adelphi, MD*

Peter B. Keller  
*Naval Surface Warfare Ctr  
Bethesda, MD*

Dan S. Kieffner  
*Naval Surface Warfare Center  
Crane, IN*

Ivan Lee  
*Army Research Laboratory  
Adelphi, MD*

Donald E. Mains  
*Naval Surface Warfare Center  
Crane, IN*

Catherine Marsh  
*U.S. Government  
Falls Church, VA*

Timothy C. Murphy  
*INEEL  
Idaho Falls, ID*

Badruddin Pirani  
*Naval Surface Warfare Center  
Crane, IN*

Michael Quah  
*U.S. Army CERDEC  
Fort Belvoir, VA*

Jeffrey Read  
*Army Research Laboratory  
Adelphi, MD*

Thomas Reitz  
*AFRL/PRPS  
Wright-Patterson AFB, OH*

Larry Ruckriegel  
*Naval Surface Warfare Center  
Crane, IN*

David M. Ryan  
*U.S. Air Force  
Wright-Patterson AFB, OH*

Lawrence G. Scanlon  
*U.S. AIR Force Wright Laboratory  
Wright-Patterson AFB, OH*

Bradley D. Secret  
*Navsea Crane  
Crane, IN*

# 41st Power Sources Conference Organizing Committee

Steve M. Slane  
*U.S. Army CECOM  
Fort Monmouth, NJ*

Patricia H. Smith  
*Naval Surface Warfare Center  
Bethesda, MD*

Rebecca Smith  
*NSWC Carderock  
Bethesda, MD*

Sam G. Stuart  
*Naval Surface Warfare Center  
Crane, IN*

Stephen P. Vukson  
*U.S. AIR FORCE  
Wright-Patterson AFB, OH*

Marvin Wilkerson  
*NAVSEA Crane Division  
Crane, IN*

Clinton S. Winchester  
*NSWC/Carderock  
Bethesda, MD*

Jeffrey B. Wolfenstine  
*Army Research Laboratory  
Adelphi, MD*

# EXHIBITION

A special feature of the 41st Power Sources Conference is the Exhibition comprised of commercial vendors exhibiting products and services of interest to the power sources community. The Exhibition will be held in the Exhibition Center during the following hours:

**Monday, June 14**                      **6:00 pm – 8:00 pm**

**Tuesday, June 15**                    **9:00 am – 6:00 pm**

**Wednesday, June 16**                **9:00 am – 6:00 pm**

**Thursday, June 17**                   **9:00 am – 12:00 pm**

The following companies will be exhibiting:

Advanced Energy Products, Inc

Bren-Tronics, Inc.

BST Systems

Digatron/Firing Circuits

Electric Fuel

Eltek Energy, LLC

GNB Network Power – Division of Exide

Hydrogenics

Idatech, LLC

Maccor, Inc.

Midtronics, Inc.

Saft America, Inc.

Ultralife Batteries, Inc.

Yardney Technical Products

# GENERAL INFORMATION

## Registration

Advance Registration is not required, but it is strongly encouraged for quick pick-up of registration materials and for your own convenience. The registration fee includes admission to all technical sessions, the exhibition, and the reception, and includes all refreshment breaks and a copy of the Conference Proceedings. A special student registration fee is available to full-time university students with proper identification. Additional copies of the Proceedings can be purchased at the conference for \$50. To register in advance, complete the enclosed registration form (see centerfold), include your payment (checks must be made payable to the Power Sources Conference in U.S. currency drawn on a U.S. bank.) and mail to:

Palisades Convention Management  
The 41st Power Sources Conference  
Attn: Ralph Nadell  
411 Lafayette Street, Suite 201  
New York, NY 10003

**The deadline for receipt of Advance Registration is May 31, 2004.** Requests for refunds must be made in writing and received no later than May 31, 2004. Confirmations will be mailed. However, confirmation of registration can also be made by calling 1-800-350-0111 or 212/460-9700.

	<u>Before May 31</u>	<u>After May 31</u>
Fee	\$320	\$360
Student	\$ 75	\$75

Registration will take place in the Preconvene Foyer on the Meeting/Exhibit level of the Adam's Mark Hotel during the hours listed below.

## Registration Hours:

<b>Monday, June 14</b>	<b>11:00 am – 6:00 pm</b>
<b>Tuesday, June 15</b>	<b>7:00 am – 5:00 pm</b>
<b>Wednesday, June 16</b>	<b>7:30 am – 5:00 pm</b>
<b>Thursday, June 17</b>	<b>7:30 am – 2:00 pm</b>

## Hotel Accommodations

The meeting will be held at the Adam's Mark Hotel located at City Avenue and Monument Road, Philadelphia, PA 19131 (telephone 215/581-5000, fax 215/581-5069). A block of sleeping rooms has been reserved for attendees of the 41st Power Sources Conference at the Adam's Mark. The special meeting rate is \$124 Government and commercial, single or double occupancy. All rates are net, non-commissionable. Commercial rates are subject to a 14% occupancy tax. In order to qualify for the special rate, you must complete and mail the enclosed hotel registration card (see centerfold) to the Adam's Mark Hotel or call 215/581-5000 prior to **May 24, 2004**. Reservations received after this date will be processed on a rate and space availability basis only. When contacting the hotel, please be sure to mention that you are attending the 41st Power Sources Conference.



## **Airport / Hotel Transportation**

The Adam's Mark is located in Philadelphia's "Golden Mile," at City Avenue (US-1) and the Schuylkill Expressway. Conveniently located 7 miles from Center City and 12 miles from airport *via* the Schuylkill Expressway (I-76) to City Avenue exit. The point of arrival by air is Philadelphia International Airport. Transportation between the airport and the hotel is provided by Lady Liberty (215/724-8888); proceed with your baggage to the ground-transportation desk and dial 27; the cost is \$12 per person each way.

## **Exhibition**

Established in 1990 and expanded each year, the exhibition has been extremely well received by the attendees and has served to complement the technical program. This year's exhibition should once again enhance this year's strong technical program. The exhibition will take place in the Exhibition Center. The exhibit hours are listed below.

Monday, June 14	6:00 pm - 8:00 pm
Tuesday, June 15	9:00 am - 6:00 pm
Wednesday, June 16	9:00 am - 6:00 pm
Thursday, June 17	9:00 am - 12:00 noon

Anyone interested in exhibiting at the 41th Power Sources Conference should contact Kate Dickie, Palisades Convention Management., at 212/460-8090 x215.

## **Speaker Orientation**

A Speaker Orientation Luncheon will be held for Monday's speakers on Monday, June 14th, at 12:00 pm. Breakfast for speakers on their respective presentation days will be available Tuesday through Thursday at 7:00 am. Session Chairs and speakers are requested to attend the orientation function on the day of their presentation.

## **Companions Program**

Accompanying companions are invited to enjoy coffee and danish on Tuesday, Wednesday, and Thursday mornings at 9:30 am in Pierre's. For tour information in neighboring Philadelphia, please call the Philadelphia Visitors Center at 1-800/537-7676.

## **Reception**

All conference attendees are invited to attend the reception to be held on Monday, June 14, from 6:00 to 8:00 pm. The reception will be held in the Exhibit Hall.

## **Messages**

Messages will be posted in the Message Center, located adjacent to the Power Sources registration desk. For incoming messages, please call the Adam's Mark at 215/581-5000 and ask to be transferred to the Power Sources registration desk.

## **Conference Contact**

Anyone requiring additional information should contact the Conference Coordinator, Ralph Nadell, Palisades Convention Management, 411 Lafayette Street, New York, NY 10003; 212/460-8090 x203. For registration verification, call 1-800/350-0111 or 212/460-9700.

## **Web Site**

Information on the Power Sources Conference may be obtained through its web site <http://www.powersources2004.com>.

## **IAPG Chemical Working Group Meeting**

The Interagency Advanced Power Group's Chemical Working Group will have its annual meeting at the conclusion of the Power Sources Conference, beginning on Thursday afternoon, June 17 and ending by noon on Friday, June 18. The meeting is open to U.S. Government employees only. There is no charge for attending. For further information and to confirm your attendance, contact the IAPG Administrator, Barbara Coles, at [barbara.coles@grc.nasa.gov](mailto:barbara.coles@grc.nasa.gov).



## Session 1

### BATTERY SAFETY/QUALITY/TESTING I

Monday, June 14, 2004 / 1:30 – 3:10 pm / Delaware Room

**Co-Chairs:** **Michael T. Brundage**

*U.S. Army, CECOM RDEC, Ft. Monmouth, NJ, U.S.A.*

**Bradley D. Secrest**

*NAVSEA, Crane, IN, U.S.A.*

**1.1: Overcharge Studies of Carbon–Carbon-Composite-Based Lithium-Ion Cells (1:30)**

**S. Hossain, R. Loutfy, Y-K. Kim, and Y. Saleh**

*MER Corp., Tucson, AZ, U.S.A.*

**J. A. Barnes**

*U.S. Department of Energy, Washington, D.C., U.S.A.*

**1.2: Safety Evaluation of Two Commercial Lithium-Ion Batteries for Space Applications (1:50)**

**J. A. Jeevarajan, J. S. Cook, and J. Collins**

*NASA/Johnson Space Center, Houston, TX, U.S.A.*

**1.3: Performance of High-Voltage Modules under Abuse Conditions (2:10)**

**J. A. Jeevarajan, E. C. Darcy, and B. W. Irlbeck**

*NASA/Johnson Space Center, Houston, TX, U.S.A.*

**F. J. Davies**

*Hernandez Engineering, Houston, TX, U.S.A.*

**P. Cowles**

*ComDev, Ltd., Cambridge, Ontario, Canada*

**1.4: Large Multi-Cell Batteries for U.S. Army Applications (2:30)**

**L. M. Cristo and G. W. Au**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**1.5: Lithium-Battery Mass Reaction Hazards (2:50)**

**B. Carpenter**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**BREAK**

**(3:10–3:30)**

## PRIMARY LITHIUM BATTERIES I

---

Monday, June 14, 2004 / 1:30 – 2:50 pm / Gettysburg Room

**Co-Chairs: Jeffrey Read**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**James A. Gucinski**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**2.1: Twenty-Year Operating-Life Bobbin-Type LiSOCl<sub>2</sub> Cell for High- Pulse-Current Applications (1:30)**

**H. Yamin, M. Shlepakov, and C. Menachem**

*Tadiran Batteries, Ltd., Ekron, Israel*

**2.2: Testing the Lithium Bimodal Reserve-Battery Concept (1:50)**

**P. P. McDermott**

*Zentek Corp, Vienna, VA, U.S.A.*

**D. Burns**

*SAGE Systems, King of Prussia, PA, U.S.A.*

**P. Schisselbauer and C. Kelly**

*ATK Ordnance and Ground Systems LLC, Horsham, PA, U.S.A.*

**2.3: Improvements in Energizer's L91 LiFeS<sub>2</sub> AA Cells (2:10)**

**J. W. Marple and A. Webber**

*Energizer, Westlake, OH, U.S.A.*

**2.4: Next-Generation High-Capacity LiSO<sub>2</sub> D Cell (2:30)**

**S. Charlton**

*Saft America, Inc., Valdese, NC*

**BREAK**

**(2:50–3:30)**

## BATTERY SAFETY/QUALITY/TESTING II

---

Monday, June 14, 2004 / 3:30 – 4:50 pm / Delaware Room

**Co-Chairs:** **Julie A. Banner**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**Donald E. Mains**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**3.1: A Survey of the Available Electrochemical Power Technologies and System Platform-Safety Concerns for Autonomous-Unmanned-Vehicle Applications (3:30)**

**J. Banner, J. Govar, and C. Winchester**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**3.2: Laboratory-Based Lithium-Microbattery Characterization Using Automated Analog Instrumentation (3:50)**

**V. Sukumar, M. Alahmad, K. Buck, M. Braley, J. Nance, F. N. Zghoul, H. Hess, H. Li, and D. Cox**  
*University of Idaho, Moscow, ID, U.S.A.*

**M. M. Mojarradi, W. C. West, and J. F. Whitacre**  
*Jet Propulsion Laboratory, CIT, Pasadena, CA, U.S.A.*

**3.3: Advanced-Technology-Vehicle Testing (4:10)**

**J. Francfort**

*Idaho National Engineering and Environmental Laboratory (INEEL), Idaho Falls, ID, U.S.A.*

**3.4: Analysis of Variance (ANOVA) for the Enhanced Delta Method (EDM) (4:30)**

**J. Freeland**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

## PRIMARY LITHIUM BATTERIES II

---

Monday, June 14, 2004 / 3:30 – 4:50 pm / Gettysburg Room

**Co-Chairs:** **Peter B. Keller**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**Jeffrey Read**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**4.1: Extended Shelf Life of Energizer L91 LiFeS<sub>2</sub> AA Cells (3:30)**

**A. Webber and D. A. Kaplin**

*Energizer, Westlake, OH, U.S.A.*

**4.2: Gassing in  $\lambda$ -MnO<sub>2</sub> Cells for Land Warrior Applications (3:50)**

**A. Driedger**

*MaxPower, Inc., Harleysville, PA, U.S.A.*

**J. Read, D. Foster, J. Wolfenstine, and W. K. Behl**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**4.3: Non-Aqueous Lithium–Air Batteries with an Advanced Cathode Structure (4:10)**

**A. Doble, J. P. DiCarlo, and K. M. Abraham**

*Lithion, Inc./Yardney Technical Products, Inc., Pawcatuck, CT, U.S.A.*

**4.4: The Temperature Performance of the Non-Aqueous Lithium–Air Battery (4:30)**

**J. Read and A. Pitt**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

Session 5

---

**ADVANCED MATERIALS AND PROCESSES I**

---

Tuesday, June 15, 2004 / 8:00 – 9:40 am / Ballroom C

**Co-Chairs: Terrill B. Atwater**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**Jeffrey B. Wolfenstine**

*U.S. Army Research Laboratory, Bethesda, MD, U.S.A.*

**5.1: High-Performance Ni-Based Lithium-Ion Cathode Material Designed for Potential Use in Hybrid-Electric Vehicles (8:00)**

**C. Lampe-Onnerud, J. Shi, P. Onnerud, S. Dalton, B. Barnett, D. Novikov, and M. Rona**  
*TIAX LLC, Cambridge, MA, U.S.A.*

**5.2: Intercalation Materials of Short-Range-Order Structures as High-Capacity Cathodes for Rechargeable Lithium Batteries (8:20)**

**J. J. Xu, G. Jain, J. Yang, and H. Ye**  
*Rutgers University, Piscataway, NJ, U.S.A.*

**5.3: LiMPO<sub>4</sub> Cathode Materials for Rechargeable Lithium Batteries (8:40)**

**A. Suszko, L. M. Cristo, and T. B. Atwater**  
*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**5.4: Thermal Behavior of Vanadium Pentoxide Aerogel and Ambigel Cathode Materials (9:00)**

**S. Dallek, P. H. Smith, and A. N. Mansour**  
*Naval Surface Warfare Center, W. Bethesda, MD, U.S.A.*

**5.5: High-Capacity Anode Materials for Lithium-Ion Batteries (9:20)**

**S. N. Iaconetti, J. P. DiCarlo, M. Gulbinska, P. G. Russell, and S. L. Suib**  
*Lithion, Inc./Yardney Technical Products, Inc., Pawcatuck, CT, U.S.A.*

**BREAK**

**(9:40–10:30)**



## MOLTEN-SALT BATTERIES I

---

Tuesday, June 15, 2004 / 8:00 – 9:40 am / Ballroom D

**Co-Chairs: Allan B. Goldberg**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**Clinton S. Winchester**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**6.1: Basic Fundamental Knowledge Required by Electrical Design Engineers in the Selection, Development, and Use of Thermal Batteries for New Designs (8:00)**

**J. Ewell**

*Textron Systems Corp., Wilmington, MA, U.S.A.*

**6.2: Thermal-Battery Modeling, Self-Discharge, and Self-Heating (8:20)**

**S. Schoeffert**

*Aerospatiale Batteries (ASB), Bourges, France*

**6.3: Gas Gettering in Operating Thermal Reserve Batteries (8:40)**

**F. C. Krieger, M. J. Shichtman, and J. A. Swank**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**6.4: AC Impedance Measurements on Molten-Salt Thermal Batteries (9:00)**

**P. Singh**

*Villanova University, Villanova, PA, U.S.A.*

**R. A. Guidotti**

*Sandia National Laboratories, Albuquerque, NM, U.S.A.*

**D. Reisner**

*U.S. Nanocorp, Inc., Farmington, CT, U.S.A.*

**6.5: New Lithium-Anode Composite for Long-Shelf-Life Thermal Batteries (9:20)**

**D. R. Dekel**

*Rafael Advanced Materials & Processes, Haifa, Israel*

**BREAK**

**(9:40–10:30)**

## POLYMER BATTERIES I

---

Tuesday, June 15, 2004 / 8:20 – 9:40 am / Constitution

**Co-Chairs:** **George Au**

*U.S. Army CECOM RDEC, Ft. Monmouth, NJ, U.S.A.*

**Donald L. Foster**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**7.1: Developments in Li-Ion SuperPolymer<sup>®</sup> Batteries for Portable Power Applications (8:20)**

**S. Das Gupta, R. Bhola, and J. K. Jacobs**

*Electrovaya Corp., Mississauga, Ontario, Canada*

**7.2: Z-Folding Cell-Assembly Technology and Overcharge Protection Chemistry: Commercial Gateways to Various Capacity and Discharge-Rate Applications of Secondary Lithium-Ion Polymer Batteries (LIPBs) (8:40)**

**J-J. Hong, S-U. Moon, and D-H. Yum**

*Kokam Engineering Co., Ltd., Seoul, Korea*

**J. Kim**

*Powergenic Systems, LLC, Tucson, AZ, U.S.A.*

**7.3: Fabrication and Performance of Microporous Gel-Electrolyte Li-Ion Battery (9:00)**

**S. S. Zhang, M. H. Ervin, D. L. Foster, K. Xu, and T. R. Jow**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**7.4: Non-Flammable Polyphosphonate Electrolytes (9:20)**

**B. G. Dixon and R. S. Morris**

*Phoenix Innovation, Inc., W. Wareham, MA, U.S.A.*

**S. Dallek**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**BREAK**

**(9:40–10:30)**

## ADVANCED MATERIALS AND PROCESSES II

---

Tuesday, June 15, 2004 / 10:00 am – 12:00 pm / Ballroom C

**Co-Chairs:** Jeffrey B. Wolfenstine

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

Terrill B. Atwater

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**8.1: Carbon–Carbon Composite: A High-Capacity Anode for Lithium-Ion-Battery Systems (10:00)**

**S. Hossain, R. Loutfy, Y. Saleh, and Y-K. Kim**

*LiTech, LLC, Tucson, AZ, U.S.A.*

**8.2: Rechargeable Electrochemical Cells Having Electrolyte Generated *in situ* from an All-Solid-State Assembly (10:20)**

**A. Gilmour**

*Lexcel Technology, Ltd., Henley-on-Thames, Oxon, U.K.*

**8.3: Electrochemical Characterization and Performance Evaluation of Battery Separator Membranes for Use in Primary Lithium and Alkaline Battery Systems (10:40)**

**M. P. Roberts and T. B. Atwater**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**M. P. Roberts, A. J. Salkind, and L. C. Klein**

*Rutgers University, Piscataway, NJ, U.S.A.*

**A. J. Salkind**

*UMDNJ, Robert Wood Johnson Medical School, Piscataway, NJ, U.S.A.*

**8.4: Acrylic Acid–Sodium Styrene Sulfonate Copolymer as a Separator for Alkaline Electrochemical Systems (11:00)**

**M. A. Schubert and J. P. Myers**

*Energizer, Westlake, OH, U.S.A.*

**8.5: An Improved CuO Cathode Material for Use in Primary Alkaline Batteries (11:20)**

**M. F. Mansuetto and A. Webber**

*Energizer, Westlake, OH, U.S.A.*

**8.6: The Primary Alkaline Zinc Electrode (11:40)**

**R. Putt**

*Electric Fuel Battery Corp., Auburn, AL, U.S.A.*

**T. B. Atwater**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**LUNCH**

**(12:00–1:30)**

## MOLTEN-SALT BATTERIES II

---

Tuesday, June 15, 2004 / 10:00 am – 12:00 pm / Ballroom D

**Co-Chairs:** **Sam G. Stuart**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**Clinton S. Winchester**

*Naval Warfare Surface Center, Crane, IN, U.S.A.*

**9.1: Water Uptake by Salts During the Electrolyte Process for Thermal Batteries (10:00)**

**P. Masset**

*Institute for Transuranium Elements, Karlsruhe, Germany*

**9.2: Iodide-Based Electrolytes: An Alternative for High-Temperature Batteries (10:20)**

**P. Masset**

*Institute for Transuranium Elements, Karlsruhe, Germany*

**9.3: Evaluation of  $\text{LiNO}_3\text{-KNO}_3$  Eutectic Electrolyte for Use in Geothermal Borehole Applications (10:40)**

**R. Guidotti**

*Sandia National Laboratories, Albuquerque, NM*

**9.4: A New Chromate-Free Cathode for Calcium Thermal Batteries (11:00)**

**S. Schoeffert**

*ASB-Aerospatiale Batteries, Bourges, France*

**9.5: Preparation and Characterization of Synthetic Metal Disulfides for Use in Thermal Batteries (11:20)**

**R. Guidotti**

*Sandia National Laboratories, Albuquerque, NM*

**9.6: Characterization of Plasma-Sprayed  $\text{FeS}_2$  and  $\text{CoS}_2$  Cathodes and Cathode-Separator Composites for Use in Thermal Batteries (11:40)**

**R. Guidotti**

*Sandia National Laboratories, Albuquerque, NM*

**LUNCH (12:00–1:30)**

## POLYMER BATTERIES II

---

Tuesday, June 15, 2004 / 10:00 – 11:20 am / Constitution

**Co-Chairs:** Lawrence G. Scanlon

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

Richard S. Baldwin

*NASA/Glenn Research Center, Cleveland, OH, U.S.A.*

**10.1: The Conductivity of POSS–PEO-Based Solid-State Electrolytes (10:00)**

**H. Zhang, S. Kulkarni, and S. L. Wunder**

*Temple University, Philadelphia, PA, U.S.A.*

**10.2: Ionic Transport Properties of Polyimide-Based Electrolyte Films (10:20)**

**D. L. Foster, M. J. Shichtman, S. S. Zhang, K. Xu, and W. K. Behl**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**10.3: Novel Polymer Gel Electrolytes Prepared by *in situ* Synthesis for Lithium Polymer Batteries (10:40)**

**J. J. Xu and H. Ye**

*Rutgers University, Piscataway, NJ, U.S.A.*

**10.4: A Study on the Characteristics of Passivation Film on the Surface of a Graphite Anode in a Polysiloxane-Based Electrolyte (11:00)**

**H. Nakahara, A. Masias, S. Y. Yoon, T. Koike, and H. Tsukamoto**

*Quallion LLC, Sylmar, CA, U.S.A.*

**LUNCH (12:00–1:30)**

## ADVANCED MATERIALS AND PROCESSES III

---

Tuesday, June 15, 2004 / 2:00 – 2:40 pm / Ballroom C

**Co-Chairs:** **Steven Dallek**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**Terrill B. Atwater**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**11.1: Packaging of Micro-Scale Power Sources (2:00)**

**A. E. Curtright, J. Pietron, A. M. Stux, and  
K. Swider-Lyons**

*Naval Research Laboratory, Washington, D.C., U.S.A.*

**11.2: Flexible Pouch Material for Land Warrior  
Battery (2:20)**

**G. Gard, M. Hoenigmann, and G. Reich**

*Pliant Corp., Chippewa Falls, WI, U.S.A.*

**H-P. Lin, M. Morgan, M. Gusenko, W. Eppley, and  
L. Bolster**

*MaxPower, Inc., Harleysville, PA, U.S.A.*

**BREAK**

**(2:40–3:30)**

## MOLTEN-SALT BATTERIES III

---

Tuesday, June 15, 2004 / 2:00 – 3:00 pm / Ballroom D

**Co-Chairs:** **David M. Ryan,**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**Sam G. Stuart**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**12.1: Application of a Ceramic Fiber Separator to Thermal-Battery Production (2:00)**

**T. D. Kaun**

*InvenTek Corp., New Lenox, IL, U.S.A.*

**12.2: Novel Thermal Batteries without Cathodes (2:20)**

**D. R. Dekel**

*Rafael Advanced Materials & Processes, Haifa, Israel*

**12.3: Importance of Heat-Sink Conditions during Thermal-Reserve-Battery Testing (2:40)**

**F. C. Krieger, J. A. Swank, and M. J. Shichtman**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**BREAK**

**(3:00–3:30)**

## NON-ELECTROCHEMICAL POWER SOURCES AND CAPACITORS

---

Tuesday, June 15, 2004 / 1:30 – 3:10 pm / Constitution

**Co-Chairs:** **Timothy C. Murphy**

*INEEL, Idaho Falls, ID, U.S.A.*

**Michael S. Ding**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**13.1: Palm Power: A Manually Cranked Battery Charger (1:30)**

**W. L. Moyers and H. S. Coombe**

*U.S. Army CECOM RDEC, Ft. Belvoir, VA, U.S.A.*

**A. Hartman**

*High Tide Associates, Palo Alto, CA, U.S.A.*

**13.2: Piezoelectric-Energy Harvesting for Soldier Systems (1:50)**

**C. A. Howells, S. J. Matthews, and H. S. Coombe**

*U.S. Army CECOM RDEC, Ft. Belvoir, VA, U.S.A.*

**13.3: Ultra-High-Temperature Selective-Emitter Heat Source for Electrical-Power Generation (2:10)**

**M. Goldstein and D. Krommenhoek**

*Quantum Group, Inc., San Diego, CA, U.S.A.*

**R. Feigelson**

*Stanford University, Stanford, CA, U.S.A.*

**K. C. Chen**

*General Atomics, San Diego, CA, U.S.A.*

**13.4: Laser-Powered Equipment (2:30)**

**M. Goldstein and D. Krommenhoek**

*Quantum Group, Inc., San Diego, CA, U.S.A.*

**13.5: Lightweight Portable Photovoltaic Power (2:50)**

**T. Teich**

*Global Solar Energy, Tucson, AZ, U.S.A.*

**BREAK (3:10–3:30)**



## SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES I

---

Tuesday, June 15, 2004 / 3:30 – 5:30 pm / Ballroom C

**Co-Chairs:** Catherine Marsh

*U.S. Government, Falls Church, VA, U.S.A.*

Dan S. Kieffner

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**14.1: 18650 Li-Ion Cell Building for Electrochemical and Thermal-Abuse Testing at Sandia National Laboratories (3:30)**

**G. Nagasubramanian, E. P. Roth, B. M. Sanchez, H. Case, and D. H. Doughty**

*Sandia National Laboratories, Albuquerque, NM, U.S.A.*

**14.2: Passive Thermal Management of Rolled-Ribbon Cells for a High-Rate Li-Ion Battery (3:50)**

**T. D. Kaun and W. G. Harris**

*InvenTek Corp., New Lenox, IL, U.S.A.*

**14.3: A New Strategy for Li-Ion-Microbattery Development as an Autonomous Micropower Source (4:10)**

**A. M. Stux, A. E. Curtright, and K. Swider-Lyons**

*Naval Research Laboratory, Washington, D.C., U.S.A.*

**14.4: Design, Thermal Analysis, and Testing of Very-Large Lithium-Ion Cells (4:30)**

**S. Cohen, S. Eaves, J. Hall, F. Puglia, and R. Scott**

*Lithion, Inc./Yardney Technical Products, Inc., Pawcatuck, CT, U.S.A.*

**14.5: High-Power Gel-Polymer Lithium-Ion Cells with Improved Low-Temperature Performance for NASA and DoD Applications (4:50)**

**M. C. Smart, B. V. Ratnakumar, L. D. Whitcanack, K. B. Chin, S. Surampudi, and S. R. Narayanan**

*Jet Propulsion Laboratory, CIT, Pasadena, CA, U.S.A.*

**M. Alamgir**

*Compact Power, Inc., Monument, CO, U.S.A.*

**J-S. Yu**

*LG Chem, Monument, CO, U.S.A.*

**E. P. Plichta**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**14.6: Assessing Low-Temperature Performance in Lithium-Ion Cells Using a Chemical Physics and Solvation-Based Description of Battery Electrolytes (5:10)**

**K. L. Gering**

*Idaho National Engineering and Environmental Laboratory, Idaho Falls, ID, U.S.A.*

## FUEL GENERATION, STORAGE, AND REFORMING

---

Tuesday, June 15, 2004 / 3:30 – 5:30 pm / Ballroom D

**Co-Chairs:** Michele L. Anderson

*ONR, Arlington, VA, U.S.A.*

Ivan Lee

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**15.1: Ceria-Containing Fuel-Processing Catalysts for Fuel-Cell Applications. Part I: Synthesis of Water–Gas-Shift Catalysts (3:30)**

**R. K. Pati and S. H. Ehrman**

*University of Maryland, College Park, MD, U.S.A.*

**I. C. Lee and D. Chu**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**15.2: Logistic Fuel to Hydrogen: Fuel Processing Using Microfibrous Entrapped Catalysts and Sorbents for PEM Fuel Cells (3:50)**

**M. Karanjikar, Y. Lu, B. Chang, N. Sathitsuksanoh, H. Yang, and B. Tatarchuk**

*Auburn University, Auburn, AL, U.S.A.*

**15.3: Integrated Logistic Fuel Processor for PEM Fuel-Cell Applications (4:10)**

**M. Cervi**

*Naval Surface Warfare Center, Philadelphia, PA, U.S.A.*

**15.4: Ceria-Containing Fuel-Processing Catalysts for Fuel-Cell Applications. Part II: Water–Gas-Shift Activities (4:30)**

**I. C. Lee and D. Chu**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**R. K. Pati and S. H. Ehrman**

*University of Maryland, College Park, MD, U.S.A.*

**15.5: Microreactors for Hydrogen Production from Ammonia (4:50)**

**J. Ganley, R. I. Masel, and E. G. Seebauer**

*University of Illinois at Urbana, Urbana, IL, U.S.A.*

**15.6: Advancements in Hydrogen-on-Demand™ Fuel Systems for Military Electronics Devices (5:10)**

**S. Shah**

*Millennium Cell, Inc., Eatontown, NJ, U.S.A.*

Session 16

FUEL CELLS I

Wednesday, June 16, 2004 / 8:00 – 9:40 am / Ballroom C

Co-Chairs: **Deryn D. Chu**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**Michael Quah**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

16.1: **Self-Hydrating Polymer-Electrolyte Fuel Cells** (8:00)

**W. L. Gellert, D. C. Dunwoody, and J. Leddy**

*University of Iowa, Iowa City, IA, U.S.A.*

16.2: **Proton-Conducting Hybrid Polymer Electrolytes Incorporated with Polyoxometalates** (8:20)

**C. Rong, R. Jiang, L. Belenky, and D. Chu**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

16.3: **Proton-Conducting Polymer Composite with Reduced Methanol Permeability** (8:40)

**C. W. Walker, Jr.**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

16.4: **Proton-Conducting Block Co-Polymers and Their Application to the Direct Methanol Fuel Cell** (9:00)

**Y. A. Elabd**

*Drexel University, Philadelphia, PA, U.S.A.*

**C. W. Walker, Jr.**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

16.5: **Improving the Power Density of PEM Fuel Cells** (9:20)

**D. Renock, H. Lei, P. Zhang, J. Ma, and C. Peiter**

*T/J Technologies, Inc., Ann Arbor, MI, U.S.A.*

**BREAK**

**(9:40–10:00)**

## Session 17

---

# SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES II

---

Wednesday, June 16, 2004 / 8:00 – 9:40 am / Ballroom D

**Co-Chairs:** **Dan S. Kieffner**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**James A. Barnes**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**17.1: Undersea-Platform Large-Lithium-Ion-Battery Program (8:00)**

**L. Ruckriegel**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**17.2: Lithium-Ion Technology for Aerospace Applications (8:20)**

**C. Deroy, R. Gitzendanner, F. Puglia, D. Carmen,  
and E. Jones**

*Lithion, Inc., Pawcatuck, CT, U.S.A.*

**17.3: Very-High-Power Lithium-Ion Technology for Aircraft and Directed-Energy Applications (8:40)**

**K. Nechev and T. Matty**

*Saft America, Inc., Cockeysville, MD, U.S.A.*

**S. Vukson**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**17.4: High-Capacity Lilon BB-2590: Performance and Safety Characteristics (9:00)**

**M. Sink**

*Saft America, Inc., Valdese, NC, U.S.A.*

**17.5: Custom-Designed Lithium-Ion Pouch Cells for Unmanned Micro Air Vehicles (9:20)**

**S. Hossain, R. Loutfy, Y-K. Kim, and Y. Saleh**

*LiTech, LLC, Tucson, AZ, U.S.A.*

**J. P. Thomas**

*Naval Research Laboratory, Washington, D.C., U.S.A.*

**M. T. Keennon**

*AeroVironment, Inc., Simi Valley, CA, U.S.A.*

**BREAK**

**(9:40–10:00)**

## AQUEOUS BATTERIES I

---

Wednesday, June 16, 2004 / 8:00 – 9:40 am / Constitution

**Co-Chairs: Marvin Wilkerson**

*NAVSEA, Crane, IN, U.S.A.*

**Badruddin Pirani**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**18.1: Electrochemical Behavior of Poly(Vinylferrocene) in Relation to Monitoring of Lead-Acid-Battery State of Charge (8:00)**

**T. B. Issa and P. Singh**

*Murdoch University, Murdoch, Western Australia, Australia*

**M. V. Baker**

*University of Western Australia, Western Australia, Australia*

**18.2: Fuzzy-Logic-Based Smart Battery Controller for Tank Batteries (8:20)**

**C. Pulamarasetty and P. Singh**

*Villanova University, Villanova, PA, U.S.A.*

**H. Chen, X. Wang, and D. Reisner**

*U.S. Nanocorp, Inc., Farmington, CT, U.S.A.*

**W. Hnatzuk**

*U.S. Army TACOM, Warren, MI, U.S.A.*

**18.3: Lead-Plated Titanium Grids for Lead-Acid Batteries (8:40)**

**J. Dai, Z. Zhang, T. D. Xiao, and D. Reisner**

*U.S. Nanocorp, Inc., Farmington, CT, U.S.A.*

**18.4: Lightweight Lead-Acid Battery for Aircraft Applications (9:00)**

**R. Bhardwaj, C. Bhardwaj, and J. Timmons**

*Concorde Battery Corp., West Covina, CA, U.S.A.*

**B. R. Johnson**

*NAWC, Patuxent River, MD, U.S.A.*

**18.5: Electrochemical Characterization of g-MnO<sub>2</sub> in Zn/MnO<sub>2</sub>/LiOH (Aqueous) Cells (9:20)**

**M. Minakshi, P. Singh, T. B. Issa, and S. Thurgate**

*Murdoch University, Murdoch, Western Australia, Australia*

**BREAK**

**(9:40–10:00)**

## FUEL CELLS II

---

Wednesday, June 16, 2004 / 10:00 am – 12:00 pm / Ballroom C

**Co-Chairs: Ken Burt**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**Joseph P. Fellner**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**19.1: Operation of PEM Stacks Utilizing Hydrogen Feeds with High Levels of Inert Gases (10:00)**

**W. H. Zhu, H. Yang, R. U. Payne, and B. J. Tatarchuk**  
*Auburn University, Auburn, AL, U.S.A.*

**19.2: Diagnosis of Commercial PEM Fuel Cells via the Impedance Response (10:20)**

**W. H. Zhu, D. R. Cahela, R. U. Payne, and B. J. Tatarchuk**  
*Auburn University, Auburn, AL, U.S.A.*

**19.3: Medis Technologies: A WEF Technological Pioneer in 2004 (10:40)**

**G. Finkelshtain**  
*More Energy, Ltd., Medis Technologies, Yahud, Israel*

**19.4: Development, Test, and Evaluation of a 20-W Direct-Methanol-Fuel-Cell Power Unit (11:00)**

**T. G. DuBois, E. Bostic, N. Sifer, C. G. M. Quah, C. Bolton, and K. Gardner**  
*U.S. Army RDECOM, Ft. Belvoir, VA, U.S.A.*

**19.5: Methanol-Crossover and Fluid-Dynamics Issues in Methanol–Air Fuel Cells (11:20)**

**R. Srinivasan, H. Saffarian, J. Wilkerson, and B. Cybyk**  
*The Johns Hopkins University, Laurel, MD, U.S.A.*

**19.6: Direct-Methanol Fuel Cells for Portable Electronics (11:40)**

**D. Renock, H. Lei, P. Zhang, J. Ma, and C. Peiter**  
*T/J Technologies, Inc., Ann Arbor, MI, U.S.A.*

**LUNCH (12:00–1:30)**

## SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES III

---

Wednesday, June 16, 2004 / 10:00 am – 12:00 pm / Ballroom D

**Co-Chairs:** **Valerie Browning**

*DARPA, Arlington, VA, U.S.A.*

**Donald L. Foster**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**20.1: Large Low-Cost Rapidly Configurable Lithium-Ion-Battery Modules Constructed from Small Commercial Cells (10:00)**

**S. S. Eaves**

*Modular Energy Devices, Inc., Charlestown, RI, U.S.A.*

**20.2: Lithium-Ion Batteries for Low-Temperature Applications (10:20)**

**C. Xu, M. Heath, C. Silkowski, and J. M. Miller**

*T/J Technologies, Inc., Ann Arbor, MI, U.S.A.*

**20.3: High-Rate Li-Ion-Cell Testing (10:40)**

**S. Santee, S. Cohen, J. DiCarlo, F. Puglia, and J. Wallace**

*Lithion, Inc., Pawcatuck, CT, U.S.A.*

**20.4: Development of a 300-Wh/kg Solid-State Rechargeable Lithium Battery (11:00)**

**S. K. Nieh, V. Krisnov, J. L. Arias, and R. M. Murphy,**

*Front Edge Technology, Inc., Baldwin Park, CA, U.S.A.*

**20.5: Lithium–Sulfur Rechargeable-Battery Characteristics, State of Development, and Applicability to Powering Portable Electronics (11:20)**

**J. Akridge**

*Sion Power Corp., Tucson, AZ, U.S.A.*

**20.6: Degradation of Li Rechargeable Batteries (11:40)**

**G. Au and E. J. Plichta**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**P. L. Moss and J. P. Zheng**

*Florida A&M University and Florida State University, Tallahassee, FL, U.S.A.*

**R. Fu and Y. Xin**

*Florida State University, Tallahassee, FL, U.S.A.*

## Session 21

---

### AQUEOUS BATTERIES II

---

Wednesday, June 16, 2004 / 10:00 – 11:20 am / Constitution

**Co-Chairs:** **Badruddin Pirani**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**Marvin Wilkerson**

*NAVSEA, Crane, IN, U.S.A.*

**21.1: Fourth-Generation Zinc–Air Batteries (10:00)**

**R. Putt and N. Naimer**

*Electric Fuel Battery Corp., Auburn, AL, U.S.A.*

**T. B. Atwater**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**21.2: Aluminum–Air Fuel Cell/Battery Research (10:20)**

**J. Dick, A. Doble, and J. Robak**

*Yardney Technical Products, Inc., Pawcatuck, CT, U.S.A.*

**21.3: 81- and 89-Ah Nickel–Hydrogen-Battery Performance in LEO Cycling (10:40)**

**T. B. Miller**

*NASA/Glen Research Center, Cleveland, OH, U.S.A.*

**H. L. Lewis**

*NAVSEA, Crane, IN, U.S.A.*

**21.4: Advances in Low-Temperature Performance of Metal-Hydride Aircraft Batteries (11:00)**

**J. K. Erbacher and G. J. Loeber**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**C. A. Riepenhoff**

*Wyle Laboratories, Dayton, OH, U.S.A.*

**LUNCH (12:00–1:30)**



## FUEL CELLS III

---

Wednesday, June 16, 2004 / 1:30 – 3:10 pm / Ballroom C

**Co-Chairs:** **Michael Quah**

*U.S. Army CERDEC, Ft. Monmouth, NJ, U.S.A.*

**Ken Burt**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**22.1: Molten-Carbonate Fuel-Cell Generator for Ship-Service Applications (1:30)**

**E. House**

*Naval Surface Warfare Center, Philadelphia, PA, U.S.A.*

**22.2: U.S. Army Foreign-Comparative-Test Fuel-Cell Program (1:50)**

**E. Bostic, N. Sifer, C. Bolton, U. Ritter, T. G. DuBois, C. G. M. Quah**

*U.S. Army RDECOM, Ft. Belvoir, VA, U.S.A.*

**22.3: Multi-Fuel-Type PEM Fuel-Cell Systems for Military Auxiliary-Power-Unit Applications (2:10)**

**R. DuBois**

*IdaTech, LLC, Bend, OR, U.S.A.*

**N. Sifer**

*U.S. Army RDECOM, Ft. Belvoir, VA, U.S.A.*

**22.4: Affordable Fuel Cells for Portable Power Applications (2:30)**

**M. Enayetullah, P. Osenar, P. Sabin, and R. Formato**

*Protonex Technology Corp., Marlborough, MA, U.S.A.*

**22.5: Characterization of Pore Structure of Fuel-Cell Components Containing Hydrophobic and Hydrophilic Pores (2:50)**

**A. Jena and K. Gupta**

*Porous Materials, Inc., Ithaca, NY, U.S.A.*

**BREAK**

**(3:10–3:30)**

---

## SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES IV

---

Wednesday, June 16, 2004 / 1:30 – 3:10 pm / Ballroom D

**Co-Chairs:** **Jeffrey B. Wolfenstine**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**Patricia H. Smith**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**23.1:  $\text{Si}_3\text{N}_4$  as an Anode for Use in Li-Ion Batteries (1:30)**

**J. Wolfenstine**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**23.2: Electrochemical Behavior of Tin Oxide Nanoparticles as Material for Negative Electrodes of Li-Ion Batteries (1:50)**

**A. Nimberger, B. Markovsky, E. Levi, E. Sominsky,  
A. Gedanken, and D. Aurbach**

*Bar-Ilan University, Ramat-Gan, Israel*

**23.3: High-Energy Rechargeable Li-Ion Battery Based on Carbon-Nanotube Technology (2:10)**

**R. S. Morris and B. G. Dixon**

*Phoenix Innovation, Inc., Wareham, MA, U.S.A.*

**T. Gennett and R. Raffaele**

*Rochester Institute of Technology, Rochester, NY, U.S.A.*

**23.4: Ultra-High-Rate Batteries Based on Nanostructured Electrode Materials (2:30)**

**J. M. Miller, B. Glomski, C. Silkowski, S. Huggett,  
M. Heath, P. Sholtes, S. Walker, C. Xu, and M. Wixom**  
*T/J Technologies, Inc., Ann Arbor, MI, U.S.A.*

**23.5: Performance Characterization of Li-Ion Cells Possessing Carbon–Carbon-Composite-Based Anodes Capable of Operating over a Wide Temperature Range (2:50)**

**M. C. Smart, B. V. Ratnakumar, L. D. Whitcanack,  
K. B. Chin, E. D. Davies, S. Surampudi, and  
S. R. Narayanan**

*Jet Propulsion Laboratory, CIT, Pasadena, CA, U.S.A.*

**S. Hossain and R. Loutfy**

*LiTech, LLC, Tucson, AZ, U.S.A.*

**BREAK**

**(3:10–3:30)**

## CHARGING TECHNIQUES & POWER MANAGEMENT I

---

Wednesday, June 16, 2004 / 1:30 – 2:50 pm / Constitution

**Co-Chairs:** **Steve M. Slane**

*U.S. Army CECOM, Ft. Monmouth, NJ, U.S.A.*

**Larry Ruckriegel**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**24.1 Compact Lightweight Smart Battery Charger (1:30)**

**R. Beech**

*NVE Corp., Eden Prairie, MN*

**24.2 Smart Charger (1:50)**

**J. Cherry**

*SHOT, Greenville, IN*

**24.3 Land Warrior 9-Position Rapid Smart-Charger Development (2:10)**

**A. Saba**

*Ultralife Batteries, Inc., Newark, NY*

**24.4 Development of an Integrated Li-Ion Battery and Charger System (2:30)**

**B. Macklin**

*AEA Technology Battery Systems, Thurso, Caithness, U.K.*

**BREAK (2:50–3:30)**

## FUEL CELLS IV

---

Wednesday, June 16, 2004 / 3:30 – 5:10 pm / Ballroom C

**Co-Chairs: Justin Govar**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**Joseph P. Fellner**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**25.1: A Survey of Fuel-Cell Systems with Circulating Electrolytes (3:30)**

**K. Kordesch, M. Cifrain, G. Faleschini, D. James, G. Koscher, and A. Stani**

*Technical University of Graz, Graz, Austria*

**25.2: Investigating a LiH<sub>2</sub>O<sub>2</sub> Semi Fuel Cell with a Microfibrous Cathode as a Power Source for Underwater Vehicles (3:50)**

**C. J. Patrissi, L. G. Carreiro, and M. G. Medeiros**

*Naval Undersea Warfare Center, Newport, RI, U.S.A.*

**R. R. Bessette**

*Naval Undersea Warfare Center, Newport, RI, U.S.A.;*

*University of Massachusetts at Dartmouth, N. Dartmouth, MA, U.S.A.; c-BAE Systems, Middletown, RI, U.S.A.*

**C. M. Deschenes**

*c-BAE Systems, Middletown, MA, U.S.A.*

**25.3: Catalysis, Architecture, and the Electrochemical Performance of Microfibrous Cathodes for Hydrogen Peroxide-Based Fuel Cells (4:10)**

**R. R. Bessette**

*Naval Undersea Warfare Center, Newport, RI, U.S.A.;*

*University of Massachusetts at Dartmouth, N. Dartmouth, MA, U.S.A.; c-BAE Systems, Middletown, RI, U.S.A.*

**C. J. Patrissi, S. P. Tucker, L. G. Carreiro, and M. G. Medeiros**

*Naval Undersea Warfare Center, Newport, RI, U.S.A.*

**T. M. Arruda**

*University of Massachusetts at Dartmouth,*

*N. Dartmouth, MA, U.S.A.*

**C. M. Deschenes**

*c-BAE Systems, Middletown, RI, U.S.A.*

**25.4: Miniature Formic Acid Fuel Cells: New Possibilities for Portable Power (4:30)**

**R. Masel**

*Renew Power, Champaign, IL, U.S.A., and the University of Illinois at Urbana, Urbana, IL, U.S.A.*

**S. Ha, M. Shannon, and A. Wieckowski**

*Renew Power, Champaign, IL, U.S.A.*

**Y. Zhu, B. Adams, G. Mozsgai, and Z. Kahn**

*University of Illinois at Urbana, Urbana, IL, U.S.A.*

**25.5: A Method for High-Throughput Evaluation of Large Numbers of Single Fuel Cells (4:50)**

**R. Jiang, C. Rong, and D. Chu**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

## SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES V

---

Wednesday, June 16, 2004 / 3:30 – 4:50 pm / Ballroom D

**Co-Chairs: Patricia H. Smith**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**Stephen P. Vukson**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**26.1: Development of High-Power Li-Ion-Battery Technology for Hybrid-Electric-Vehicle Applications (3:30)**

**N. S. Raman**

*Saft America, Inc., Cockeysville, MD, U.S.A.*

**26.2: Development of High-Energy-Density Lithium-Ion Cells (3:50)**

**A. M. Jeffery and J. K. Hinde**

*AGM Batteries, Ltd., Thurso, Caithness, U.K.*

**26.3: Suppression of Decomposition Reactions of Lithium-Ion-Battery Electrolytes (4:10)**

**B. L. Lucht, C. L. Champion, and W. Li**

*University of Rhode Island, Kingston, RI, U.S.A.*

**B. Ravdel, J. F. DiCarlo, R. Gitzendanner, and K. M. Abraham**

*Lithion, Inc., Pawcatuck, CT, U.S.A.*

**26.4: Safe-Design Composite Material in Negative Electrodes for Lithium-Ion Cells (4:30)**

**G. Au and L. M. Cristo**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**S. Hossain**

*MER Corp., Tucson, AZ, U.S.A.*

## CHARGING TECHNIQUES & POWER MANAGEMENT II

---

Wednesday, June 16, 2004 / 3:30 – 4:50 pm / Constitution

**Co-Chairs:** **Mary A. Hendrickson**

*U.S. Army CECOM, Ft. Monmouth, NJ, U.S.A.*

**Steve M. Slane**

*U.S. Army CECOM, Ft. Monmouth, NJ, U.S.A.*

**27.1: Scalable Automated Configuration and Charging System for Multiple Series-Parallel Lithium-Ion (LIPON) Batteries (3:30)**

**M. Alahamad, V. Sukumar, H. Hess, K. Buck, and H. Li**

*University of Idaho, Moscow, ID, U.S.A.*

**M. Mojarradi**

*Jet Propulsion Laboratory, CIT, Pasadena, CA, U.S.A.*

**27.2: Diagnostic and Prognostic Methods for the Health and Condition of Primary and Secondary Batteries (3:50)**

**J. D. Kozlowski**

*The Pennsylvania State University, State College, PA, U.S.A.*

**27.3: Advancements in Battery Capacity Prediction Techniques (4:10)**

**H. Singh, S. Hoenig, T. Palanisamy, and H. Atehortua**

*Honeywell International, Inc., Teterboro, NJ, U.S.A.*

**27.4: Fuzzy-Logic-Based State-of-Health Estimation of Li-Ion Batteries (4:30)**

**P. Singh and R. Vinjamuri**

*Villanova University, Villanova, PA, U.S.A.*

**X. Wang and D. Reisner**

*U.S. Nanocorp, Inc., Farmington, CT, U.S.A.*

Session 28

---

**AQUEOUS BATTERIES III**

---

Thursday, June 17, 2004 / 8:20 – 9:40 am / Ballroom C

**Co-Chairs:** **John K. Erbacher**

*Air Force Research Laboratory, Dayton, OH, U.S.A.*

**Scott Windell**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**28.1: Silver–Zinc-Battery-Technology Improvement Program (8:20)**

**R. Serenyi and J. Skelton**

*Yardney Technical Products, Inc., Pawcatuck, CT, U.S.A.*

**28.2: Zinc Anti-Corrosion Additives (8:40)**

**J. C. Flynn**

*BST Systems, Inc., Plainfield, CT, U.S.A.*

**28.3: Silver–Zinc-Battery Separator Improvement (9:00)**

**G. J. Moore**

*BST Systems, Inc., Plainfield, CT, U.S.A.*

**28.4: A Novel Membrane System and Its Application in Zn-Based Rechargeable Batteries (9:20)**

**M. Chen, F. Cao, and L. Liang**

*eVionyx, Inc., Hawthorne, NY, U.S.A.*

**BREAK (9:40–10:00)**



## SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES VI

---

Thursday, June 17, 2004 / 8:20 – 9:40 am / Ballroom D

**Co-Chairs: Edward J. Plichta**

*U.S. Army CECOM, Ft. Monmouth, NJ, U.S.A.*

**Wishvender K. Behl**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**29.1: Evaluation of Substituted Lithium Nickel Vanadate Solid Solutions as Cathode Materials for Lithium-Ion-Battery Applications (8:20)**

**P. Kalyani, N. Kalaiselvi, N. Jayaprakash,  
R. V. Arumugam, and N. G. Renganathan**

*Central Electrochemical Research Institute, Karaikudi, India*

**29.2: A Comparative Study on the Electrochemical Performance of  $\text{LiNi}_{0.7}\text{M}_{0.3}\text{O}_2$  (M = Co, Mg, Al, and B) Cathode Materials for Rechargeable Lithium-Ion Batteries (8:40)**

**P. Kalyani, N. Kalaiselvi, R. V. Arumugam,  
N. Jayaprakash, and N. G. Renganathan**

*Central Electrochemical Research Institute, Karaikudi, India*

**29.3: Nanostructured Electrodes for Next-Generation Rechargeable Electrochemical Devices (9:00)**

**A. Singhal and G. Skandan**

*NEI Corp., Piscataway, NJ, U.S.A.*

**G. Amatucci, F. Badway, H. Ye, and J. J. Xu**

*Rutgers University, Piscataway, NJ, U.S.A.*

**N. Ye and A. Manthiram**

*University of Texas at Austin, Austin, TX, U.S.A.*

**29.4:  $\text{LiFePO}_4$  Cathode Material Designed for Use in Lithium-Ion Batteries for Hybrid-Electric Vehicles (9:20)**

**P. Onnerud, J. Shi, R. Chamberlain, D. Novikov,  
M. Rona, and C. Lampe-Onnerud**

*TIAX, LLC, Cambridge, MA, U.S.A.*

## HYBRID POWER SYSTEMS AND COMPONENTS I

---

Thursday, June 17, 2004 / 8:00 – 9:40 am / Constitution

**Co-Chairs: Peter J. Cygan**

*U.S. Army CECOM, Ft. Monmouth, NJ, U.S.A.*

**Capt. David Pfahler**

*AFRL, Wright-Patterson AFB, OH, U.S.A.*

**30.1: Tantalum Hybrid-Button-Cell Capacitor (8:00)**

**D. A. Evans**

*Evans Capacitor Co., Inc., E. Providence, RI, U.S.A.*

**30.2: High-Reliability Back-Up Power Systems Using Ultracapacitors (8:20)**

**G. S. Jasinski**

*Maxwell Technologies, San Diego, CA, U.S.A.*

**30.3: A Structural Ultracapacitor Using Dual-Function Carbon-Composite Electrodes (8:40)**

**J. B. Olson, S. Sinor, S. Doherty, T. L. Feaver, and P. C. Lyman**

*Boundless Corp., Boulder, CO, U.S.A.*

**30.4: The Making of a Hybrid System: Performance Matrix of Zn–Air/Lithium-Ion Hybrid Variants (9:00)**

**L. P. Jarvis, T. B. Atwater, A. Suszko, and P. Cygan**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**30.5: A Self-Regulating Hydrogen-Fueled Flatstack™ Fuel-Cell/Li-Ion Hybrid Power Source for the Objective Force Warrior (9:20)**

**B. Fiebig, D. Houy, and H. Maheshwari**

*Lynntech, Inc., College Station, TX, U.S.A.*

**BREAK (9:40–10:00)**

## AQUEOUS BATTERIES IV

---

Thursday, June 17, 2004 / 10:00 – 11:20 am / Ballroom C

**Co-Chairs:** **Scott Windell**

*Naval Surface Warfare Center, Crane, IN, U.S.A.*

**John K. Erbacher**

*Air Force Research Laboratory, Dayton, OH, U.S.A.*

**31.1: Development of a New Rechargeable Silver–Zinc Battery (10:00)**

**D. Doniat, B. Bugnet, R. Rouget, F. Fourgeot, and I. Chery**

*S.C.P.S., Rosny-sous-Bois, France*

**31.2: High-Power Zinc Alkaline Batteries for Military/Aerospace Applications (10:20)**

**R. Kainthla and B. Coffey**

*RBC Technologies, College Station, TX, U.S.A.*

**31.3: Development of On-Board Power Sources for Interceptor Missiles (10:40)**

**R. Serenyi, J. Murphy, A. Puhlick, L. Orlando, and J. Skelton**

*Yardney Technical Products, Inc., Pawcatuck, CT, U.S.A.*

**31.4: Development of a 1.5-Ah Silver–Zinc Battery for Launch-Vehicle GPS Applications (11:00)**

**P. Imhof**

*BST Systems, Inc., Plainfield, CT, U.S.A.*

## SECONDARY LITHIUM BATTERIES: LITHIUM-ION BATTERIES VII

---

Thursday, June 17, 2004 / 10:00 – 11:20 am / Ballroom D

**Co-Chairs:** **Wishvender K. Behl**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**Kang Xu**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**32.1: Characteristics and Behavior of 1M LiPF<sub>6</sub> 1EC:1DMC Electrolyte at Low Temperatures (10:00)**

**L. M. Cristo**

*U.S. Army RDECOM CERDEC, Ft. Monmouth, NJ, U.S.A.*

**32.2: Characterization and Performance of LiBOB as Electrolyte Solute in Li-Ion Devices (10:20)**

**K. Xu, S. Zhang, U. Lee, J. L. Allen, and T. R. Jow**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**32.3: Effect of LiBF<sub>4</sub> on Cycling Performance of Li-Ion Batteries Containing Carbonate Solvents (10:40)**

**T. Barbarich, B. Ravdel, S. Santee, J. P. DiCarlo, and K. M. Abraham**

*Lithion, Inc./Yardney Technical Products, Inc., Pawcatuk, CT, U.S.A.*

**32.4: Change of Conductivity with Salt Molality, Solvent Composition, and Temperature and Its Mechanisms for PC-DEC and PC-EC Solutions of LiBF<sub>4</sub>, LiPF<sub>6</sub>, LiBOB, Et<sub>4</sub>NBF<sub>4</sub>, and Et<sub>4</sub>NPF<sub>6</sub> (11:00)**

**M. S. Ding and T. R. Jow**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

## HYBRID POWER SYSTEMS AND COMPONENTS II

---

Thursday, June 17, 2004 / 10:00 – 11:40 am / Constitution

**Co-Chairs:** **T. Richard Jow**

*U.S. Army Research Laboratory, Adelphi, MD, U.S.A.*

**Rebecca Smith**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**33.1: Hybrid Power Systems for Portable Communications Systems (10:00)**

**C. J. Govar, R. A. Smith, A. Mansour, and P. H. Smith**

*Naval Surface Warfare Center, Bethesda, MD, U.S.A.*

**33.2: Integrated Hybrid (Fuel Cell/Capacitor/Battery) PowerPack (10:20)**

**B. Dweik**

*Giner, Inc., Newton, MA, U.S.A.*

**33.3: Hybrid Power Systems and Components: Land Warrior Hybrid Power-Source Development (10:40)**

**M. Matthews**

*Ultralife Batteries, Inc., Newark, NY, U.S.A.*

**33.4: A 1-kW Hybrid Power System for Mobile Applications (11:00)**

**R. Kirby**

*Auburn University, Auburn, AL, U.S.A.*

**Z. Shotts**

*Radiance Technologies, Inc., Huntsville, AL, U.S.A.*

**33.5: A 1.2-kW Free-Piston Stirling-Engine Hybrid Power System (11:20)**

**H. W. Brandhorst, Jr.**

*Auburn University, Auburn, AL, U.S.A.*

**M. F. Rose**

*Radiance Technologies, Inc., Huntsville, AL, U.S.A.*



