

# **Battery Safety Symposium 2016**

Held at the 33rd Annual International  
Battery Seminar & Exhibit 2016

Fort Lauderdale, Florida, USA  
24 March 2016

ISBN: 978-1-5108-2254-2

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2016) by International Battery Seminar  
All rights reserved.

Printed by Curran Associates, Inc. (2016)

For permission requests, please contact International Battery Seminar  
at the address below.

International Battery Seminar  
250 First Avenue, Suite 300  
Needham, MA 02494  
USA

Phone: (561) 367-0193  
Fax: (561) 367-8429

[info@powersources.net](mailto:info@powersources.net)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2633  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

SYMPOSIUM 1: MARCH 24, 2016



# BATTERY SAFETY

Innovations to Improve Lithium Battery Safety from Cell to Systems



7:30 am Symposium Registration and Morning Coffee

## CELL SAFETY, PERFORMANCE AND LIFETIME MANAGEMENT

- 8:00 **Organizer's Opening Remarks....N/A**  
*Mary Ann Brown, Executive Director, Conferences, Cambridge EnerTech*
- 8:05 **Chairperson's Opening Remarks....N/A**  
*Judith Jeevarajan, Ph.D., Research Director, Electrochemical Safety, Underwriters Laboratories, Inc.*
- 8:10 **FEATURED PRESENTATION: Li-Ion Battery Safety Technologies and Their Implementation....1**  
*Brian Barnett, Ph.D., Vice President, TIAX/CAMX Power*
- 8:40 **All Tests and Standards Are Not Created Equal – Even if They Have the Same Name!....22**  
*Cindy Millsaps, President & CEO, Energy Assurance LLC*
- 9:10 **Enhanced Battery Safety by Applying Embedded Photonic Sensors....34**  
*Antonio Nedjalkov, Dipl.-Ing., Research Associate, Department for Fiber Optical Sensor Systems, Heinrich Hertz Institute, Fraunhofer-Gesellschaft*
- 9:40 **Coffee Break with Poster Viewing**
- 10:10 **Safe Lithium-Ion Battery Designs for Use, Transportation and Second Use....49**  
*Judith Jeevarajan, Ph.D., Research Director, Electrochemical Safety, Underwriters Laboratories, Inc.* Sponsored by 
- 10:40 **Single-Point Probes for Lithium-Ion Battery Fault Detection and Temperature Monitoring....66**  
*Corey T. Love, Ph.D., Materials Research Engineer, Alternative Energy Section, Chemistry Division, U.S. Naval Research Laboratory*
- 11:10 **Addressing the Safety Issues Related to Air Transportation of Lithium-Ion Batteries with Effective Engineered Thermal Management Solutions....77**  
*Richard Clark, Strategic Business Development Specialist, Morgan Advanced Materials* Sponsored by 
- 11:40 **Enjoy Lunch on Your Own**

## MODELING AND ENGINEERING A SAFE SYSTEM FOR VARIOUS APPLICATIONS

- 1:20 pm **Chairperson's Remarks....N/A**  
*Brian Barnett, Ph.D., Vice President, TIAX/CAMX Power*
- 1:25 **NREL Multiphysics Modeling Tools for Designing Safer Li-Ion Batteries....N/A**  
*Ahmad A. Pesaran, Ph.D., Manager, Energy Storage Group, Transportation and Hydrogen System Center, National Renewable Energy Laboratory (NREL)*
- 1:55 **Li-Ion Battery Characterization across Space and Time: Imaging Microstructure in 2D, 3D and 4D....N/A**  
*Jeff Gelb, Senior Applications Development Engineer, Carl Zeiss X-ray Microscopy*

SYMPOSIUM 1: MARCH 24, 2016

# BATTERY SAFETY

*Innovations to Improve Lithium Battery Safety from Cell to Systems*



- 2:25**      **Effects of Cell Reversal on Li-Ion Batteries....92**  
*E. Joseph Nemanick, Ph.D., Senior Member, Technical Staff, Energy Technology Department, The Aerospace Corporation*
- 2:55**      **Refreshment Break with Poster Viewing**
- 3:30**      **Experiments and Simulations for Battery Safety....N/A**  
*Sergiy Kalnaus, Ph.D., Research Scientist, Computational Engineering and Energy Sciences, Oak Ridge National Laboratory (ORNL)*
- 4:00**      **Battery Safety Requires More than Safe Batteries....105**  
*Todd Vanyo, Senior Systems Engineer, Texas Instruments*
- 4:30**      **Mesoscale Implications in Lithium-Ion Battery Thermal Behavior....112**  
*Chien-Fan Chen, Energy Storage Lead, Energy and Transport Sciences Laboratory, Mechanical Engineering, Texas A&M University*
- 5:00**      **Close of Symposium & Close of International Battery Seminar & Exhibit**