INTERNATIONAL BATTERY SEMINAR & EXHIBIT

35th ANNUAL
March 26-29, 2018

Fort Lauderdale Convention Center | Fort Lauderdale, FL

CONFERENCE PROGRAMS

R&D STREAM
- Next-Generation Battery Research
- Lithium-Ion Development & Commercialization

MANUFACTURING STREAM
- High Performance Battery Manufacturing
- Lithium-Ion Development & Commercialization

APPLICATIONS STREAM
- Advances in Automotive Power Applications
- Power Applications for Consumer Electronics
- Alternatives in Energy Storage

ENGINEERING STREAM
- Battery Safety
- Battery Management Systems

PLENARY KEYNOTES

How Does the Electrolyte Change during the Lifetime of a Li-Ion Cell?
Jeff Dahn, PhD
NSERC/Tesla Canada, Dalhousie University

Addressing Key Battery Issues from a Thermodynamics Perspective
Rachid Yazami, PhD
Nanyang Technological University, Singapore

How Does the Electrolyte Change during the Lifetime of a Li-Ion Cell?
Jeff Dahn, PhD
NSERC/Tesla Canada, Dalhousie University

Uber Elevate - Powering an Electric UberAIR Future
Dolina Mikołajczak
Uber

Global Electrification and LG Chem
Denise Gray
LG Chem Power

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Sample List Of 2017 Delegates

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AGENDA
TUTORIALS & TRAINING SEMINAR
R&D STREAM
• Next-Generation Battery Research
• Lithium-Ion Development & Commercialization
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• High Performance Battery Manufacturing
• Lithium-Ion Development & Commercialization
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• Advances in Automotive Power Applications
• Power Applications for Consumer Electronics
• Alternatives in Energy Storage
ENGINEERING STREAM
• Battery Safety
• Battery Management Systems
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REGISTRATION

TO REGISTER!
FINAL WEEKS
See website for further descriptions.

*Separate registration or All Access required for Tutorials and Training Seminar. See website for further descriptions.
**TUT11: Lithium Battery Transportation Regulations**  
George A. Kerchner, Executive Director, PRBA – The Rechargeable Battery Association  
Christopher Egloff, Vice President, Sales, Americase, Inc.  
Jody Leber, Senior Technologist, Energy Storage, CSA Group  

Lithium batteries come in many forms, chemistries, and sizes, from button cells to large containerized lithium-ion batteries, and only one set of transportation regulations must address all known and potential hazards. Just as technology has evolved, transport regulations must also evolve to keep pace with the increasing chemistries, form factors, and applications.

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**TRAINING SEMINAR**

A Training Seminar offers in-depth training and instruction on a specific subject area that isn't covered at this level during the main program or tutorials. An experienced Training Seminar instructor offers a mix of formal lectures, interactive discussions and activities to help attendees maximize their learning experiences.

8:00 am - 4:00 pm

**TS1: Lithium-Ion Battery Cell and Pack Technology**  
Bob Spotnitz, President, Battery Design LLC  
Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.  

The first part of this seminar will provide an overview of lithium-ion cell technology and an in-depth discussion of the principles guiding the design of both high-energy and high-power lithium-ion cells. The second part will present the overall design of battery systems, the product development process, cost, and system validation. Topics to be covered include:

- Overview of Li-ion cell technology and discussion of the principles guiding the designs of both high-energy and high-power cells and their manufacturing technology
- Porous electrode theory
- Impact of potential improvements in materials and processes
- Introduction to battery systems
- System specification development
- System design: cell and module design, and mechanical, thermal, and battery management (hardware and software)
- Product development process overview w/ key milestones and cost considerations
**R&D STREAM**

Next-Generation Battery Research
Advances in Material, Chemical, and Electrochemical Engineering

**March 27-28, 2018 | FORT LAUDERDALE, FLORIDA**

**MONDAY, MARCH 26**

7:00 am - 4:00 pm Tutorial and Training Seminar*
Registration Open

7:00 - 8:00 am Morning Coffee
8:00 - 10:00 Pre-Conference Tutorials and Training Seminar*
10:30 - 12:30 pm Pre-Conference Tutorials and Training Seminar*
12:30 - 1:30 Enjoy Lunch on Your Own
1:30 - 2:00 Networking Refreshment Break
2:00 - 4:00 Pre-Conference Tutorials and Training Seminar*
4:00 Close of Day

**TUESDAY, MARCH 27**

7:00 am Registration and Morning Coffee
8:10 Plenary Keynote Sessions: Organizer’s Opening Remarks
Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

**8:15 How Does the Electrolyte Change during the Lifetime of a Li-Ion Cell?**
Jeff Dahn, PhD, Professor, Canada Research Chair, NSERC/Telesa Canada Industrial Research Chair, Department of Chemistry, Dalhousie University

Jeff Dahn is recognized as one of the pioneering developers of the lithium-ion battery that is now used worldwide in laptop computers and cellphones. This presentation will examine how the electrolyte changes during the lifetime of the cell.

**8:45 Uber Elevate - Powering an Electric UberAIR Future**
Celina Mikolajczak, Director of Battery Development, Uber

Following a 32-year career working on emerging technologies at NASA, Mark Moore joined Uber to lead vehicle systems development for its urban air mobility program. He’ll be speaking about this Uber Elevate initiative and sharing vision for how vertical take-off and landing vehicles will change the world, as well as the energy storage needs required to power UberAIR missions in the years ahead.

**9:15 Networking Coffee Break**

**Advances in Capacity and Capacity Retention**

**9:45 Organizer’s Opening Remarks**
Mary Ann Brown, Executive Director, Conferences, Cambridge EnerTech

**9:50 Chairperson’s Remarks**
Maximilian Fichtner, PhD, Executive Director, Helmholtz Institute Ulm (HIU); Managing Director, Energy Storage Group, Institute of Nanotechnology, Karlsruhe Institute of Technology (KIT)

A new material is presented, which is based on an organic natural material and which delivers good specific capacities in the order of 180 mAh/g at an average voltage of approximately 3 V. The material can be charged and discharged at rates around 50 C. By a simple modification of the material, the typical issue of organic batteries, the degradation upon cycling, was greatly improved and 80% of the capacity was retained after 6,000 cycles.

**10:00 FEATURED PRESENTATION: Strategies for Mitigating Active Lithium Losses in High-Energy Lithium-Ion Cells**
Tobias Placke, Dr. rer. Nat., Division Manager, Materials, MEEI Battery Research Center, University of Münster

Active lithium loss is caused by lithium consuming parasitic reactions like SEI formation and results in capacity fading and, thus, is a major reason for the reduction of the usable energy density of lithium-ion batteries. Here, we present novel results for mitigating the active lithium loss such as novel electrolyte additives in high-energy lithium-ion cells.

**10:30 Unlocking Metal Oxide Anodes for LIBs by Understanding Relationships between Conductivity, Structure, Chemistry and Performance**
William E. Mustain, PhD, Professor, Department of Chemical Engineering, Swearingen Engineering Center, University of South Carolina

New materials hold the key to next-generation high energy density lithium-ion batteries. At the anode, high capacity materials – including transition metal oxides – rely on non-intercalation processes to store charge, which inherently work to limit cycle life. This talk highlights approaches to design electrodes and manage degradation mechanisms to allow for high capacity and capacity retention electrodes.

**11:00 FEATURED PRESENTATION: Stabilized Porhyrins as a New Class of Ultrafast Storage Materials with High Capacity**
Maximilian Fichtner, PhD, Executive Director, Helmholtz Institute Ulm (HIU); Managing Director, Energy Storage Group, Institute of Nanotechnology, Karlsruhe Institute of Technology (KIT)

A new material is presented, which is based on an organic natural material and which delivers good specific capacities in the order of 180 mAh/g at an average voltage of approximately 3 V. The material can be charged and discharged at rates around 50 C. By a simple modification of the material, the typical issue of organic batteries, the degradation upon cycling, was greatly improved and 80% of the capacity was retained after 6,000 cycles.

**11:30 Electrochemical Performance of Silicon Enhanced Lac Knife Natural Flake Graphite from Quebec, Canada in Li-Ion Batteries**
Joseph E. Doninger, PhD, Director, Manufacturing and Technology, Focus Graphite Inc.

Coin cell tests were conducted on Lac Knife carbon coated spherical graphite treated with amorphous silicon at levels ranging from 4.5 to 18 wt% Si. The
results showed that the reversible capacities achieved in the anode with the silicon enhanced graphite ranged from 462 to 613 mAh/g.

11:45 Optimized for Economies of Scale: High-Performing Natural Graphite for Next-Generation Li-ion Batteries
Shaun Verner, MSc, Managing Director and CEO, Syrah Resources
Christina Lampé-Onnerud, PhD, Founde and CEO, Cadenza Innovation
Exponential growth in electric vehicles and grid storage – already fueling the dramatic reduction in the cost of Li-ion batteries – is driving the need for further optimization across the industry’s manufacturing lines. Enhancements to increase throughput and generate higher yields are now front and center for all Li-ion cell OEMs. These dynamics are compelling equipment suppliers, and the anode materials market as a whole, to remain cost-competitive while delivering higher performance.

11:55 Networking Luncheon
Sponsored by ENE

12:55 pm Networking Refreshment Break
Increasing Energy Density with Alternative Chemistries
1:25 Chairperson’s Remarks
Tobias Placke, Dr. rer. Nat., Division Manager, Materials, MEET Battery Research Center, University of Münster
1:30 Minimal Architecture Zinc-Bromine Battery for Low Cost Electrochemical Energy Storage
Daniel Steingart, PhD, Associate Professor, Department of Mechanical and Aerospace Engineering, Andlinger Center for Energy and the Environment, Princeton University
In this work, we seek to reduce cost and increase cycle life of a grid-scale system by de-emphasizing the requirements for shelf life and short circuit prevention. We show a reconfiguration of the zinc-bromine system creates a system that may “live forever by dying everyday” by eliminating much of the balance-of-plant and exploiting the physical properties of the bromine and zinc.

2:00 Dendrite-Free Rechargeable Zinc-Based Batteries: Solving a Chronic Impediment through Architectural Design
Debra Rolison, PhD, Head, Advanced Electrochemical Materials Section, Surface Chemistry Branch – Code 6170, U.S. Naval Research Laboratory
Zinc-based batteries offer a compelling alternative to lithium-ion batteries thanks to nonflammable aqueous electrolytes augmented by the high energy density of Zn-based batteries. We redesign the zinc anode as a porous, apertured 3D-wire “spounge” architecture that intrinsically promotes greater rechargeability when cycled in prototype Ag-Zn and Ni-Zn cells. Our results show that all Zn-based chemistries can now be reformulated for next-generation rechargeable, Li-free batteries.

2:30 Manufacturing Technology of All-Solid-State Thin-Film Li Battery for IoT Applications
Koukou Suu, PhD, ULVAC Fellow, General Manager, Global Marketing and Technology Strategy, ULVAC, Inc.
Solid-State Thin-Film Li secondary batteries have come to be recognized as one of the key enabling technologies for standalone MEMS/Sensor devices which are essential for Internet of Things (IoT) solutions. A detailed explanation will be given on the sputtering process required for the manufacturing of these batteries. ULVAC has developed reliable hardware and processes for the mass production for solid-state Li batteries.

3:00 Grand Opening Dessert Break in the Exhibit Hall with Poster Viewing
Insights into Complex and Dynamic Interactions: Modeling
3:45 Rational Design and Experimental Validation of Battery Cathode Materials
Kyeongjae (KJ) Cho, PhD, Professor, Department of Materials Science and Engineering, The University of Texas, Dallas
We discuss ‘materials by design’ and validation experimental research on high-capacity cathode materials for Li- and Na-ion batteries (LiB and NIB). Using the first-principles density functional theory method, we have designed electrode materials for battery cathodes, and subsequently performed experimental studies to validate the material designs. Through an integrated material design-experiment research, we have developed highly efficient cathode materials.

SPEAKER CANCELLATION
4:15 Discovery of New Solid-State Li-Ion Conductors through Machine Learning
Chen Ling, PhD, Principal Scientist, Materials Research Department, Toyota Research Institute of North America
Materials with high Li-ion conductivity as well as other desirable properties are the key to the success of all-solid-state battery. Here we apply machine learning to explore Li-ion conductors from thousands of Li-containing compounds. Our study achieved an unprecedented success rate for the exploration of new solid lithium-ion conductors. The high conductivities of several candidates are verified through ab initio molecular dynamics simulation.

4:45 Enabling Next-Generation Batteries through High-Performance Computing
Kandler Smith, PhD, Senior Scientist, Battery Computational and Systems Modeling, Transportation & Hydrogen Systems Center, National Renewable Energy Laboratory
Battery manufacturers and automotive integrators have largely adopted computer-aided engineering tools for design of large format cells and battery pack systems. Active research is increasingly turning towards the microstructure length scale, to understand and quantify the role of electrode microstructure on performance and lifetime. This presentation outlines ongoing modeling and experimental studies designed to address gaps and enable next generation electrode architectures and chemistries.

5:15 Transition to Breakout Discussions
5:20 Interactive Breakout Discussion Groups (See website for details.)
6:20 Welcome Reception in the Exhibit Hall with Poster Viewing (Sponsorship Opportunity Available)
7:20 Close of Day

WEDNESDAY, MARCH 28
8:00 am Registration and Morning Coffee
Insights into Complex and Dynamic Interactions: Diagnostics
8:25 Chairperson’s Remarks
Alexej Jerschow, PhD, Professor, Chemistry Department, New York University
8:30 Probing Interfaces Involving Solid Electrolytes: Atomic-Scale Insights from New Microscopy Techniques
Miaofang Chi, PhD, Senior Staff Scientist, Center for Nanophase Materials Sciences, Oak Ridge National Laboratory
Interfaces involving solid electrolytes represent a critical but largely under-researched area. Microscopic factors, e.g., lattice structure and carrier distributions, determine the interfacial conductivity and stability and thus dictate the rate capability in batteries. Real interfaces are complex and dynamic, and are challenging to probe for both theory and experiment. This talk focuses on the atomic-scale insights recently revealed by advanced and emerging microscopy methods.

9:00 Novel Advanced Diagnostics at BatteryX
Jigang Zhou, PhD, Staff Scientist, Innovation Division, Canadian Light Source, Inc.; Adjunct Professor, Materials Engineering Department, Western University
BatteryX uses non-destructive characterizations to monitor complex structural and chemical changes that occur in the battery. This leads to deeper practical understanding of batteries’ synthesis, surface engineering, device design, and failure mechanisms. We review the platform and newest research at BatteryX such as in situ nanoscale chemical imaging of composite electrode to integrate the fine understanding of interphase structure with degradation and safety.

9:30 Nondestructive and Fast Scanning of Cells with MRI-Based Technique
Alexej Jerschow, PhD, Professor, Chemistry Department, New York University
We are presenting battery assessment technology based on non-destructive Magnetic Resonance Imaging (MRI) techniques. The approach works on intact, commercial rechargeable batteries (for example, Li-ion batteries) – no need to take the batteries apart. Moreover, the technique can detect changes in the electrode chemistry that occur as the battery is charged and discharged, or if it is damaged. The vision is to use a benchtop-type instrument, which could be deployed in a variety of ways.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing

10:45 Healing of Lithium Metal Dendrites for Electrochemical Energy Storage Applications
Lu Li, Research Assistant, Nikhil A. Koratkar Group, Department of Mechanical, Aerospace, and Nuclear Engineering, Rensselaer Polytechnic Institute
I describe how self-heating can be used to anneal and heal lithium metal dendrites in lithium-sulfur batteries. Operation of the battery at high operating current densities will be used to heat the lithium dendrites. Above a critical activation temperature, surface diffusion and migration of Li atoms is triggered resulting in a morphology change of the dendrites into a smooth film-like morphology, eliminating risk of the electrochemical cell's dendritic shorting.

11:15 Design of Polymer-Supported, Low Volatility Gel Electrolytes
Matthew Panzer, PhD, Associate Professor, Graduate Program Chair, Chemical & Biological Engineering, Tufts University
Solid (gel) electrolyte films featuring room temperature ionic liquids (materials known as ionogels) hold great promise for realizing safe electrochemical energy storage devices. Ionogels are inherently safer than currently used liquid solvent-based electrolytes due to their nonvolatile, nonflammable and leak-proof nature. Recent findings suggest that controlling ion-polymer scaffold interactions through rational chemical functionalization is an important strategy by which one can optimize iongel performance.

11:45 Making Li-Ion Batteries Safe and Flexible with Water
Kang Xu, PhD, Senior Research Chemist & Project Lead, U.S. Army Research Lab
Non-aqueous electrolytes are responsible for the rare but high-profile safety incidents encountered by Li-ion batteries, and their moisture-sensitive and toxic nature also brought rigid form-factors. Using aqueous electrolytes would resolve most of these concerns, if water could be stabilized at extreme potentials required for most LIB chemistries. This work aims to explore that possibility.

12:15 pm Enjoy Lunch on Your Own

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynotes

Safer Electrochemical Energy Storage

Yoshio Nishi, PhD, Executive Alumni, Sony Corporation
Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1964 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company’s materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014, Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. Since the early 1990s, LIBs were introduced into various mobile devices and we were reasonably confident that our customers would be satisfied with their performance. Shortly afterwards, however, we noticed that there were some discrepancies between the performance we offered and that expected by our customers. Dr. Nishi will discuss here what LIB users really require from secondary batteries.

2:05 Global Electrification and LG Chem
Denise Gray, CEO, LG Chem Power
Denise Gray is President/CEO of LG Chem Power Inc. (LECPI), the North American subsidiary of lithium-ion battery maker, LG Chem (LGIC), Korea. In this position, she has overall responsibility for the strategic direction, engineering, and business development activities for the North American market. The majority of her professional career, nearly 30 years, was spent at General Motors in the USA. Director of Battery Systems Engineering, Director of Powertrain Controller Engineering,
Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem's participation in the various segments from materials, cell and cost points of view.

Rachid Yazami, PhD, School of Materials Science & Engineering, Program Director, Energy Storage, Energy Research Institute, Nanyang Technological University, Singapore

Rachid Yazami is a French Morrocan scientist best known for his research on lithium-ion batteries and on fluoride-ion batteries. He is the inventor of the graphite anode (negative pole) of lithium-ion batteries. In 2014 Rachid Yazami, John Goodenough, Yoshio Nishi and Akira Yoshino were awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today's lithium-ion battery. In this presentation, we will show how online thermodynamics data collection and processing addresses the SOC and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of entropy and enthalpy. Linearity coefficients are LIB chemistry and SOH dependent. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.
WEDNESDAY, MARCH 28

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynotes

Yoshio Nishi, PhD, Executive Alumni, Sony Corporation
Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1966 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company's materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014, Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today's lithium-ion battery. In this presentation, we will show how online thermodynamics data collection and processing addresses the SOC and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of entropy and enthalpy. Linearity coefficients are LIB chemistry and SOH dependent. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.

2:05 Global Electrification and LG Chem
Denise Gray, CEO, LG Chem Power
Denise Gray is President/CEO of LG Chem Power Inc. (LG CPI), the North American subsidiary of lithium-ion battery maker, LG Chem (LGC), Korea. In this position, she has overall responsibility for the strategic direction, engineering, and business development activities for the North American market. The majority of her professional career, nearly 30 years, was spent at General Motors in the USA. Director of Battery Systems Engineering, Director of Transmission Controls Engineering, Director of Powertrain Controller Engineering, Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem's participation in the various segments from materials, cell and cost points of view.

2:25 Addressing Key Battery Issues from a Thermodynamics Perspective
Rachid Yazami, PhD, School of Materials Science & Engineering Program Director Energy Storage, Energy Research Institute, Nanyang Technological University, Singapore
Rachid Yazami is a French Moroccan scientist best known for his research on lithium-ion batteries and on fluoride-ion batteries. In 2014 Rachid Yazami, John Goodenough, Yoshio Nishi and Akira Yoshino were awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today's lithium-ion battery. In this presentation, we will show how online thermodynamics data collection and processing addresses the SOC and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of entropy and enthalpy. Linearity coefficients are LIB chemistry and SOH dependent. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.


2:45 Refreshment Break in the Exhibit Hall with Poster Viewing

Processes to Improve Battery Performance

3:30 Organizer's Opening Remarks
Mary Ann Brown, Executive Director, Conferences, Cambridge EnerTech

3:35 Chairperson's Remarks
Robert Gitzendanner, PhD, General Manager & Executive Director, Lithium Engineering, Yardney Division, EaglePicher Technologies LLC

3:40 FEATURED PRESENTATION: Comprehensive Enhancement of Nanostructured Lithium-Ion Battery Cathode Materials via Conformal Graphene Dispersion
Mark C. Hersam, PhD, Walter P. Murphy Professor of Materials Science and Engineering, Director, Northwestern University Materials Research Center, Northwestern University

Nanostructured electrode materials present compelling opportunities for high-performance lithium-ion batteries, but inherent problems related to the high surface area to volume ratios at the nanometer scale have impeded their adoption for commercial applications. Here, we demonstrate a materials and processing platform that realizes high-performance
Processes to Improve Battery Sustainability

9:00 Chairperson’s Remarks
Alexandre Chagnes, PhD, Professor, Head, National Network Promethee, Université de Lorraine-Georesources

9:05 The Costs and Environmental Impacts of Lithium-Ion Battery Production and Recycling
Rebecca Diaz, PhD, Postdoctoral Fellow, Andlinger Center for Energy and the Environment, Princeton University

This talk explores both the economic and environmental costs associated with producing and disposing/recycling lithium-ion batteries. A process-based cost model assessment of the costs of domestic lithium battery cell manufacturing will be offered in an effort to understand the current market pricing structure observed around the world, and the commensurate burden associated with disposing or repurposing cells after use will also be examined.

9:35 Challenges for the Development of Sustainable Lithium-Ion Batteries
Alexandre Chagnes, PhD, Professor, Head, National Network Promethee, Université de Lorraine-Georesources

Recovery of lithium-ion batteries (LIBs) is mandatory to protect the environment and it is also a good opportunity from an economical viewpoint since LIBs contain valuable metals. This presentation gives an overview on recent advances in LIBs recycling.

10:05 Development of High-Performance Lithium-Ion Batteries
Yangxing Li, PhD, Chief Scientist, Watt Lab, Central Research Institute, Huawei Technologies Co., Ltd.

High-performance lithium batteries are desirable in modern society, especially on enhanced safety, improved energy density, increased rate capability and high-temperature performance. To achieve high-energy density for batteries, significant efforts have been taken to develop high-capacity electrode materials, high cut-off voltage cathodes, and increased loading density. Some specific technical approaches to achieve high-performance lithium-ion batteries will be discussed.

10:35 Coffee Break in the Exhibit Hall with Poster Viewing

Monitoring & Modeling to Reduce Costs

11:20 Measurement and Origins of Conductivity Variations in Commercial Li-Ion Electrode Films
Brian Mazzeo, PhD, Associate Professor, Electrical and Computer Engineering, Brigham Young University

Because microstructural variation is inherent in electrode film formation, commercial electrodes exhibit significant variations in their electronic conductivity properties across different length scales. Flexible micro-line electrical probes and numerical inversion techniques can be used to scan across areas of electrodes to quantify the conductivity variation that exists. By imaging areas with significant variation, microstructural morphology variations can be correlated to these conductivity variations.

11:50 Research-Scale Testing and Evaluation for Lithium-Ion Electrodes and Materials
Jason R. Croy, PhD, Materials Scientist, Electrochemical Energy Storage, Materials Science Research Group, Chemical Sciences and Engineering Division, Argonne National Laboratory

This talk discusses efforts at Argonne National Laboratory to standardize materials, procedures, and protocols within a large, multi-institutional program aimed at understanding degradation mechanisms occurring in high-energy/high-voltage lithium-ion cells. These efforts include cycling protocols, evaluation of performance metrics, analysis of data and model, experimental systems designed to provide connection between theory and experiment.

12:20 pm Advances in Electrode Coatings Technology: Combining Formulation Chemistry and Processes to Improve Performance
Stuart Helling, PhD, Senior Scientist, Research & Development, Automotive Coatings, PPG

12:50 Session Break

1:00 Networking Luncheon (Sponsorship Opportunity Available) or Enjoy Lunch on Your Own

2:00 Dessert Break in the Exhibit Hall with Poster Viewing
Prototypes & Scale-Up for Manufacturing

2:30 Chairperson’s Remarks  
Yang-Tse Cheng, PhD, Frank J. Derbyshire Professor of Materials Science, Department of Chemical and Materials Engineering, University of Kentucky

2:35 Technical and Economic Analysis of Solvent-Based Lithium-Ion Electrode Drying with Water and NMP  
Jianlin Li, PhD, Research Scientist, Energy & Transportation Science Division, Oak Ridge National Laboratory

Total electrode manufacturing costs contribute about 8-9% of the total pack cost. However, it was found that up to a 2× reduction in electrode processing (drying and solvent recovery) cost can be expected along with a $3-$6 M savings in associated plant capital equipment (for a plant producing 100,000 10-kWh Plug-in Hybrid Electric Vehicle (PHEV) batteries) when using water as the electrode solvent.

3:05 Working towards Making Better and Cheaper Lithium-Ion Batteries  
Yang-Tse Cheng, PhD, Frank J. Derbyshire Professor of Materials Science, Department of Chemical and Materials Engineering, University of Kentucky

We have recently investigated an electrostatic spray process for making lithium-ion battery electrodes. This process does not use organic solvents that are used in the conventional slurry mixing and casting process, thus eliminating the cost associated with solvent evaporation and recovery. Our results suggest that the dry coating process is a promising alternative to the conventional wet process of making electrodes.

3:35 Dry Printing Manufacturing to Enable Long-Life and High-Energy Lithium-Ion Batteries  
Yan Wang, PhD, William Smith Foundation Dean’s Associate Professor, Mechanical Engineering and Chemical Engineering, Worcester Polytechnic Institute

Here we demonstrate an advanced powder printing technique that is completely solvent-free and dry. Through removing the solvent and related procedures, this method is anticipated to statistically save 20% of the cost at a remarkably shortened production cycle. The dry printed electrodes outperform commercial slurry cast ones in 650 cycles, and thick electrodes are successfully fabricated to increase the energy density.

The Road to Commercialization

4:05 Accelerating the Commercialization and Launch of New Battery Materials with Special Focus and Emphasis on Manufacturability of New Materials and Designs  
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC

There are tremendous developments associated with new materials to enhance the performance of rechargeable batteries and many challenges that make the transition to full production difficult and time consuming. Polaris Labs works with a variety of developers and strives to help them move quickly through the development process to full production. We point out areas to consider in the assessment and processing of new materials as well as considerations to ease the transition to full production.
4:30 PANEL DISCUSSION: The Cost of Quality in Advanced Battery Development and Manufacturing
Moderator: John Wozniak, President, Energy Storage and Power Consulting
Panelists: Bruce Miller, Technology Strategist, Dell
Brian Cunningham, Engineer, U.S. Department of Energy
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
Additional Panelists to be Announced
The development of durable and affordable advanced batteries for use in automotive, consumer electronics and stationary applications drives R&D activities. This panel of experts examines the true cost of quality and how approaches to the development of advanced batteries must be adapted to avoid the significant pitfalls on the road to commercialization.

5:30 Close of Conference
Monday, March 26

7:00 am - 4:00 pm Tutorial and Training Seminar* Registration Open

7:00 - 8:00 am Morning Coffee

8:00 - 10:00 Pre-Conference Tutorials and Training Seminar*

10:30 - 12:30 pm Pre-Conference Tutorials and Training Seminar*

12:30 - 1:30 Enjoy Lunch on Your Own

1:30 - 2:00 Networking Refreshment Break

2:00 - 4:00 Pre-Conference Tutorials and Training Seminar*

4:00 Close of Day


Tuesday, March 27

7:00 am Registration and Morning Coffee

8:10 Plenary Keynote Sessions: Organizer’s Opening Remarks

8:45 Uber Elevate - Powering an Electric UberAIR Future

9:15 Networking Coffee Break

9:45 Organizer’s Opening Remarks

9:50 Chairperson’s Remarks

10:00 Challenges, Risks, and Opportunities for a Rapid Expansion of xEV Batteries and Materials

11:00 The Study of Thermal Management System with Intelligent Temperature Control for Power Battery Pack

11:45 Youlion Enters the GWh Factory Competition

12:30 Lunch on Your Own

1:30 Networking Refreshment Break

2:00 - 4:00 Poster Presentations

4:00 Close of Day
12:05 pm Networking Luncheon

12:55 Networking Refreshment Break

New Chemistries & Innovations for Manufacturing
1:25 Chairperson's Remarks
Craig Rigby, Advanced Market & Technology Strategist, Johnson Controls

1:30 FEATURED PRESENTATION: Glass Battery Cells in Numbers
M. Helena Braga, PhD, Professor, Engineering Physics Department, University of Porto, Portugal and Materials Science and Materials Engineering Department, University of Texas at Austin
John Goodenough, PhD, Professor, Virginia H. Cockrell Centennial Chair in Engineering, Department of Mechanical Engineering, University of Texas at Austin
The Li+ or Na+ glass electrolyte with a cation conductivity \( \mu > 10^{-2} \text{ S cm}^{-1} \) at 25°C and a dielectric constant, \( \varepsilon_r > 103 \) at 0.1 Hz that is wet by a metallic lithium or sodium anode is used to develop a new strategy for an all-solid-state, rechargeable, metal-plating battery. We will make an overview on the calculations, \textit{ab initio} simulations and experimental data to explain how the glass cells work. The result is a safe, low-cost, lithium or sodium rechargeable battery of high energy density and long cycle life.

2:00 High Energy and Long-Life Li-S Cells with High-Loading Cathodes
Ratnakumar Bugga, PhD, Principal Member Technical Staff, Electrochemical Technologies Group, Jet Propulsion Laboratory, California Institute of Technology
At NASA/JPL, we have been developing high energy and long-life lithium-sulfur cells for NASA and DoD applications. Our approach is based on using: i) Composite high area-specific capacity sulfur cathodes, blended with metal sulfides, ii) polysulfide blocking layers based on ceramic/organic coated polymeric separators, and iii) protected lithium anode. These approaches have resulted in laboratory Li-S cell showing high sulfur utilization (800 mAh/g) even in dense cathodes stable through >100 cycles.

2:30 Next Generation Anodes for Li-Ion Cells: How to Achieve Both High Capacity and Cycle Stability When Using Silicon Metal
Jeff Norris, PhD, CEO, Paraclete Energy
Surface modification of silicon particles functions both as artificial SEI while preventing silicon from exposure to electrolyte. Paraclete’s surface modification architecture is covalently bonded directly to silicon’s surface (not through surface oxides) enabling the silicon to expand without substantial contact with electrolyte, resulting in a highly stable surface for SEI formation, increasing the cycle stability of the cell. Paraclete’s SM-Silicon’s morphology leads to a rate capability, tap density and a low ICL as conventional graphite.

3:00 Grand Opening Dessert Break in the Exhibit Hall with Poster Viewing

3:45 Separator, Solid State Electrolyte and Challenges for Future High Energy Batteries
John Zhang, PhD, Senior Technical Executive Officer, Asahi Sasei Separator
Separator has been widely used in Li-ion batteries, and its performance has been greatly enhanced by ceramic coatings. Meanwhile, the attempt to replace traditional separator by solid state electrolyte to make safe all solid lithium batteries with lithium metal anode have been announced by many research institutes as well as Toyota. I will show the hope of new era on battery progress. We will discuss the challenges and realities of the hope.

4:15 Supply Chain Dynamics and How This Will Impact the Price Targets of Li Ion Industry
Kurt Vandeputte, Vice President, Rechargeable Battery Materials Business Unit, Umicore

4:15 PANEL DISCUSSION: Investing in Growth on the Path to Profitability in Energy Storage
Moderator: Craig Rigby, Advanced Market & Technology Strategist, Johnson Controls

5:15 Transition to Breakout Discussions

5:20 Interactive Breakout Discussion Groups (See website for details)

6:20 Welcome Reception in the Exhibit Hall with Poster Viewing (Sponsorship Opportunity Available)

7:20 Close of Day

InternationalBatterySeminar.com 14
be discussed and a three-year product roadmap will be presented.

9:00 Vibration Matters in Battery Ultrasonic Welding
Wayne Cai, PhD, Staff Researcher, Research, General Motors
Ultrasonic welding is a mainstream welding technology for Li-ion batteries. While vibration brings energy to the ultrasonic welding process to make a weld, it can also cause potential damages to the welding components or even the systems. This talk discusses research results and engineering methodologies towards mitigating the detrimental vibration effects on battery and battery electric vehicle manufacturing.

9:30 From Lab to Gigafactory - Scale-Up of LIB Slurry Processing
Adrian Spillmann, Head, Market Segment Battery Solutions, Grinding & Dispersing Technologies, Buhler AG
Electrode slurry production is one of the most critical process steps for the manufacturing of LIB electrodes and essentially impacts the electrochemical performance of the battery cell. However, the traditional batch mixing will no longer fulfill the future requirements for cost reduction and capacity ramp-up. Buhler have developed a continuous slurry preparation process which enables to significantly reduce investment and operation cost through improved consistency and yield.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing

10:45 The Smart Cell Factory
Raphael Goossens, CEO, General Management, PEC North America
How Industry 4.0 standards will help cell manufacturers to increase efficiency and reduce their manufacturing costs. The presentation will focus on cell finishing, which is the most complex process in the cell factory.

Innovations in Recycling Battery Materials for Manufacturing

11:15 Current Environmental Activities Related to Portable Secondary Batteries
Hirohito Terakawa, Chief Technical Officer, Ni-MH Battery division, FDK Corporation
We would like to discuss environmental activities for portable secondary batteries. We would like to discuss collection and recycling methods and improvements for future benefits. We would like to discuss and promote a future environmental standard for portable secondary batteries.

11:45 A Closed-Loop Battery Model for Use by Recyclers, Manufacturers, and Researchers
Linda Gaines, PhD, Systems Analyst, Argonne National Laboratory
This closed-loop system provides the user with not just the cost and environmental impact of a portion of the cycle, but offers a view of the overall impact throughout the entire circular material loop and provides a comparison of virgin battery builds and batteries using recycled content. The model is designed to permit easy updates as new materials, manufacturing methods, and recycling methods develop and mature.

12:15 pm Enjoy Lunch on Your Own

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynotes

Yoshio Nishi, PhD, Executive Alumni, Sony Corporation
Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1966 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company’s materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014 Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. Since the early 1990’s LIB were introduced into various mobile devices and we were reasonably confident that our customers would be satisfied with their performance. Shortly afterwards, however, we noticed that there were some discrepancies between the performance we offered and that expected by our customers. Dr. Nishi will discuss here what LIB users really require from secondary batteries.

2:05 Global Electrification and LG Chem
Denise Gray, CEO, LG Chem Power
Denise Gray is President/CEO of LG Chem Power Inc. (LCPI), the North American subsidiary of lithium-ion battery maker, LG Chem (LGC), Korea. In this position, she has overall responsibility for the strategic direction, engineering, and business development activities for the North American market. The majority of her professional career, nearly 30 years, was spent at General Motors in the USA. Director of Battery Systems Engineering, Director of Transmission Controls Engineering, Director of Powertrain Controller Engineering, Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem’s participation in the various segments from materials, cell and cost points of view.

2:25 Addressing Key Battery Issues from a Thermodynamics Perspective
Rachid Yazami, PhD, School of Materials Science & Engineering, Program Director, Energy Storage, Energy Research Institute, Nanyang Technological University, Singapore
Rachid Yazami is a French Moroccan scientist best known for his research on lithium-ion batteries and on fluoride-ion batteries. He is the inventor of the graphite anode (negative pole) of lithium-ion batteries. In 2014 Rachid Yazami, John Goodenough, Yoshio Nishi and Akira Yoshino were awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. In this presentation,
we will show how online thermodynamics data collection and processing addresses the SOC and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of entropy and enthalpy. Linearity coefficients are LIB chemistry and SOH dependent. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.
MONDAY, MARCH 26

7:00 am - 4:00 pm Tutorial and Training Seminar*
Registration Open

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8:00 - 10:00 Pre-Conference Tutorials and Training Seminar*
10:30 - 12:30 pm Pre-Conference Tutorials and Training Seminar*
12:30 - 1:30 Enjoy Lunch on Your Own
1:30 - 2:00 Networking Refreshment Break
2:00 - 4:00 Pre-Conference Tutorials and Training Seminar*
4:00 Close of Day


TUESDAY, MARCH 27

7:00 am Registration and Morning Coffee
8:10 Plenary Keynote Sessions: Organizer’s Opening Remarks
Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

8:15 How Does the Electrolyte Change during the Lifetime of a Li-Ion Cell?
Jeff Dahn, PhD, Professor, Canada Research Chair, NSERC/Teledyne Canada Industrial Research Chair, Department of Chemistry, Dalhousie University

Jeff Dahn is recognized as one of the pioneering developers of the lithium-ion battery that is now used worldwide in laptop computers and cellphones. This presentation will examine how the electrolyte changes during the lifetime of the cell.

8:45 Uber Elevate - Powering an Electric UberAIR Future
Celina Mikolajczak, Director of Battery Development, Uber

Following a 32-year career working on emerging technologies at NASA, Mark Moore joined Uber to lead vehicle systems development for its urban air mobility program. He’ll be speaking about this Uber Elevate initiative and sharing vision for how vertical take-off and landing vehicles will change the world, as well as the energy storage needs required to power UberAIR missions in the years ahead.

9:15 Networking Coffee Break

OEM Application-Driven Development

9:45 Organizer's Opening Remarks
Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

9:50 Chairperson’s Remarks
Odysseas Paschos, PhD, Battery Technology Project, BMW Group

10:00 U.S. Department of Energy's Vehicle Battery Research Progress
Brian Cunningham, Engineer, U.S. Department of Energy

This presentation provides an overview of DOE vehicle battery R&D progress and the associated initiatives for accelerating commercialization. It also includes highlights of many significant research breakthroughs resulting from VTO-funded R&D. A discussion of electric drive vehicle technology performance targets, gaps, and future research directions is also included.

10:30 On the Optimal Size of Batteries for Electric Vehicles and the Influence of Fast Charge
Mark Verbrugge, Director, Chemical and Materials Systems Laboratory, General Motors

We are at a crossroads in terms of balancing two promising technologies: (1) higher energy density (Wh/L) and specific energy (Wh/kg) batteries, relative to today's conventional graphite/metal-oxide lithium ion systems, and (2) fast-charge capability, defined here as greater than Level 2 charging, or greater than about 20 kW. We present a simple model to assist in evaluating such matters as cell performance, cost, life, and fast-charge capability. * Co-Author: Charles Wampler, Chemical and Materials Systems Lab, General Motors

11:00 Technology and Research for Safer and Longer Lasting Batteries
Tobias Glossman, Senior Engineer, Mercedes-Benz Research and Development North America

The dropping cost of Li-ion cells enables more transportation applications to be electrified than ever before. The overall auto industry is working on the integration of batteries with high energy content. Safety and endurance are important requirements especially for premium cars, high energy content and superior power do not satisfy the expectations. This talk will discuss some of the recent efforts in R&D toward higher safety and durability goals.

11:30 Commercialization of a New Class of Additives to Improve Li-ion Abuse Tolerance
Steven Weiss, PhD, Founder, Xilectric Inc.

The emergence of ride sharing and autonomous vehicles will require batteries with improved durability. In this talk, Xilectric will discuss its newly-developed technology aimed at improving Lithium-ion batteries’ cycle lifetime and abuse tolerance. Xilectric’s work stems from the development of a new acidity framework and its vision of what it means to buffer Lithium-ion electrolytes from changes in acidity. This technology helps with high voltage, high temperature, and fast charge and has been shown to achieve a greater than 2.5 times battery lifetime increase for a variety of electrolyte and cathode formulations.

11:45 The Next Era in Li-Ion Batteries Begins Today with Nano-Coatings
Reuben Sarkar, MSc, MBA, Chief Product Officer, Forge Nano

Production ready nano-coatings can unlock the full potential of today’s Li-ion batteries providing greater capacity, longer life, lower cost, and faster charging along with a higher intrinsic safety.
12:00 pm Networking Luncheon
12:55 Networking Refreshment Break

OEM Application-Driven Development (Cont.)
1:25 Chairperson’s Remarks
Mark Verbrugge, Director, Chemical and Materials Systems Laboratory, General Motors

1:30 Perspectives and Challenges of Automotive Li-Ion Materials and Cells
Odysseas Paschos, PhD, Battery Technology Project, BMW Group
The development of e-mobility is at a tipping point with increasingly optimistic forecasts for the future market share of electric vehicles. This presentation will outline the potential and limits of present material concepts from a car manufacturer point of view. In particular, it will address open issues to be solved in the future development of electric energy storage technologies for automotive applications.

2:00 Trends in Urban Mobility and BlueSolutions Opportunities
Didier Marginedes, Senior Vice President, Director, BlueSolutions – Groupe BOLLARE
Urban mobility is one of the toughest challenges that cities face today as existing mobility systems are not responding to the new needs. Evolution of travel habits, demand for new services, speed and predictability, as well as evolving customer expectations toward individualization and sustainability will require new mobility services. BlueSolutions intends to be part of this evolution with car sharing services and public transportation solutions based on its battery technology and systems solutions.

2:30 Extreme Fast Charge Capable Batteries Using Silicon-Dominant Anode & Cell Technology
Benjamin Park, PhD, Founder & CTQ, Enevate Corporation
Enevate’s silicon-dominant anode (>70% silicon) and Li-ion cell technology utilizes a self-standing film without typical battery binder materials. Batteries using Enevate’s anode offer extreme fast charge with high energy density, wide temperature operation, and safety. Data will be shown along with analysis of other potential technology benefits for EV applications.

3:00 Grand Opening Dessert Break in the Exhibit Hall with Poster Viewing
3:45 Advancements and Challenges in Batteries beyond Li-Ion
Rana Mohtadi, PhD, Principal Scientist, Toyota
Over the past few years, there have been increasing interests in battery chemistries promising to overcome the limitations with existing lithium ion batteries. Namely, the limited energy density has been a key driver to revisit metallic systems such as those based on lithium and magnesium metal. Although nascent in nature compared to its Li counterpart, advancements in technologies related to magnesium batteries have been reshaping our understanding of these systems. We will address the opportunities and technical hurdles facing these technologies.

4:15 Porsche’s Technical Innovations for EVs in Production Vehicles through Motorsport Development Activities
Kenneth Gould, E-Mobility Technical Systems Engineer, Porsche Cars North America
The relationship between motorsport activities, technical innovation, durability and refinement is fundamental at Porsche. As we move toward the electrically enhanced and full electric vehicle drive systems in production vehicles, it is important to retain the performance and the “Fun to Drive” characteristics. We believe development for and participation in motorsport activities is the best way to achieve this goal.

4:45 Surpassing the Internal Combustion Engine (ICE) with Poster Viewing
Fabio Albano, PhD, Vice President of Battery Systems, Fisker, Inc.
This presentation will share Fisker’s battery architecture to achieve an 800V powertrain that can enable ultra-fast charging and energy density in excess of 230 Wh/kg at the system level. Such high energy density battery systems will enable vehicles with range more than 400 miles, a necessary step for EVs to surpass current transportation technologies with range more than 400 miles, a necessary step for EVs to surpass current transportation technologies. We will also provide a glimpse at solid state battery technologies under development for the electric vehicles of tomorrow.

5:15 Transition to Breakout Discussions
5:20 Interactive Breakout Discussion Groups (See website for details.)
6:20 Welcome Reception in the Exhibit Hall with Poster Viewing (Sponsorship Opportunity Available)

7:20 Close of Day

WEDNESDAY, MARCH 28

8:00 am Registration and Morning Coffee

Innovation & Design in Next Generation Transportation Applications
8:25 Chairperson’s Remarks
Rana Mohtadi, PhD, Principal Scientist, Toyota
8:30 Safety Testing and Simulation of Existing and Next Generation of Lithium Batteries
Ahmad Pesaran, PhD, Chief Energy Storage Engineer, National Renewable Energy Laboratory
Cost and performance of existing lithium ion batteries have improved significantly. To make these batteries safe in electric vehicles, current solutions add extra cost, weight, and volume. NREL’s modeling tools evaluate the abuse behavior of lithium batteries under overheating, overcharge, nail penetration, crush, and internal short circuit. In this presentation, we will discuss select results of using our testing and modeling tools for the existing lithium ion technologies and how they could be applied to the next generation of lithium batteries.

9:00 A123’s Advanced Global Lithium Ion Cell Development for Low and High Voltage Automotive Applications
Patrick Hurley, PhD, CTO, A123 Systems, LLC
With the rapid global adoption of electrochemical energy storage for use in automotive transportation, safety has become a key focus. The adoption of Nickel-rich NMC cathodes along with novel Group IV anodes is pushing gravimetric energy densities past 350 Wh/Kg. This presentation will discuss A123’s advancements in safety technology for high energy density applications for use in FHEV and EV technologies along with low temperature performance for 12 & 48V applications.

9:30 JCI’s 48-Volt Lithium-Ion Micro Hybrid Battery Enabling Optimization of Energy Generation and Consumption
Phil Shaw, Global Product Lead, Advanced Battery, Johnson Controls
This presentation will examine the advancements to JCI’s 48v lithium-ion micro hybrid and its optimization.

10:00 Coffee Break in the Exhibit Hall with Poster Viewing
Innovation & Design in Next Generation Transportation Applications (Cont.)

10:45 12V Start-Stop and 48V Mild Hybrid
LMO-LTO Batteries
Veselin Manev, PhD, Senior Technical Director, LTBBatteries Technology, XALT Energy

The presentation outlines the significant accomplishments of XALT-Energy in LTO battery technology introducing this year LTO based battery products achieving 60,000 cycles at 100% DOD and room temperature and more than 10,000 cycles at 55°C. It will also review the application of said LMO-LTO technology advancements in development 12 V start stop and 48 V mild hybrid batteries meeting the USABC goals, including cold cranking 6 kW pulse power requirement at -30°C.

11:15 What Can the Automotive Industry Learn from Consumer Electronics?
John Wowziak, President, Energy Storage and Power Consulting

The consumer electronics industry has been plagued by massive recalls over the past 12 years. The vast majority of these involve large, reputable cell manufacturers. The expected rapid growth in XEV applications, with hundreds or thousands of cells per battery pack, raises significant concerns about safety.

11:45 Fast Forward to a Fast Charge Future
Renata Arsenaux, Senior Researcher, Ford Motor Company

The convergence of a number of disruptive technologies, steadily declining battery costs, and the connectivity that is changing every facet of our lives has thrust EVs onto the doorstep of mainstream adoption. Ford currently offers a DC Fast Charge capable Focus Electric, and has recently unveiled ambitious plans for its future electrification portfolio. Widespread fast charging capability is one of the final frontiers that must be conquered in order to make EVs fully competitive with their ICE counterparts. An overview of the DC Fast Charging landscape in the US and abroad will provide context for a closer look at the barriers that remain, technology status and needs, and the implications for a society where fast charging stations abound and where EVs roam the roads in ever-increasing numbers.

12:15 pm Enjoy Lunch on Your Own

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynotes

Yoshio Nishi, PhD, Executive Alumni, Sony Corporation

Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1966 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company’s materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014, Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. Since the early 1990s, LIBs were introduced into various mobile devices and we were reasonably confident that our customers would be satisfied with their performance. Shortly afterwards, however, we noticed that there were some discrepancies between the performance we offered and that expected by our customers. Dr. Nishi will discuss here what LIB users really require from secondary batteries.

2:05 Global Electrification and LG Chem
Denise Gray, CEO, LG Chem Power

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Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem’s participation in the various segments from materials, cell and cost points of view.

2:25 Addressing Key Battery Issues from a Thermodynamics Perspective
Rachid Yazami, PhD, School of Materials Science & Engineering, Program Director, Energy Storage, Energy Research Institute, Nanyang Technological University, Singapore

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2:45 Refreshment Break in the Exhibit Hall with Poster Viewing

3:30 Close of Advances in Automotive Power Applications
Power Applications for Consumer Electronics
Overcoming the Challenges to Commercialization of Batteries for Portable Devices

March 28-29, 2018 | FORT LAUDERDALE, FLORIDA

Wednesday, March 28

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynote

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OEM Application-Driven Development

3:30 Organizer’s Opening Remarks
Craig Vail, Executive Director, Conferences, Cambridge EnerTech

3:35 Chairperson’s Remarks
James Kaschmitter, CEO, SpectraPower

3:40 Zhuhai Coslight Power Battery (EV/HEV/ESS/PT) Solution
Tony Li, Ph.D., Director, R&D, Zhuhai Coslight Battery CO., Ltd., China

Compared with other types of Li-ion batteries (prismatic, cylindrical), pouch type Li-ion batteries have the advantage of size flexibility (very low cost to customize new dimension), high specific energy density and better safety performance. Zhuhai Coslight’s mainstream MP NCM EV cell can achieve >2000 cycle life with 242Wh/kg gravimetric energy density, and will be further increased to 277 Wh/kg by 2018 through new chemistry introduction. While, mainstream NCM HEV cell can achieve ~5000Wh/kg power density with >100Wh/kg gravimetric energy density and >2500 cycle life.

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Lib users really require from secondary batteries.
FINAL WEEKS TO REGISTER!

4:10 Towards Comprehending Battery Behavior in Support of High Performance Workloads
Kamal Shah, PhD, Director, Platform Architecture Management Client Computing Group, Intel Corp.; Chairman, Mobile PC Extended Battery Life Working Group, EBLWG
Next-generation mobile platforms require support for high performance workloads driven by emerging high bandwidth I/O, higher resolution displays, and higher peak power demand. Comprehending battery behavior is critical in ensuring if these power sources can support needs of high performance workloads optimally. The presentation will discuss some early experiments for study of impact of battery impedance on high performance workloads and proposes additional experiments to gain more insight.

4:40 Quality Philosophy in the Manufacture of Lithium-Ion Batteries
Bruce Miller, Technology Strategist, Dell
The manufacturing processes employed in the creation of lithium ion cells are quite convoluted and intricate. To ship a good consistent product, the process design and control methodology employed must be quite rigorous. Attention to detail is important from end to end. In actual practice, two manufacturing processes may appear to be equivalent, but the implementation approach can significantly affect the output of the process. A few real world examples will be used to illustrate the points.

5:10 Networking Reception in Exhibit Hall with Poster Viewing

6:10 Close of Day

THURSDAY, MARCH 29

7:45 am Registration Open
7:45 Interactive Breakout Discussion Groups with Continental Breakfast (See website for details.)
8:45 Session Break

Innovation & Design in Next-Gen Consumer Electronics Applications

9:00 Chairperson's Remarks
Kamal Shah, PhD, Director, Platform Architecture Management Client Computing Group, Intel Corp.; Chairman, Mobile PC Extended Battery Life Working Group, EBLWG

9:05 Internal Safety Motifs for Lithium-Ion Batteries
Sean Andrews, PhD, Staff Engineer, Qualcomm
As battery energy densities continue to increase, so do the risks of catastrophic failure. While there exists many external circuits designed to prevent such occurrences, safety methodologies integrated within the cells themselves offer more effective, passive solutions. The work presented here covers both academic and industrial efforts in producing effective safety technologies within electrochemical cells.

9:35 Balancing the Need for High Capacity and the Desire for Fast Charge in Consumer Electronics
Walter van Schalkwijk, PhD, Principal Battery Scientist, Microsoft

10:05 New Battery Test Capability
Maximizing Test Coverage
Mike Costello, Vice President, Engineering, Chroma ATE, Inc.
Rudy Sterbenz, Chief Systems Architect, Chroma ATE, Inc.

10:35 Coffee Break in the Exhibit Hall with Poster Viewing

11:20 Cell Internal Shorts as Next Frontier of Battery Safety: Types, Prevention and Detection inside Battery Pack
Yevgen Barsukov, Head, Algorithm Development, Battery Management Systems, Texas Instruments
Present battery packs have sophisticated protection against external device faults, leaving cell internal short as the last frontier that needs to be addressed. Depending on the type of internal short, it can be either prevented by improved cell-state aware charging controls such as MaxLife charging, or in some cases detected in early stages, giving the manufacturer exact knowledge of time and type of failure. This would allow the manufacturer to take quick corrective action and avoid potential costly recalls.

11:50 Increasing Battery Cycle Life through Charging Algorithm to Reduce IOT Cost of Ownership
Naoki Matsumura, PhD, Senior Technologist, Intel
IOT devices expect Li-ion batteries to have a long cycle life because they may be used in areas where battery replacement is not easy. This session talks about a method to extend battery cycle life through battery charging algorithm. This is expected to reduce the cost of ownership as it enables less battery replacement.

12:20 pm A Unique Lithium Technology to Power the World's Smallest Fully Implantable Spinal Cord Neurostimulator
Erik Scott, PhD, Bakken Fellow, Technical Fellow, Direct of Advanced Development, Medtronic
Medtronic is a world-leader in implantable medical devices with over forty years of experience in battery R&D and manufacturing for demanding applications. In 2017, Medtronic released its newest generation of implantable neurostimulator. The Intellis™ spinal cord stimulator uses the proprietary Ovdrive™ lithium-ion battery technology, specifically designed for the critical requirements of miniaturized implantable devices. Ovdrive™ technology enables miniaturized cells that can be recharged very rapidly while showing negligible capacity fade over many years of continuous use. The solution is also tolerant of deep discharge, unlike traditional lithium ion chemistries. Highlights of performance data, modeling approach and technical insights from development of Ovdrive™ technology will be discussed.

12:50 Session Break
1:00 Networking Luncheon (Sponsorship Opportunity Available) or Enjoy Lunch on Your Own
2:00 Dessert Break in the Exhibit Hall with Poster Viewing
2:30 Chairperson’s Remarks
Bruce Miller, Technology Strategist, Dell
2:35 Building Next-Generation Rechargeable Lithium Metal Batteries
Jie Xiao, PhD, Chief Scientist, Pacific Northwest National Laboratories
Dr. Xiao will discuss the recent progress of high energy lithium sulfur batteries supported by Battery500 program. Cell-level challenges in Li-S batteries will be discussed. The fundamental science behind cell fabrication and the proposed solutions will be explored.

3:05 Healing of Lithium Metal dendrites in Electrochemical Energy Storage Devices
Lu Li, Research Assistant, Nikhil A. Koratkar Group, Department of Mechanical, Aerospace, and Nuclear Engineering, Rensselaer Polytechnic Institute
I will describe how self-heating (Joule heating) can be used to anneal and heal lithium metal dendrites in lithium-sulfur batteries. Operation of the battery at high operating current densities (i.e. high charge-discharge rates) will be used to heat the lithium dendrites. Above a critical activation temperature, surface diffusion and migration of Li atoms is triggered resulting in a morphology change of the dendrites into a smooth film-like morphology, which eliminates the risk of dendritic shorting of the electrochemical cell.

3:35 Ultra-High Temperature Li-ion Battery
James Kaschmitter, CEO, SpectraPower
SpectraPower, in partnership with Covalent Associates, has developed a unique Li-ion battery that is capable of cycling at elevated temperatures up to 2000C. The battery incorporates several unique components, including binder-less electrodes, a specially formulated ionic liquid electrolyte and a non-woven separator.

The Road to Commercialization
4:05 Accelerating the Commercialization and Launch of New Battery Materials with Special Focus and Emphasis on Manufacturability of New Materials and Designs
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
There are tremendous developments associated with new materials to enhance the performance of rechargeable batteries and many challenges that make the transition to full production difficult and time consuming. Polaris Labs works with a variety of developers and strives to help them move quickly through the development process to full production. We point out areas to consider in the assessment and processing of new materials as well as considerations to ease the transition to full production.

4:30 PANEL DISCUSSION: The Cost of Quality in Advanced Battery Development and Manufacturing
Moderator: John Wozniak, President, Energy Storage and Power Consulting
Panelists: Bruce Miller, Technology Strategist, Dell
Brian Cunningham, Engineer, U.S. Department of Energy
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
Additional Panelists to be Announced
The development of durable and affordable advanced batteries for use in automotive, consumer electronics and stationary applications drives R&D activities. This panel of experts examines the true cost of quality and how approaches to the development of advanced batteries must be adapted to avoid the significant pitfalls on the road to commercialization.

5:30 Close of Conference

Student Fellowships Now Available
Full time graduate students and PhD candidates presenting a poster can now attend the International Battery Seminar for only $299. Please see the website for details.
Applications Stream

Alternatives in Energy Storage

Meeting Evolving & Increasing Energy Demands

March 28-29, 2018 | Fort Lauderdale, Florida

Wednesday, March 28

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynotes


Yoshio Nishi, PhD, Executive Alumni, Sony Corporation

Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1966 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company's materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014, Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today's lithium-ion battery.

2:05 Global Electrification and LG Chem

Denise Gray, CEO, LG Chem Power

Denise Gray is President/CEO of LG Chem Power Inc. (LGCPI), the North American subsidiary of lithium-ion battery maker, LG Chem (LGC), Korea. In this position, she has overall responsibility for the strategic direction, engineering, and business development activities for the North American market. The majority of her professional career, nearly 30 years, was spent at General Motors in the USA. Director of Battery Systems Engineering, Director of Transmission Controls Engineering, Director of Powertrain Controller Engineering, Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem’s participation in the various segments from materials, cell and cost points of view.

2:25 Addressing Key Battery Issues from a Thermodynamics Perspective

Rachid Yazami, PhD, School of Materials Science & Engineering, Program Director, Energy Storage Research Institute, Nanyang Technological University, Singapore

Rachid Yazami is a French Moroccan scientist best known for his research on lithium-ion batteries and on fluoride-ion batteries. He is the inventor of the graphite anode (negative pole) of lithium-ion batteries. In 2014 Rachid Yazami, John Goodenough, Yoshio Nishi and Akira Yoshino were awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. In this presentation, we will show how online thermodynamics data collection and processing addresses the SOH and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of entropy and enthalpy. Linearity coefficients are LIB chemistry and SOH dependent. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.

2:45 Refreshment Break in the Exhibit Hall with Poster Viewing

Stationary Energy Storage

3:30 Organizer’s Opening Remarks

Mary Ann Brown, Executive Director, Conferences, Cambridge EnerTech

3:35 Chairperson’s Remarks

Xianfeng Li, PhD, Professor, Division of Energy Storage, Dalian Institute of Chemical Physics, Chinese Academy of Sciences

3:40 FEATURED PRESENTATION: Stable Annotated Dialkoxybenzenes as Catholyte Materials for Non-Aqueous Redox Flow Batteries

Lu Zhang, PhD, Chemist, Electrochemical Energy Storage, Argonne National Laboratory

Redox active molecules are a key component that could determine the performance of non-aqueous redox flow batteries (NRFBs). Two novel bicyclical substituted dialkoxybenzene molecules, BODMA and BODEA, have been developed for use as catholyte materials in NRFBs. These molecules have been engineered to provide greater solubility (in their neutral state) and improved chemical stability (in their charged state).

Click Here to register Online
InternationalBatterySeminar.com
4:10 Aqueous Redox Flow Batteries for Grid Energy Storage
Bin Li, PhD, Staff Scientist, Energy and Environment, Pacific Northwest National Laboratory
Redox flow batteries (RFBs) systems, as one of the most promising electrical energy storage systems, provide an alternative solution to the problems of balancing power generation and consumption. Because of good safety characteristics and high power densities (e.g., VRBs), aqueous systems have attracted widespread interest. We introduce new low-cost aqueous systems developed at PNNL based on Zn/I or organometallic redox species.

4:40 Zinc-Based Flow Battery with High Energy Density and Low Cost for Stationary Energy Storage
Xianfeng Li, PhD, Professor, Division of Energy Storage, Dalian Institute of Chemical Physics, Chinese Academy of Sciences
Flow battery is one of the most important technologies to store sustainable energy such as solar and wind power. Current flow batteries are somehow limited by relatively low energy density and high cost. Zinc-based flow battery is very attractive due to its low cost and high energy density. We present some Zinc-based flow batteries, e.g., Zn/Br, Zn/Fe, which are very promising for next-generation energy storage.

5:10 Networking Reception in Exhibit Hall with Poster Viewing
6:10 Close of Day

THURSDAY, MARCH 29
7:45 am Registration Open
7:45 Interactive Breakout Discussion Groups with Continental Breakfast (See website for details.)
8:45 Session Break

Electrode and Electrolyte Dynamics
9:00 Chairperson’s Remarks
Xingcheng Xiao, PhD, Staff Researcher, Chemical and Material System Lab, General Motors Global R&D Center

9:05 Mechno-Chemical Response of Battery Materials for Biomechanical Energy Harvesting
Gary L. Pint, PhD, Assistant Professor, Department of Mechanical Engineering, Vanderbilt University
We present research efforts demonstrating how flexible battery materials can be reconfigured into an electrochemical device to harvest, rather than store, energy. Results will demonstrate design criteria for energy harvesters tailored to frequencies and bending angles relevant to human biomechanical motion, with the purpose of energy harvesting fabric design.

9:30 Solid Electrolytes for Lithium Metal Batteries
Daniel T. Hallinan Jr., PhD, Assistant Professor, Chemical and Biomedical Engineering, FAMU-FSU College of Engineering
Solid electrolytes will enable safer, longer-lasting, next-generation batteries, but new techniques are required to determine electrochemical transport parameters and reaction kinetics. Using 7Li Magnetic Resonance Imaging, concentration gradients in solid polymer electrolytes were visualized to determine salt diffusion coefficients. An electrochemical alternative to the rotating disk electrode has been developed to investigate oxidative electrolyte degradation and lithium plating/stripping kinetics in cells with solid polymer electrolyte.

9:55 Promise and Challenges of Practical High-Power-Density Solid-State Batteries
Johannes Voss, PhD, Staff Scientist, SUNCAT Center for Interface Science and Catalysis, SLAC National Accelerator Laboratory, Stanford University
All-solid-state batteries could in principle be safe non-flammable high-gravimetric energy density replacements for liquid electrolyte Li-ion batteries in electric vehicles. Based on first-principles theory, we show that there are no fundamental power limitations in going from a solid-liquid to a sharp solid-solid interface. Practically, however, there are several interfacial issues that seem to make high-power-density solid-state batteries with long cycle life challenging.

10:20 Atomic Layer Deposition (ALD) Coatings Enable Higher Energy Batteries with Enhanced Lifetimes
Rob Hall, PhD, Director, Product Development, ALD NanoSolutions, Inc.
Lithium-ion batteries are driving today’s growth in the battery market. Dramatic changes and industry expansion are creating large new markets for cost-effective, nano-engineered materials. ALD Nano uses proprietary Atomic Layer Deposition (ALD) techniques to deposit tailored materials that solve battery performance challenges cost-effectively at scale.

10:35 Coffee Break in the Exhibit Hall with Poster Viewing
10:45 Sponsored Presentation (Opportunity Available)

Electrode and Electrolyte Dynamics (Cont.)
11:20 Printing 3D Gel Polymer Electrolyte Using Projection-Type Micro-Stereolithography
Liang Pan, PhD, Assistant Professor, Mechanical Engineering, Purdue University
Here we demonstrate the use of projection stereo-micro-lithography as a low-cost and high-throughput method to fabricate three-dimensional (3D) microbattery. We used UV-curable gel electrolyte under micro-stereo-micro lithography to build a 3D architecture of microbattery. Active materials, LFP and LTO, are mixed with carbon black and flown into the 3D structure. The GPE is characterized and the microbattery is performed a cycling test. Results show a feasibility of microbattery fabrication using projection micro-stereolithography.

11:50 Power and Energy Tradeoffs in Li-Air Batteries: The Importance of Electrolyte Dynamics
Forrest S. Gittleson, PhD, Advanced Battery Technology Engineer, BMW Technology Office USA
Emerging Li-air batteries can achieve exceptionally high energy densities, yet current combinations of electrolytes and electrodes have been unable to demonstrate reasonable power densities and long-term efficient cycling. For high-power applications, major issues include poor reactant transport and electrolyte decomposition. This presentation details Sandia’s efforts to combine experimental electrochemistry, synthesis, and simulation to better understand the influence of electrolyte dynamics on full battery operation.

12:20 pm Advanced Electrode Materials for Next-Generation Lithium-Ion Batteries
Xingcheng Xiao, PhD, Staff Researcher, Chemical and Material System Lab, General Motors Global R&D Center
Lithium-ion batteries are driving today’s growth in the battery market. Dramatic changes and industry expansion are creating large new markets for cost-effective, nano-engineered materials. ALD Nano uses proprietary Atomic Layer Deposition (ALD) techniques to deposit tailored materials that solve battery performance challenges cost-effectively at scale.

12:50 Session Break
1:00 Networking Luncheon (Sponsorship Opportunity Available) or Enjoy Lunch on Your Own
2:00 Dessert Break in the Exhibit Hall with Poster Viewing

Hybrid Batteries
2:30 Chairperson’s Remarks
Brian Cunningham, Engineer, U.S. Department of Energy
2:35 FEATURED PRESENTATION: Considerations in the Selection of Batteries to be Used with Supercapacitors in Vehicle Applications
Andrew F. Burke, PhD, Research Faculty, Institute of Transportation Studies, University of California, Davis
The selection of batteries to be used with supercapacitors in plug-in hybrid vehicles (PHEVs) is analyzed from the design, performance, and economic points of view. The use of the supercapacitors to load-level the energy storage battery permits the use of an "energy battery" rather than a "power battery" in PHEVs. Energy batteries have higher energy density, longer cycle life, and lower cost than power batteries of the same energy storage capacity (kWh).

3:05 Toward Highly Stable Solid-State Unconventional Thin-Film Battery-Supercapacitor Hybrid Devices: Interfacing Vertical Core-Shell Array Electrodes with a Gel Polymer Electrolyte
Jun Li, PhD, Professor, Department of Chemistry, Kansas State University

3:35 Hybrid Battery/Supercapacitor Energy Storage Systems Supply the Power Demands of Small Devices
Gene Armstrong, Director, Applications, Engineering, PBC Tech
Small devices require physically small energy storage capabilities. Unfortunately, small form factor batteries suffer from a lack of ability to deliver the peak power and while meeting the supply noise requirements of pulsed load applications such as RF transmitters, camera flashed or audio speaker drivers. In conjunction with the advances in thin battery technology, the supercapacitor is well positioned to form a hybrid battery/capacitor solution to achieve high power delivery in tight spaces.

The Road to Commercialization
4:05 Accelerating the Commercialization and Launch of New Battery Materials with Special Focus and Emphasis on Manufacturability of New Materials and Designs
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
There are tremendous developments associated with new materials to enhance the performance of rechargeable batteries and many challenges that make the transition to full production difficult and time consuming. Polaris Labs works with a variety of developers and strives to help them move quickly through the development process to full production. We point out areas to consider in the assessment and processing of new materials as well as considerations to ease the transition to full production.

4:30 PANEL DISCUSSION: The Cost of Quality in Advanced Battery Development and Manufacturing
Moderator: John Wozniak, President, Energy Storage and Power Consulting
Panelists: Bruce Miller, Technology Strategist, Dell
Brian Cunningham, Engineer, U.S. Department of Energy
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
Additional Panelists to be Announced
The development of durable and affordable advanced batteries for use in automotive, consumer electronics and stationary applications drives R&D activities. This panel of experts examines the true cost of quality and how approaches to the development of advanced batteries must be adapted to avoid the significant pitfalls on the road to commercialization.

5:30 Close of Conference
**Monday, March 26**

7:00 am - 4:00 pm Tutorial and Training Seminar*  
Registration Open

7:00 - 8:00 am Morning Coffee

8:00 - 10:00 Pre-Conference Tutorials and Training Seminar*  
10:30 - 12:30 pm Pre-Conference Tutorials and Training Seminar*  
12:30 - 1:30 Enjoy Lunch on Your Own  
1:30 - 2:00 Networking Refreshment Break  
2:00 - 4:00 Pre-Conference Tutorials and Training Seminar*  
4:00 Close of Day


**Tuesday, March 27**

7:00 am Registration and Morning Coffee  
8:10 Plenary Keynote Sessions: Organizer's Opening Remarks  
Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

**8:15 How Does the Electrolyte Change during the Lifetime of a Li-Ion Cell?**  
Jeff Dahn, PhD, Professor, Canada Research Chair, NSERC/Teela Canada Industrial Research Chair, Department of Chemistry, Dalhousie University  
Jeff Dahn is recognized as one of the pioneering developers of the lithium-ion battery that is now used worldwide in laptop computers and cellphones. This presentation will examine how the electrolyte changes during the lifetime of the cell.

8:45 Uber Elevate - Powering an Electric UberAIR Future  
Celina Mikolajczak, Director of Battery Development, Uber  
Following a 32-year career working on emerging technologies at NASA, Mark Moore joined Uber to lead vehicle systems development for its urban air mobility program. He’ll be speaking about this Uber Elevate initiative and sharing vision for how vertical take-off and landing vehicles will change the world, as well as the energy storage needs required to power UberAIR missions in the years ahead.

9:15 Networking Coffee Break

**9:45 Organizers Opening Remarks**  
Victoria Mosolgo, Conference Producer, Cambridge EnerTech

**9:50 Chairperson’s Remarks**  
Cynthia Millsaps, President and CEO, Quality, Energy Assurance LLC

10:00 Regulatory Updates for Li-Ion Batteries Globally  
Cynthia Millsaps, President and CEO, Quality, Energy Assurance LLC  
Updates on all major global markets for lithium ion cells and batteries. Battery compliance is an ever-changing area and it can be challenging to keep up with all the new regulations and proposals going on globally. We will review the current major battery markets and what it takes to ship and cell products in these areas.

10:30 Safety Guidelines and Changes  
Janet McLaughlin, Director, Hazardous Materials Safety Program, Federal Aviation Administration

11:00 Understanding the Complexities of Shipping New, refurbished, and Waste Lithium Batteries  
George Kerchner, Executive Director, PRBA - The Rechargeable Battery Association  
What happens when lithium batteries are disassembled and refurbished? Are they subject to the dangerous goods and hazardous waste regulations when transported? When lithium batteries reach the end of life and are shipped domestically and internationally as waste, what transport and hazardous waste regulations apply? Do they require a hazardous waste manifest when transported within or exported from the U.S., require an export permit from the U.S. Environmental Protection Agency, and consent from the country receiving the waste batteries?

11:30 Lithium-Ion Battery Thermal Management and Thermal Runaway Propagation Mitigation Solutions with Carbon Fiber Technology  
Michael Mo, CEO, KULR Technology Corporation  
KULR Technology is a pioneer in thermal management technology with its proprietary carbon fiber technology that has been used by NASA, Boeing and JPL in over 500 aerospace and industrial applications. It will showcase its latest solutions to prevent lithium-ion battery thermal runaway propagation, testing for battery safety and thermal management of battery operations.

11:45 High Power and Safe Li-metal Batteries Part I: The Mechanism of Li Metal Growth in Porous Structures  
Slobodan Petrovic, PhD, CTO, XNRGI  
Lithium metal batteries with liquid electrolytes are not safe because of dendrite growth. A new electrode structure consisting of porous silicon is shown to suppress dendrite growth, enabling high-power and safe battery. The results, supported by the study of reaction mechanisms, demonstrate excellent Coulombic efficiency and high volumetric energy density.

12:00 pm Networking Luncheon  
Sponsored by XNRGI
12:55 Networking Refreshment Break  

Transportation Safety  
1:25 Chairperson's Remarks  
Chris Turner, CTO & Vice President, Inventus Power  
1:30 The Challenges of Shipping Damaged Batteries - Understanding the Transport Regulations to Facilitate Forensic Analysis and Product Recalls  
Bob Richard, PhD, President, Consulting, Hazmat Safety Consulting  
Regulators, airlines, aircraft manufacturers and pilots continue to express concerns relative to the safe transport of lithium batteries by air. These concerns continue to result in restrictions that impact supply chains. What risk mitigation solutions are available and how can shippers minimize supply chain impacts?  
2:00 Sizing Cell Modules to Prevent Thermal Events in Medium and Large Format Systems; How to Prevent Costly Over-Design and Maintain Safety  
Chris Turner, CTO & Vice President, Inventus Power  
Inventus Power has analyzed construction and thermal mass characteristics in a study to show how the other cells in the module dissipate heat. Thresholds for the total absorption of heat are established, and a design approach is demonstrated for proper use of this method to improve thermal event resilience at module level in medium and large format battery systems.  
2:30 Sponsored Presentation (Opportunities Available)  
3:00 Grand Opening Dessert Break in the Exhibit Hall with Poster Viewing  
3:45 Combined Battery Calorimetry and Simulation for Prevention of Thermal Runaway and Increased Safety  
Carlos Ziebert, PhD, Senior Scientist, Thermophysics & Thermodynamics Group, Karlsruhe Institute of Technology  
Battery calorimetry as a powerful and versatile electrochemical-thermal characterization technique will be presented under normal use together with safety tests under abuse and accident conditions (thermal abuse, nail penetration). It will be shown how the data (temperature, heat, internal pressure) gained from these experiments combined with multiscale modelling of the thermal runaway and advanced BMS diagnostics provide a powerful tool for the early prediction and prevention of the thermal runaway.  
4:15 Thermal Propagation Testing within EV Battery Packs  
Dean MacNeil, PhD, Research Officer, Energy Mining and Environment, National Research Council of Canada  
We have developed a novel thermal runaway initiation method that permits the investigation of thermal propagation studies within a wide variety of battery packs using different cell choices and construction methods. It is minimally invasive, provides minimal external energy to the system and results in thermal runaway in less than 10 seconds. The use of this method within a number of EV battery pack designs will be shown.  
4:45 Statistical Characterization 18650 Format Lithium Ion Cell Thermal Runaway Energy Distributions  
William Walker, Heat Transfer Analyst, Thermal Design Branch, NASA Johnson Space Center  
5:15 Transition to Breakout Discussions  
5:20 Interactive Breakout Discussion Groups (See website for details.)  
6:20 Welcome Reception in the Exhibit Hall with Poster Viewing (Sponsorship Opportunity Available)  
7:20 Close of Day  

WEDNESDAY, MARCH 28  
8:00 am Registration and Morning Coffee  

Simulation and Testing  
8:25 Chairperson's Remarks  
Andy Keates, Technology Manager, Intel Corporation  
8:30 Testing Li-Metal Cells for Actual Usage Scenarios  
Andy Keates, Technology Manager, Intel Corporation  
We typically test Li-ion batteries for cycle life with only a short period at 100% state of charge. It's not realistic, but it's not dangerous either. Realism may take on a new challenge if USB becomes an option for charging our laptops. This can easily lead to many shallow charge cycles a minute and very frequent reversals in charge/discharge. Hundreds of short charge cycles a day can happen. What does that mean for dendrite growth?  
9:00 Short Detection Technology for Battery Safety  
Brian Barnett, PhD, Vice President, CAMX Power  
9:30 Understanding Safety of Aging Cells  
Judith Jeevarajan, PhD, Research Director, Electrochemical Safety, Underwriters Laboratories, Inc.  
Results of studies to cycle cells and modules under different voltage ranges as well as under the hybrid electric vehicle profile at different temperatures. The fresh and cycled cells and modules were subjected to off-nominal tests such as overcharge and external shorts to understand the characteristics of the aging process and how it might affect safety. Destructive analysis was carried out on fresh and cycled cells to understand component level changes that occur during the aging process.  
10:00 Coffee Break in the Exhibit Hall with Poster Viewing  

Next-Generation Battery Research/ Battery Safety  
10:45 Healing of Lithium Metal Dendrites for Electrochemical Energy Storage Applications  
Lu Li, Research Assistant, Nikki A. Koratkar Group, Department of Mechanical, Aerospace, and Nuclear Engineering, Rensselaer Polytechnic Institute  
I describe how self-heating can be used to anneal and heal lithium metal dendrites in lithium-sulfur batteries. Operation of the battery at high operating current densities will be used to heat the lithium dendrites. Above a critical activation temperature, surface diffusion and migration of Li atoms is triggered resulting in a morphology change of the dendrites into a smooth film-like morphology, eliminating risk of the electrochemical cell's dendritic shorting.  
11:15 Design of Polymer-Supported, Low Volatility Gel Electrolytes  
Matthew Panzer, PhD, Associate Professor, Graduate Program Chair, Chemical & Biological Engineering, Tufts University  
Solid (gel) electrolyte films featuring room temperature ionic liquids (materials known as ionogels) hold great promise for realizing safer electrochemical energy storage devices. Ionogels are inherently safer than currently used liquid solvent-based electrolytes due to their nonvolatile, nonflammable and leak-proof nature. Recent findings suggest that controlling ion-polymer scaffold interactions through rational chemical functionalization is an important strategy by which one can optimize ionogel performance.
11:45 Making Li-ion Batteries Safe and Flexible with Water
Kang Xu, PhD, Senior Research Chemist & Project Lead, US Army Research Lab
Non-aqueous electrolytes are responsible for the rare but high-profile safety incidents encountered by Li-ion batteries, and their moisture-sensitive and toxic nature also brought rigid form-factors. Using aqueous electrolytes would resolve most of these concerns, if water could be stabilized at extreme potentials required for most LIB chemistries. This work aims to explore that possibility.

12:15 pm Enjoy Lunch on Your Own

1:30 Shep Wolsky Battery Innovator Award and Tribute & Plenary Keynotes

Yoshio Nishi, PhD, Executive Alumni, Sony Corporation
Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1966 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company’s materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014, Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. Since the early 1990s, LIBs were introduced into various mobile devices and we were reasonably confident that our customers would be satisfied with their performance. Shortly afterwards, however, we noticed that there were some discrepancies between the performance we offered and that expected by our customers. Dr. Nishi will discuss here what LIB users really require from secondary batteries.

2:05 Global Electrification and LG Chem
Denise Gray, CEO, LG Chem Power
Denise Gray is President/CEO of LG Chem Power Inc. (LGCP), the North American subsidiary of lithium-ion battery maker, LG Chem (LGC), Korea. In this position, she has overall responsibility for the strategic direction, engineering, and business development activities for the North American market. The majority of her professional career, nearly 30 years, was spent at General Motors in the USA. Director of Battery Systems Engineering, Director of Transmission Controls Engineering, Director of Powertrain Controller Engineering, Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem’s participation in the various segments from materials, cell and cost points of view.

2:25 Addressing Key Battery Issues from a Thermodynamics Perspective
Rachid Yazami, PhD, School of Materials Science & Engineering, Program Director, Energy Storage, Energy Research Institute, Nanyang Technological University, Singapore
Rachid Yazami is a French Morrocan scientist best known for his research on lithium-ion batteries and on fluoride-ion batteries. He is the inventor of the graphite anode (negative pole) of lithium-ion batteries. In 2014 Rachid Yazami, John Goodenough, Yoshio Nishi and Akira Yoshino were awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. In this presentation, we will show how online thermodynamics data collection and processing addresses the SOC and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of the battery ages. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.

2:45 Refreshment Break in the Exhibit Hall with Poster Viewing

3:30 Close of Battery Safety
Akira Yoshino were awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. In this presentation, we will show how online thermodynamics data collection and processing addresses the SOC and SOH determination. We found a universal rule, which applies to all LIB tested at any SOH (ageing), that is the SOC is a linear function of entropy and enthalpy. Linearity coefficients are LIB chemistry and SOH dependent. Therefore, the thermodynamics assessment method teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.

2:45 Refreshment Break in the Exhibit Hall with Poster Viewing

Improvements in Pack Modeling
3:30 Organizer’s Opening Remarks
Victoria Mosolgo, Conference Producer, Cambridge EnerTech

3:35 Chairperson’s Remarks
Craig Arnold, PhD, Director, Princeton Institute for the Science and Technology of Materials, Princeton University

3:40 Effects of Local Phenomena on Battery Degradation and Safety
Craig Arnold, PhD, Director, Princeton Institute for the Science and Technology of Materials, Princeton University

Here we discuss effects in Li-ion batteries in which local non-uniformities in battery construction or mechanical stress can couple into the electrochemical processes of the system and lead to accelerated decay and safety concerns. We present the relevant mechanisms and discuss methods of mitigating these effects in real systems.

2:05 Global Electrification and LG Chem
Denise Gray, CEO, LG Chem Power

Denise Gray is President/CEO of LG Chem Power Inc. (LG CPI), the North American subsidiary of lithium-ion battery maker, LG Chem (LGC), Korea. In this position, she has overall responsibility for the strategic direction, engineering, and business development activities for the North American market. The majority of her professional career, nearly 30 years, was spent at General Motors in the USA. Director of Battery Systems Engineering, Director of Transmission Controls Engineering, Director of Powertrain Controller Engineering, Director of Powertrain Software Engineering, and development of powertrain and vehicle electrical systems were her core engineering responsibilities. A review of the current global trends in vehicle electrification and automotive battery technologies will be presented. This will be carried out highlighting LG Chem’s participation in the various segments from materials, cell and cost points of view.

2:25 Addressing Key Battery Issues from a Thermodynamics Perspective
Rachid Yazami, PhD, School of Materials Science & Engineering, Program Director Energy Storage, Energy Research Institute, Nanyang Technological University, Singapore

Rachid Yazami is a French Morrocan scientist best known for his research on lithium-ion batteries and on fluoride-ion batteries. In 2014 Rachid Yazami, John Goodenough, Yoshio Nishi and Stanley Whittingham were awarded the Nobel Prize in Chemistry for their pioneering work in lithium-ion batteries. In the current talk he will discuss how online thermodynamics data collection and processing addresses the SOC and SOH determination. We will show how the degree of anode and cathode degradation can be estimated indirectly from online thermodynamic data collected from today’s high-performance lithium-ion batteries. This new method of thermodynamics assessment teaches on the type of cathode material and on the degree of anode and cathode degradation as the battery ages.

Yoshio Nishi, PhD, Executive Alumni, Sony Corporation

Mr. Yoshio Nishi is retired senior vice president and chief technology officer of the Sony Corporation. He graduated in 1966 from the Faculty of Applied Chemistry of the Department of Technology at Keio University in Tokyo and immediately joined Sony, where he rose through the ranks to become corporate research fellow, vice president, and president of the company’s materials laboratories. In 1991 his team succeeded in the commercialization of the first lithium-ion secondary batteries (LIB). In 1994 he received technical awards from the Electrochemical Societies of both Japan and the United States in recognition of his contributions to LIB technology. In 2014, Dr. Nishi was awarded the Draper Prize by the National Academy of Engineering for pioneering and leading the groundwork for today’s lithium-ion battery. Since the early 1990s, LIBs were introduced into various mobile devices and we were reasonably confident that our customers would be satisfied with their performance. Shortly afterwards, however, we noticed that there were some discrepancies between the performance we offered and that expected by our customers. Dr. Nishi will discuss here what LIB users really require from secondary batteries.
4:10 Identifying Li-Ion Physics-Based Model Parameter Values from Cell-Level Current/Voltage Data
Gregory Plett, PhD, Professor, Electrical and Computer Engineering, University of Colorado, Colorado Springs
Adapting physics-based model parameter values as battery cells age can result in unstable and physically nonmeaningful models. In this presentation, we propose an alternate approach that instead uses an interacting multiple model Kalman filter to select the model from a set of pre-computed pre-aged models that best matches the presently observed input/output dynamics of the battery cell under observation. Unlike other approaches, this method guarantees stable and physically meaningful models that track cell parameter values over the lifetime of the cell.

4:40 Precise Power-Limit Estimation for Lithium-Ion Batteries Using Physics-Based Constraints and Predictive Methods
Scott Trimble, PhD, Assistant Professor, College of Engineering & Applied Sciences, University of Colorado, Colorado Springs
Electric vehicle battery management systems must be able to determine, in real time, the available power that may be provided by the battery pack. Similarly, in rechargeable packs, it is required to determine how much charge power the pack can accept. Such power limits should ensure that the pack will not suffer damage by exceeding charge or voltage limits or by exceeding a design current or power limit. This paper describes a method that uses a physics-based dynamic cell model and predictive optimization to accurately compute battery-pack available power.

5:10 Networking Reception in Exhibit Hall with Poster Viewing

6:10 Close of Day

THURSDAY, MARCH 29

7:45 am Registration Open

7:45 Interactive Breakout Discussion Groups with Continental Breakfast (See website for details.)

8:45 Session Break

Modeling for Longer Life and Durability
Naoki Matsumura, Senior Technologist, Intel Corporation

9:00 Chairperson’s Remarks

9:05 Beyond Estimating Battery State of Health: Identifiability of Individual Electrode Capacity and Utilization
Anna Stefanopoulou, PhD, Professor, Mechanical Engineering, University of Michigan
Degradation of Li-ion battery is the result of a number of physical and chemical mechanisms that take place at various components of the cell. To maximize the usage but not induce further degradation, estimation techniques about the type of degradation and state of health of the individual electrodes, specifically their capacities and utilization window, are required. Their identifiability is studied for different operating windows given that there are practical limitations in the availability of data for deep discharged and full charged states in real world battery applications. It is shown that having stress data in addition to the voltage measurements at phase transitions provides better identifiability of the individual electrode parameters. It is noted that the dE/dQ data augment the long-established method, Differential Voltage Analysis (DVA), followed by electrochemists which depends on terminal voltage data across phase transitions used to compute shifts in the peak locations in the dV/dQ curve.

9:35 Accelerating Development of High Nickel NMC Cathodes- Improved Lifetime and Durability
Dee Strand, PhD, CSO, Chemistry, Wildcat Discovery Technologies
High energy cathodes, such as NMC811 can deliver improved energy density relative to today’s materials. However, it suffers from poor lifetime and durability. Variations in electrode composition can impact the performance of the material. This presentation will highlight parameters that can accelerate implementation of NMC811 in applications.

10:05 Sponsored Presentation (Opportunity Available)

10:35 Coffee Break in the Exhibit Hall with Poster Viewing

11:20 Cell Internal Shorts as Next Frontier of Battery Safety: Types, Prevention and Detection inside Battery Pack
Yevgen Barsukov, Head, Algorithm Development, Battery Management Systems, Texas Instruments
Present battery packs have sophisticated protection against external device faults, leaving cell internal short as the last frontier that needs to be addressed. Depending on the type of internal short, it can be either prevented by improved cell-state aware charging controls such as MaxLife charging or in some cases detected in early stages, giving manufacturer exact knowledge of time and type of failure. This would allow manufacturer to take quick corrective action and avoid potential costly recalls.

11:50 Battery Cycle Life Extension by Charging Algorithm
Naoki Matsumura, Senior Technologist, Intel Corporation
IOT devices expect Li-ion batteries to have a long cycle life because they may be used in areas where battery replacement is not easy. This session talks about a method to extend battery cycle life through battery charging algorithm. This is expected to reduce the cost of ownership as it enables less battery replacement.

12:20 pm A Unique Lithium Technology to Power the World’s Smallest Fully Implantable Spinal Cord Neurostimulator
Erik Scott, PhD, Bakken Fellow, Technical Fellow, Direct of Advanced Development, Medtronic
Medtronic is a world-leader in implantable medical devices with over forty years of experience in battery R&D and manufacturing for demanding applications. In 2017, Medtronic released its newest generation of implantable neurostimulator. The Intellis™ spinal cord stimulator uses the proprietary Overdrive™ lithium-ion battery technology, specifically designed for the critical requirements of miniaturized implantable devices. Overdrive™ technology enables miniaturized cells that can be recharged very rapidly while showing negligible capacity fade over many years of continuous use. The solution is also tolerant of deep discharge, unlike traditional lithium ion chemistries. Highlights of performance data, modeling approach and technical insights from development of Overdrive™ technology will be discussed.

12:50 Session Break

1:00 Networking Luncheon (Sponsorship Opportunity Available) or Enjoy Lunch on Your Own

2:00 Dessert Break in the Exhibit Hall with Poster Viewing

Battery Management for Hybrid Applications
Brian Cunningham, Engineer, U.S. Department of Energy
2:35 FEATURED PRESENTATION: Considerations in the Selection of Batteries to be Used with Supercapacitors in Vehicle Applications
Andrew F. Burke, PhD, Research Faculty, Institute of Transportation Studies, University of California, Davis
The selection of batteries to be used with supercapacitors in plug-in hybrid vehicles (PHEVs) is analyzed from the design, performance, and economic points of view. The use of the supercapacitors to load-level the energy storage battery permits the use of an "energy battery" rather than a "power battery" in PHEVs. Energy batteries have higher energy density, longer cycle life, and lower cost than power batteries of the same energy storage capacity (kWh).

3:05 Toward Highly Stable Solid-State Unconventional Thin-Film Battery-Supercapacitor Hybrid Devices: Interfaces Vertical Core-Shell Array Electrodes with a Gel Polymer Electrolyte
Jun Li, PhD, Professor, Department of Chemistry, Kansas State University

3:35 Hybrid Battery/Supercapacitor Energy Storage Systems Supply the Power Demands of Small Devices
Gene Armstrong, Director of Applications, Engineering, PBC Tech
Small devices require physically small energy storage capabilities. Unfortunately, small form factor batteries suffer from a lack of ability to deliver the peak power and while meeting the supply noise requirements of pulsed load applications such as RF transmitters, camera flashed or audio speaker drivers. In conjunction with the advances in thin battery technology, the supercapacitor is well positioned to form a hybrid battery/capacitor solution to achieve high power delivery in tight spaces.

The Road to Commercialization

4:05 Accelerating the Commercialization and Launch of New Battery Materials with Special Focus and Emphasis on Manufacturability of New Materials and Designs
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
There are tremendous developments associated with new materials to enhance the performance of rechargeable batteries and many challenges that make the transition to full production difficult and time consuming. Polaris Labs works with a variety of developers and strives to help them move quickly through the development process to full production. We point out areas to consider in the assessment and processing of new materials as well as considerations to ease the transition to full production.

4:30 PANEL DISCUSSION: The Cost of Quality in Advanced Battery Development and Manufacturing
Moderator: John Wozniak, President, Energy Storage and Power Consulting
Panelists: Bruce Miller, Technology Strategist, Dell
Brian Cunningham, Engineer, U.S. Department of Energy
Curtiss Renn, PhD, Senior Scientist, Polaris Laboratories LLC
Additional Panelists to be Announced
The development of durable and affordable advanced batteries for use in automotive, consumer electronics and stationary applications drives R&D activities. This panel of experts examines the true cost of quality and how approaches to the development of advanced batteries must be adapted to avoid the significant pitfalls on the road to commercialization.

5:30 Close of Conference

Hotel & Travel Information

CONFERENCE VENUE:
The Greater Ft. Lauderdale / Broward County Convention Center
1950 Eisenhower Boulevard
Fort Lauderdale, FL 33316

HOST HOTEL:
Hilton Fort Lauderdale Marina
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Discounted Room Rate Cut-off Date: February 23, 2018

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