

Special One Day Symposium

Fuel Cell & Battery

Hybrid Systems

Conveniently timed with

10th Annual International Conference
**Small Fuel Cells
2008**

May 1-2, 2008

Building Synergy
Towards
Commercialization

April 30, 2008

Atlanta, GA USA

 **KNOWLEDGE FOUNDATION**
TECHNOLOGY COMMERCIALIZATION ALLIANCE

www.knowledgefoundation.com

ENDORISING ORGANIZATIONS:





10th Annual Small Fuel CellsSM 2008

PORTABLE & MICRO FUEL CELLS FOR COMMERCIAL & MILITARY APPLICATIONS

April 30-May 2,
2008

CALL FOR SPONSORS, EXHIBITORS & POSTERS

SPONSORSHIP AND EXHIBIT OPPORTUNITIES

Attendees at this event represent the very top industry, government and academic researchers from around the world and provide an extremely targeted and well-qualified audience for exhibitors and sponsors. Your participation as an exhibitor or sponsor is the most cost effective way to gain high quality, focused exposure to these industry leaders. Among other benefits, sponsorship packages include your logo on marketing materials to promote your participation and expose your company to 10's of thousands of prospects prior to the program - in addition to the highly targeted audience we deliver at the event itself.

CONFERENCE SPONSORSHIPS

A variety of conference sponsorships are available which offer incremental levels of visibility to conference delegates at the event — as well as opportunities for marketing exposure prior to the event. Taking advantage of pre-conference options has the added benefit of getting your organization's name out to a large group of interested decision makers.

NETWORKING EVENT SPONSORSHIPS

These "mini" sponsorships offer representatives of your organization a dedicated opportunity to network with conference delegates — with your organization clearly recognized as the host of the event.

- Cocktail Receptions
- Luncheons
- Dinner Banquets
- Hospitality Suites

WORKSHOP SPONSORSHIPS

Your company may sponsor an instructional workshop (subject to approval) for delegates in conjunction with the conference. Highlight your organization's expertise! Delegate feedback indicates that these scientific/technical vehicles enhance retention of your organization's presence in their minds — increasing the potential for drawing customers long after the conference is over.

Call Lindsay Kennedy at (617) 232-7400 ext. 210 or email lkennedy@knowledgefoundation.com today for pricing information and customization options.

CALL FOR POSTER PRESENTATIONS

Industry and academic scientists are encouraged to submit poster titles for this event. One-page abstracts (8 1/2" x 11" with 1-inch margins) must be submitted no later than **April 7, 2008** for inclusion in conference documentation. Additional poster submissions will be accepted until **April 25, 2008** but may not be included in conference documentation. Note: If you are submitting a poster, you **MUST** be registered and paid in advance to ensure that a posterboard is reserved for you.

COMPREHENSIVE DOCUMENTATION AVAILABLE

Nothing can substitute the benefits derived from attending **Small Fuel CellsSM 2008**. But if your schedule prevents you from attending, this invaluable resource is available to you. Please allow 3-4 weeks after the conference date for delivery. *Note: Documentation is included with conference fee for registered delegates.*



Become a member of the Alliance today and save 15% off your conference registration to Small Fuel Cells 2008

For complete membership information go to:
www.knowledgefoundation.com



SPECIAL ONE-DAY SYMPOSIUM AGENDA

Wednesday, April 30, 2008

9:15 *Registration and Refreshments*

10:00 **Materials Challenges for the Next Generation Electrode Materials for Li-Ion Batteries and Hybrid Technology**

Sanjeev Mukerjee, PhD, Professor, Director, Northeastern University Energy Research Center, Laboratory for Electrochemical Advanced Power, Northeastern University

This presentation will provide an overview of the current state of the art materials as applied for various Li-ion battery technologies including their increased use in small and medium scale portable devices to the present thrust towards safe, cheap and reliable HEV and PHEV applications. Prospects for new materials developments will be discussed from the purview of their structural and charge transfer characteristics. In addition advances in the arena of hybrid batteries in concert with other technologies such as fuel cell electrodes will be discussed. Transition to new materials formulation and synthesis enabling unique interfacial characteristics will be presented within the context of new technology initiatives.

10:30 **Fuel Cell / Battery Hybrid Systems: Designing for a Moving Target**

Jeremy Steinshnider, PhD, Group Leader / Product Development Senior Scientist, Lynntech, Inc.

This presentation will address the challenges and opportunities associated with designing fuel cell / battery hybrid power systems for applications with dynamic requirements. Topics to be discussed include various power management configurations, fuel cell dominant vs. battery dominant systems, pros and cons of off-the-shelf balance-of-plant components, and the pitfalls of designing for a moving target. Along the way, real world examples of existing fuel cell / battery hybrid power systems will be shown.

11:00 **Methods and Tools for Designing Successful Hybrid Systems**

Roger A. Dougal, PhD, Professor of Electrical Engineering, VTB Project Director, University of South Carolina

Design of fuel cell and battery hybrid systems entails integration of strongly interdisciplinary sub-systems involving everything from electrochemistry and power electronics to fluid and heat transfer. The design process can be simplified by the application of appropriate multidisciplinary design tools. This presentation will describe methods for hybrid system design and illustrate those methods with example systems that have been validated in hardware.

11:30 *Networking Refreshment Break*

12:00 **Direct Borohydride Fuel Cells: A Novel Class of Fuel Cell - Battery Hybrid Technology**

Gennadi Finkelshstein, Chief Technical Officer, Medis Technologies

Medis Technologies' Direct Borohydride Fuel Cells (DBFC) offers a compelling alternative to the traditional fuel cell chemistries. Medis has launched its first consumer product, the Medis 24/7 Power Pack, based on a novel approach, including proprietary chemistry and assembly technologies. We will provide an overview Power Pack product, including performance, production technology and chemistry. Medis has developed a second generation hybridized version of our Power Pack and we will provide an overview of our hybridization method, including an overview of the performance benefits created by hybridization.

12:30 **Identification and Characterization of Near-Term Commercial Markets for PEM Fuel Cells in Portable Applications**

Kathleen Judd, Senior Research Scientist, Pacific Northwest National Laboratory / Battelle Memorial Institute

In a study for the U.S. Department of Energy, TV broadcasting video cameras were identified as a near-term opportunity for portable direct hydrogen PEM fuel cells. A technical comparison of PEM fuel cells and competing battery alternatives was performed for TV broadcasting video cameras. The comparison includes a lifecycle cost analysis of fuel cell and battery technologies (lithium ion and nickel cadmium) under different use scenarios for TV broadcasting video cameras. A sensitivity analysis was also performed to show the variability in average annual system cost as individual factors (e.g. cost, durability of the fuel cell) are varied

while other factors are held constant. A value proposition was defined for this market based on the overall market, economic, and technology assessments.

1:00 *Lunch*

2:15 **Durability and Design of Battery / Fuel Cell Hybrid Systems**

Tom Fuller, PhD, Professor, Director, Center for Innovative Fuel Cell and Battery Technologies, Georgia Institute of Technology

Hybrid architectures are becoming common regardless of the system scale. The principal goal of system design has been minimizing fuel consumption. Whereas it is understood that the components of the system must be evaluated and the control strategy scrutinized simultaneously, what's missing is any consideration of the durability of the electrochemical devices. The necessity of understanding and predicting not just initial performance but life behavior is paramount to commercialization of these power systems. A system model elucidates the interactions between components and enables the response of the system as a whole to changing load demands to be determined. Their life and the associated failure mechanisms are strongly dependent on the architecture, load profile, and control strategies. This is illustrated with an example of platinum stability in a fuel-cell hybrid system.

2:45 **Development of a Fully-Integrated, Hybrid, High Temperature PEM Fuel Cell / Lithium Ion Battery Power Plant**

Daniel A. Betts, PhD, Engineering Manager, EnerFuel, a subsidiary of Ener1, Inc.

From a business standpoint, Ener1, Inc. is well-positioned to take advantage of the upcoming demand for fuel cell/battery automotive power plants. Ener1 is the parent company of EnerDel, an automotive lithium-ion battery developer, and EnerFuel, a fuel cell company. While EnerDel is in the process of establishing itself as an important player in the automotive lithium ion battery market, EnerFuel has been developing fuel cells with substantial technical advantages over traditional automotive fuel cell technologies. EnerFuel has pioneered high temperature PEM fuel cell stacks. High temperature operation has allowed EnerFuel to pursue designs that are durable, thermally stable, compact, and relatively inexpensive. In this presentation, quantifiable benefits of EnerFuel's high temperature PEM fuel cell are discussed.

3:15 *Networking Refreshment Break*

3:45 **Powering Micro-Systems with Fuel-Cell Hybrids**

Gabriel A. Rincón-Mora, PhD, Professor of Electrical and Computer Engineering, Georgia Institute of Technology

The demand for portable, lightweight, long-lasting electronics is high, filling a growing need in military, space exploration, biomedical and commercial micro-sensors. Conforming to micro-scale dimensions means energy and power supplies, conditioning and processing microelectronics, sensors, wireless transceivers, and other constituent system components must synergistically share a common miniaturized platform. Integrating and managing micro-sources, however, present a myriad of diverse and interdependent mechanical, chemical, and electrical challenges. This talk presents hybrid energy-management schemes for powering micro-systems with emphasis on fuel-cell hybrids.

4:15 **Fuel Cell and Battery Hybrid System for Portable Electronics Applications**

Naehyuck Chang, PhD, Associate Professor, Dept of Electrical Engineering and Computer Science, Seoul National University, Korea

This talk introduces a PEM fuel cell and Li-ion battery hybrid system for use in portable microelectronic systems which are subject to high power fluctuation though their average power consumption is small. We introduce several issues in fuel cell and battery hybrid systems for such systems in view of computer engineering that includes architectures of hybrid systems, battery management, load shaping using power management techniques, and a prototype implementation.

4:45 **PANEL DISCUSSION Fuel Cells / Batteries / Hybrid Power Systems: Different Problems - Common Solutions**

Moderator - Tom Fuller, Georgia Institute of Technology

5:30 *Concluding Remarks, End of Symposium*



Brochure images courtesy of Atomic Energy Commission - DTN France

SMALL FUEL CELLSsm 2008

May 1-2, 2008
Atlanta, GA USA

Portable & Micro Fuel Cells
For Commercial & Military
Applications

Conveniently timed with the
10th Annual International Conference
Small Fuel Cells 2008
Register for both and save

REGISTRATION FORM

3000

ONLINE

FAX, MAIL, CALL, E-MAIL TO:

Please register me for	Member	Non-Member
<input type="checkbox"/> Symposium Only (Commercial)	<input type="checkbox"/> \$424	<input type="checkbox"/> \$499*
<input type="checkbox"/> Symposium Only (Acad./Gov.)*	<input type="checkbox"/> \$339	<input type="checkbox"/> \$399*
<input type="checkbox"/> SFC 2008 Conference & Symposium (Commercial)	<input type="checkbox"/> \$1359	<input type="checkbox"/> \$1599
<input type="checkbox"/> SFC 2008 Conference & Symposium (Acad./Gov.)*	<input type="checkbox"/> \$934*	<input type="checkbox"/> \$1099*
<input type="checkbox"/> Poster Space Reservation	<input type="checkbox"/> \$65	<input type="checkbox"/> \$65

Become a member of the alliance & take 15% off your registration fee

The Knowledge Foundation, Inc.
18 Webster Street
Brookline, MA 02446 USA
Tel: (617) 232-7400
Fax: (617) 232-9171
E-Mail: custserv@knowledgefoundation.com

PAYMENT: All payments must be made in U.S. funds drawn on a U.S. bank. Please make check(s) payable to The Knowledge Foundation, Inc. and attach to the registration form even if you have registered by phone, fax or e-mail. To guarantee your registration, payment must be received prior to the conference. Confirmation of your booking will follow.

DISCOUNT ACCOMMODATIONS AND TRAVEL: A block of rooms has been allocated at a special reduced rate. Please make your reservations by **March 28, 2008**. When making reservations, please refer to the The Knowledge Foundation. Contact The Knowledge Foundation if you require assistance.

Venue: Omni Hotel at CNN Center
100 CNN Center
Atlanta, GA 30303

For Hotel Reservations Contact:

ANDERSEN TRAVEL
Phone: (508) 429-6494 or 1-800-229-6494
Fax: (508) 429-7380
Email: kramer@andersentvl.com

SUBSTITUTIONS/CANCELLATIONS: A substitute member of your company may replace your attendance at any time at no charge if you find your schedule prevents you from attending. Please notify us immediately so that materials can be prepared. If you do not wish to substitute your registration, we regret that your cancellation will be subject to a \$100 processing fee. To receive a prompt refund, we must receive your cancellation in writing 30 days prior to the conference. Unfortunately cancellations cannot be accepted after that date. In the event that The Knowledge Foundation, Inc. cancels an event, The Knowledge Foundation, Inc. cannot resume responsibility for any travel-related costs.

I would like to become a member of the Knowledge Foundation Technology Commercialization Alliance:

\$199/yr Individual Commercial Member \$99/yr Individual Student Member

\$149/yr Individual Government/Academic Member

I cannot attend, but please send the conference documentation.

Enclosed is my check for \$299. Invoice Me

Enclosed is a check/bank draft for US\$ _____

Invoice me Charge my Credit Card: VISA MC AMEX in the amount of US\$ _____

Card #: _____ Exp.: _____

Please send me information on exhibit and sponsorship opportunities.

Name: _____

Job Title: _____

Organization: _____

Division: _____

Address: _____

City/State/Zip: _____

Tel: _____ Fax: _____

Email: _____

UNABLE TO ATTEND?

You can purchase a full set of conference documentation. Simply check the box on the registration form and send it to us along with your payment. Please allow 4 weeks after the conference date for delivery.

*The academic/government rate is extended to all participants registering as full time employees of government and universities. To receive the academic/government rate you must not be affiliated with any private organizations either as consultants or owners or part owners of businesses.