On-Line Registration Closes June 10

16th Annual

advanced automotive battery conference

FINAL AGENDA

June 14-17, 2016 • Cobo Center • Detroit, MI

Now in the Newly Renovated Grand Riverview Ballroom!

R&D Symposium 1
Chemistry

R&D Symposium 2
Engineering

Track 1
xEV

Track 2
Fuel Cells

Track 3
Lead-Based

PROGRAM HIGHLIGHTS:

- Assessment of the Current xEV & xEV-Battery Markets
- xEV-Battery Technology Updates [Fiat Chrysler Automobiles, Ford, GM, Honda, Mitsubishi Motors, Nissan, Toyota]
- Battery Safety Testing: Materials, Cells, Packs, and In-Vehicle
- Beyond Lithium Ion – Solid-State Systems and Li Sulfur Challenges & Opportunities
- Fuel Cell Technology and Commercial Status Update: Components & Systems
- Lead-Based Battery Technological Advances & New Applications
- Network with Battery Technologists from More than a Dozen Top Automotive OEMs

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Welcome!

The international effort to curb man-generated CO_2 emissions and limit their contribution to global warming became more of an urgent priority this year as evidenced by the signing of the Paris climate accord. The automotive industry is expected to do its share and reduce CO_2 emissions by 30-40% in the next decade. Which xEV powertrains will expand in each of the key international markets is the question of the moment.

Future battery performance, durability, cost, and abuse tolerance are key to achieving cost competitiveness and thus viability for each hybrid/electric vehicle powertrain. This is why AABC was founded, and why the 2016 program features a dedicated session focused on each of these key battery technology attributes. Simply put, the AABC program uncovers the underlying technical and business issues that will impact the pace and path of vehicle electrification worldwide.

While Lead-Acid batteries and supercapacitors are contenders for a low level of hybridization, Lithium-Ion chemistry is the dominant candidate for most applications. Yet, for each of them, some fundamental questions remain:

- What are the specific anode and cathode chemistries?
- What cell design?
- What pack design?
- Which supplier?
- At what cost?
- In what volume for each category?

These questions will be addressed at AABC 2016, where chief battery technologists from major automakers will present their development trends and projected battery needs, and key suppliers will present their latest offerings and roadmaps for the future.

This is a pivotal time for the industry, with production volumes starting to ramp up, the battery designs of new programs being completed and suppliers selected, and next-generation concepts explored. Join us and our new partners from Cambridge EnerTech in Detroit in June and stay informed on the latest technology and trends in this fastest-growing battery market.

Menahem Anderman, Conference Chair
Advanced Automotive Battery Conference 2016

Growing with Cambridge EnerTech

Phillips Kuhl,
President, Cambridge EnerTech

For over 15 years, the Advanced Automotive Battery series of conferences has attracted professionals from the hybrid and electric vehicle world and their battery system suppliers, to stimulate the sharing of experiences and views at venues across Europe, the United States, and Japan.

Cambridge EnerTech unites these leading automotive battery events within a diverse portfolio of conferences spanning the entire energy storage landscape. Together with the International Battery Seminar, founded by Shep Wolsky, and the battery conferences from Knowledge Foundation, founded by Craig Wohlers, Cambridge EnerTech represents the definitive network of resources for the rechargeable battery market. We look forward to continuing our relationships with Menahem, Shep and Craig through their ongoing support and contributions to the development of all of the Cambridge EnerTech programs. The positive impact of this synergy has already been experienced at recent events.

Each year, AABC brings together an international audience of automakers and energy storage system developers to discuss the key issues impacting the technology and market of advanced vehicles and the batteries that will power them on a global scale.

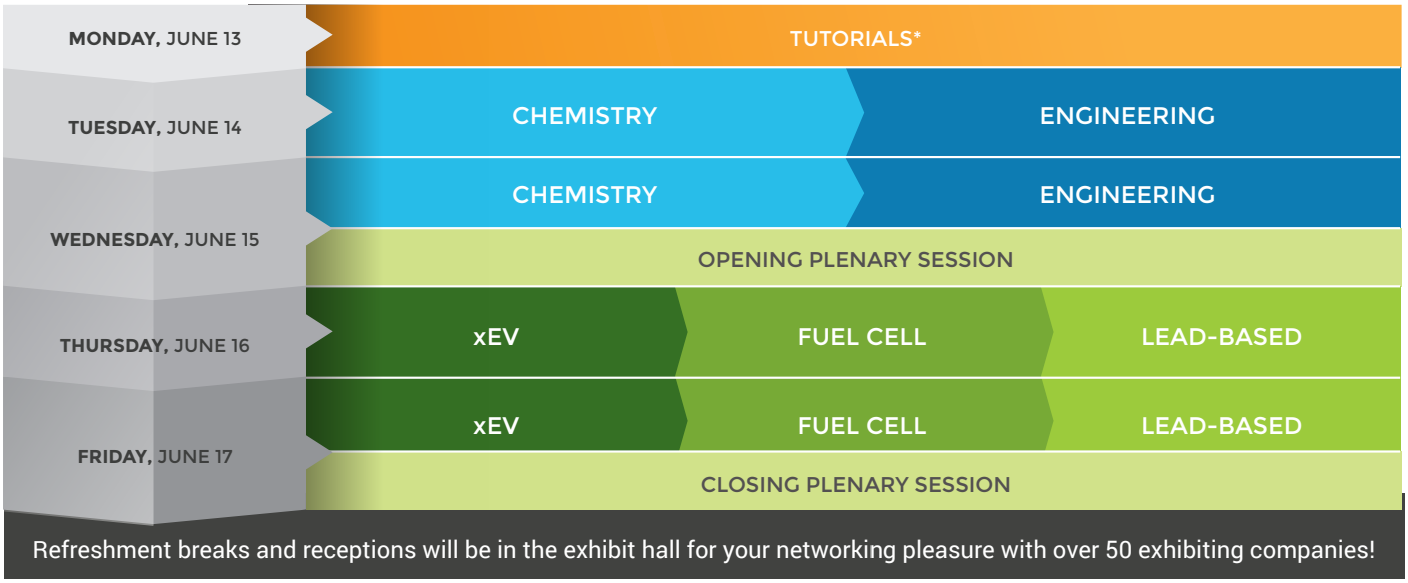
We are excited to share this year's agenda with you. As always, the core of the event is a strong technical program. The 2016 schedule will also feature ample opportunities to have dynamic discussions with technical poster presenters, meet with exhibitors to explore the latest developments, and network with speakers and other attendees.

We look forward to welcoming you to Detroit in June!

Cambridge EnerTech
Facilitating Advances in Rechargeables

TOP REASONS TO ATTEND

- Learn first-hand about the technical and business directions of international automakers from seven of the major automakers currently active in the market
- Learn about the newest advances in next-generation materials and cell technologies from some of the world's top battery materials experts
- Participate in frank discussions on battery safety validation
- Hear the latest updates on advances in Fuel Cell technology and application
- Learn of the recent development in Lead-Acid battery technology and application
- Network with the largest 2016 international gathering of automotive energy-storage technology developers and integrators



*Separate registration required

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Cambridge EnerTech offers diverse sponsorship packages that provide your company the opportunity to showcase your products, services, and solutions to an elite group of delegates. All sponsorship packages are customizable to your company's specific marketing needs and budget.

PODIUM PRESENTATIONS - *within the Main Agenda!*

Showcase your solutions to a guaranteed, targeted audience through a 15- or 30-minute presentation during a specific conference program, breakfast, lunch, or separate from the main agenda within a pre-conference workshop.

EXHIBIT

Exhibitors will enjoy facilitated networking opportunities with qualified delegates. Speak face-to-face with prospective clients and showcase your latest product, service, or solution.

INVITATION-ONLY VIP DINNER/HOSPITALITY SUITE

Select specific delegates from the pre-registration list to attend a private function at an upscale restaurant or a reception at the hotel. From extending the invitations, to venue suggestions, Cambridge EnerTech will deliver your prospects and help you make the most of this invaluable opportunity.

ONE-ON-ONE MEETINGS

Select your top prospects from the pre-conference registration list. Cambridge EnerTech will reach out to your prospects and arrange the meeting for you. A minimum number of meetings will be guaranteed, depending on your marketing objectives and needs. A very limited number of these packages will be sold.

Additional branding and promotional opportunities are available!

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- Choice of Monday Welcome Reception, Ride and Drive, or Battery Pavilion
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- Private meeting room for one day

Platinum Sponsorship
- Choice of Monday Welcome Reception, Luncheon or VIP Dinner (up to 15 guests)
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TUTORIALS* | Monday, June 13

MORNING TUTORIAL
8:30 – 10:30 AM

The Rechargeable Battery Market: Value Chain and Main Trends 2016 - 2026

This tutorial will present the 10 year automotive market forecasts from Avicenne and other analysts (micro|hybrid|P-HEV|EV). Other coverage will include car makers' strategies and advanced energy storage (advanced lead-acid|supercap|NiMH|LIB). Additionally, LIB design for P-HEV & EV markets (cylindrical, prismatic, pouch|wounded, stacked, Z fold cells) and LIB cell, module & pack cost structure 2016-2026 will be discussed.

Christophe Pillot, Ph.D., Battery Survey Manager, Avicenne Energy, France
Christophe has acquired extensive experience in marketing, strategy analysis, technology and financial studies for the battery and power management fields. He developed the battery market analysis for Avicenne. Globally, he has been involved in more than 200 projects for 100+ customers in the battery value chain. Before joining Avicenne, Mr. Pillot held a key position in France Telecom's innovation division. He has a degree in Chemistry and a MBA in Innovation management from Pays IX Dauphine.

MIDDAY TUTORIALS
11:00 AM – 1:00 PM

Recent Advances in Solid State Electrolytes for Energy Storage

Dangerous liquid electrolytes are employed over solid electrolytes due to their high conductivities and excellent interfacial behavior. However, current research is narrowing the gap between liquid and solid electrolytes. This course will provide a review of advances in solid electrolyte, from material synthesis, to practical device applications.

Marca Doeff, Ph.D., Scientist, Lawrence Berkeley National Lab
Marca M. Doeff received her B.A. in Chemistry from Swarthmore College, and her Ph.D. in Inorganic Chemistry from Brown University. She is currently a staff scientist at Lawrence Berkeley National Laboratory and a principal investigator working in various battery programs funded by the U.S. Department of Energy. She is currently secretary of the Battery Division of the Electrochemical Society, and has served in various capacities for that division, and the Society since 2003

Josh Buettner-Garrett, Ph.D., CTO, SolidPower

Steve W. Martin, Ph.D., Distinguished Professor, University Professor, Department of Materials Science & Engineering, Iowa State University of Science & Technology
Steve W. Martin received his Ph.D. in Physical Chemistry from Purdue University. His research interests include glass and amorphous materials, solid electrolytes for batteries and fuel cells, optical materials and fibers and the characterization of materials. He is currently the chair of the Glass and Optical Materials Division, immediate past President of the ISU Sigma XI Chapter and is a member ACerS, MRS, ECS, ASEE, and Sigma XI professional societies.

AFTERNOON TUTORIALS
3:00 – 5:00 PM

Battery Safety and Abuse Tolerance Validation

Safety of the Li-Ion battery will have the greatest impact on the market acceptance of the technology in automotive and stationary applications. In this tutorial, we will discuss safety-enhancing technology and the validation of battery safety under ordinary and abusive conditions.

Tutorial Chair: Brian M. Barnett, Ph.D., Vice President, TIAX LLC
Dr. Brian Barnett's multidisciplinary team develops advanced battery materials, battery technologies, and battery-safety technologies. He has played a founding role in developing polymer electrolyte battery technology, carbon anode materials, battery safety technologies, and high-energy, high-power cathode material. Prior to TIAX, Dr. Barnett was a Vice President and Member of the Board of Directors at Arthur D. Little where he directed battery activities.

*Separate registration required

PLENARY KEYNOTE SESSIONS

Wednesday, June 15

OPENING PLENARY SESSION: xEVS: VEHICLE AND BATTERY MARKET EXPANSION

2:00 Chairperson's Opening Remarks
Menahem Anderman, Ph.D., President, Total Battery Consulting

2:05 Vehicle Electrification: Challenges and Opportunities
Kevin Layden, Director, Electrified Powertrain Engineering, Ford Motor Company
Regulations and restrictions on ICE emissions including CO_2, particulates and other tailpipe emissions are in place promoting the introduction of electrified vehicles and requiring increased options from manufacturers. However, oil price has reached a 13-year low. To enable expansion of xEVs, the battery industry must not only continue to deliver the cost, weight, energy, and power density improvements it has demonstrated over the past decade, but it must go further and work with its partners to enhance features that batteries can provide exclusively. This will make electrified vehicles the consumers' first choice.

2:25 Electric Vehicles: Current Status and Future View of Nissan
Yasuharu Watanabe, General Manager, EV and HEV Battery Engineering Department, Nissan Motor Company
This presentation will introduce future possibility and engineering direction of Nissan Electric vehicle, which realize the long driving range by battery evolution. It will also introduce the field data and customers' opinions through the experiences of over 200,000 vehicles of the Nissan LEAF, which was released in December of 2010.

2:45 Toyota's Electrification Roadmap
Michael Lord, Executive Engineer, Vehicle Regulation and Certification Engineering, Toyota Technical Center, Toyota Motor Engineering & Manufacturing NA
The presentation will discuss Toyota's electrification plan. In the short term, continued improvement and propagation of hybrid technology, including the expansion of plug-in hybrids, will provide the greatest benefits for CO_2 reduction. For full electric drive, Toyota is focused on the launch of the Mirai Fuel Cell Vehicle and believes that fuel cell vehicles have the greatest potential for use as general purpose household cars and large vehicles. For limited-range city vehicles, battery EVs could fit the requirement.

3:05 Refreshment Break in the Exhibit Hall with Poster Viewing

4:00 xEV Expansion, Technology and Market Outlook
Menahem Anderman, Ph.D., President, Total Battery Consulting
In this presentation, electrified-vehicle market expansion and battery technology and market development from micro-hybrids to full EVs will be discussed. As for battery technology, the key challenge is to enhance performance—to ease battery packaging in the car and reduce cost, while maintaining or improving durability, reliability, and safety.

4:30 Latest xEV & Battery Market Topics and Outlook for the Future
Takeshi Miyamoto, Senior Vice President, B3 Corporation

4:50 Hybrids versus Diesel and Other Technologies, including impact of Recent NOx Scandal
John German, Senior Fellow, ICCT
The presentation will discuss test versus real life CO_2 and pollutant emission of various advanced vehicle architectures, including advanced gasoline and diesel, hybrids, plug in hybrids, full battery, and Fuel Cell EVs. Improvements in conventional technologies and hybrids, and their impacts on paths to low CO_2, will also be assessed.

5:10 Q&A

5:30 Networking Reception in the Exhibit Hall with Poster Viewing

7:00 Close of Day

Friday, June 17

CLOSING PLENARY SESSION: xEV INFRASTRUCTURE

2:55 Chairperson's Remarks
Mark Duvall, Director, Electric Transportation and Energy Storage, Electric Power Research Institute

3:00 Status of FCEVs and H2 Infrastructure in California - The Challenges Met and What's Next
Bill Elrick, Executive Director, California Fuel Cell Partnership
With fuel cell electric vehicles now commercially available and the California Roadmap and ZEV Action Plan documents as guidance, California is nearly half way to the 100 hydrogen station objective for initial commercial launch. This presentation will highlight the current status, progress made and priority activities for advancing the commercial market in California.

3:20 Charging Infrastructure Progress and Challenges
Mark Duvall, Director, Electric Transportation and Energy Storage, Electric Power Research Institute

3:40 Charging Infrastructure – Southern California Edison Experience
Jordan W. Smith, Engineering Manager Advanced Technology, Southern California Edison
Southern California Edison developed a program to install thousands of charging stations in long-term parking locations. SCE developed requirements for EVSE, and established a qualification process to select a pool of qualified EVSE. The requirements focus on hardware and controls. Equipment must have the capability to respond to standard utility DR signals, presenting a versatile asset which enables further electrification of transportation while managing grid system impact.

4:00 Q&A

4:20 Closing Remarks

4:30 Close of Conference

HOTEL & TRAVEL INFORMATION

Conference Venue:
Cobo Center
One Washington Boulevard
Detroit, MI 48226
www.cobocenter.com

▶ *Now in the Newly Renovated Grand Riverview Ballroom!*

For hotel reservations and additional information, visit the travel page of
www.advancedautobat.com/aabc-us

R&D SYMPOSIUM 1
Battery Chemistries for Automotive Applications

TUESDAY, JUNE 14

8:00 am Registration Open and Morning Coffee

INTRODUCTION TO KEYNOTE & SYMPOSIUM OVERVIEW

9:00 Chairperson's Opening Remarks
Martin Winter, Ph.D., Chair, Applied Material Science for Energy Conversion and Storage, MEET Battery, Research Center, Institute of Physical Chemistry, University of Muenster

9:05 KEYNOTE PRESENTATION: Future Trends of Li-Ion Batteries
M. Stanley Whittingham, D.Phil., Distinguished Professor, Chemistry and Materials Science & Engineering, Binghamton University
Today Li-ion batteries are the work-horse of advanced portable storage for vehicles. However, they achieve only 10-20% of the theoretical energy densities. By "closing the gap" between theory and practice for the layered oxides and incorporating 2e per redox center, it should be possible to attain 350 Wh/kg and 1 kWh/liter at the cell level. These and other approaches will be discussed.

CHALLENGES AND OPPORTUNITIES FOR LITHIUM-ION BATTERIES

Chairperson: *Venkat Srinivasan, Ph.D., Staff Scientist, Lawrence Berkeley National Lab*

9:25 Development of Novel Electrolyte Additives for Designed Surface Modification
Brett L. Lucht, Ph.D., Professor of Chemistry, Department of Chemistry, University of Rhode Island
Investigation of electrolytes on performance of lithium-ion batteries will be presented. *Ex situ* surface analysis of the cycled electrodes allows the development of an understanding of the role of the electrolyte and common additives in the structure of interfacial electrode films. The mechanistic insight is used to systematically develop novel electrolyte Additives for Designed Surface Modification (ADSM) of the electrodes.

9:45 Safe, Green and Low Cost Li-Ion Chemistry Enabled by Aqueous Interphase
Arthur Cresce, Ph.D., Materials Scientist, Electrochemistry Branch, U.S. Army Research Laboratory.
The interphases play a key role in enabling Li-ion intercalation chemistries in non-aqueous electrolytes, in which solvents reduction mainly contributes the chemical building blocks. Recently Suo et al. discovered for the first time that such protective interphases could be formed in aqueous media via manipulation of the Li-ion solvation structure. This discovery opened a window to an entirely new world, and makes it possible to employ aqueous electrolytes to replace the inflammable and toxic non-aqueous components that induce huge costs in processing, safety management and packaging. This talk will summarize the newest progress achieved in this new direction.

10:05 Grand Opening Coffee Break in the Exhibit Hall with Poster Viewing

Sponsored by TOYO SYSTEM USA, Inc.

11:30 A Closer Look at Silicon-Graphite (Si-Gr) Composite Electrodes During Cycling in NCM523/Si-Gr Full Cells
Daniel P. Abraham, Ph.D., Scientist, Argonne National Laboratory
Silicon-graphite composite electrodes, which are physically robust, highly uniform, and very flexible even at high capacity loadings, have been developed at Argonne. However, NCM523-bearing full cells containing these electrodes show significant capacity loss and impedance rise during cycling. We explore sources of these performance changes in cells with Li-metal and Lix Sn reference electrodes, and propose practical solutions that improve cell life.

11:50 Tailoring Properties of Carbon Additives to Meet the Needs of Li-Ion Batteries
Miki Oljaca, Ph.D., Technology Manager, Battery R&D, Cabot Corporation
Despite significant advances in Li-ion battery technology over the last few years, specific energy density is still insufficient to enable widespread adoption of electric vehicles. New approaches are needed to increase energy density, reduce cost and improve safety. In this talk, we will discuss how tailoring of conductive additive properties can impact processing and performance of Li-ion battery electrodes and provide some examples of novel conductive additives that can address requirements of next generation batteries.

12:10 pm Irreversible Capacities, Coulombic Efficiencies and Energy Efficiencies: Sorting out Promising and Less Promising Lithium-Ion Battery Materials
Martin Winter, Ph.D., Chair, Applied Material Science for Energy Conversion and Storage, MEET Battery, Research Center, Institute of Physical Chemistry, University of Muenster
Research is searching for new materials. Optimization efforts are in large majority focused on the increase in capacity, cycle life and rate behavior of these materials. In this presentation, irreversible capacities, Coulombic efficiencies and energy efficiencies of new and as promising considered electrode materials will be detailed and compared. As a result, several of the new electrode materials may be reconsidered with regard to their relevance for applications where efficiency plays a key role.

12:30 Q&A

Sponsored by FOCUS GRAPHITE

12:50 Electrochemical Performance of Lac Knife High Purity Flake Graphite in the Anode and Cathode of Lithium Ion Batteries
Joseph Doninger, Ph.D., Director, Manufacturing and Technology, Focus Graphite Inc.
Li-Ion coin cell tests conducted on the Lac Knife spherical graphite resulted in achieving near theoretical reversible capacities and first cycle ICLs as low as 1%. Long term cycling tests exhibited essentially zero capacity loss after 110 cycles. Resistivity tests incorporating Lac Knife expanded graphite in the cathode matrix resulted in greatly improved conductivities and thereby offer the potential to improve overall Li-Ion battery performance.

1:05 Networking Lunch

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

EMERGING FUTURE CHEMISTRIES (I): SOLID STATE BATTERY

3:00 Chairperson's Remarks
Tim Arthur, Ph.D., Toyota Motor Engineering & Manufacturing North America

3:05 Next-Generation Batteries based on Protected Lithium Metal Electrodes
Steven J. Visco, Ph.D., CEO, CTO, PolyPlus Battery Company
Over the past few decades, there have been significant investments in R&D targeted at next-generation batteries. PolyPlus has focused its effort on the development of solid-state lithium metal electrodes as an enabling technology for next generation batteries. In this presentation, we will examine a number of development paths for solid-state anodes, as well as the evolution from Li-ion to safe, rechargeable Li metal batteries.

3:25 Solid Electrolytes: An Enabling Technology for Vehicle Electrification
Jeff Sakamoto, Ph.D., Professor, Mechanical Engineering, University of Michigan
Increases to the performance of Li-ion batteries will not be sufficient to reach targets such as the USABC EV 2020 goals, and the liquid electrolyte poses a safety risk. Solid electrolytes enable alternative advanced battery concepts which solve the safety issue and can meet or exceed the performance needed for EV. This talk overviews these concepts with a focus on Solid-State Batteries.

3:45 Development of Solid Electrolyte for All-Solid-State Battery
Yuki Katoh, Ph.D., Battery AT, Advanced Technology Toyota Motor Europe NV/SA
The all-solid-state battery is the most promising candidate for future battery systems, due to the high energy density obtained by direct-series-stacking of the battery cells. However, the low power of this system still remains an unsolved issue. It is mainly because of low ionic conductivity of solid electrolytes. In order to improve the battery performance, we developed a solid electrolyte based on the Li10GeP2S12.

4:05 On the Importance of Scale-Up
Mohan Karulkar, Ph.D., Battery Research Engineer, Energy Storage Materials & Strategy, Ford Motor Company
The need for higher energy density has driven development of promising bench-scale technologies. However, key automotive metrics and targets are difficult to evaluate at the bench scale. Thus, resources that enable low-volume scale-up of promising benchtop research are critical to addressing automotive needs. This talk will detail strategies for scale-up of energy storage technologies and associated metrics.

4:25 Q&A

4:45 Networking Reception in the Exhibit Hall with Poster Viewing

Sponsored by Johnson Controls

5:45 Close of Day

WEDNESDAY, JUNE 15

8:30 am Morning Coffee

EMERGING FUTURE CHEMISTRIES (II): LI-METAL CHEMISTRIES

9:00 Chairperson's Remarks
Steven J. Visco, Ph.D., CEO, CTO, PolyPlus Battery Company

9:05 Status of Li-Metal Batteries for Vehicle Applications
Venkat Srinivasan, Ph.D., Staff Scientist, Lawrence Berkeley National Lab
While there has been renewed interest in Li metal-based batteries, driven by recent progress in solid electrolytes, it is still not clear if the properties of presently available solid electrolytes are sufficient to meet the targets for electric vehicle applications. This talk will access the status of presently available material and provide guidance for materials development.

9:25 Drivers and Technologies for Li-Metal Solid-State Batteries
Juergen Gross, Ph.D., Senior Vice President Research, Bosch
Success of electrified mobility will be decided by battery performance and cost. Some of the limitations of Li-ion technology can be overcome by Solid-State Batteries. Improvements in energy density, intrinsic safety and cost are demonstrated. Bosch and Seeo see good chances to introduce such technologies to mass market in the early 2020s.

9:45 Li-Metal Battery - Application in Automotive
Mei Cai, Ph.D., Technical Fellow & Lab Group Manager, General Motors
Highly emerged EV market evokes the demands on advanced batteries with high energy density. Among all industrial areas where advanced batteries will be applied, the automotive industry has critical requirements on specific parameters. In this talk we will present the requirements for future electrical vehicle application and the impact of Li-metal batteries on the automotive industry. Some concerns and disadvantages of Li-metal batteries will be also discussed.

10:05 Coffee Break in the Exhibit Hall with Poster Viewing

11:00 Design of Components for the Sustainable Li-S Batteries
Robert Dominko, Ph.D., Research Associate, National Institute of Chemistry, Slovenia Ljubljana University
A special attention will be paid to development of carbons, electrolytes and separators used for cylindrical prototype cells prepared within EU projects Eurolis and Helis. Selection of the components is based on understanding the mechanisms of the electrochemical reactions with a focus to obtain Li-S cells with high energy density and long cycling life.

11:20 Prospects of Lithium-Sulfur Batteries for Automotive Applications
Kevin G. Gallagher, Ph.D., Chemical Engineer, Argonne National Laboratory
The high theoretical specific energy of lithium-sulfur coupled with the low cost and natural abundance of sulfur is intuitively attractive for researchers and battery developers. This talk translates the materials-only values to the system level cost and energy density in comparison to forecasted advances in lithium-ion. Lithium-sulfur challenges and potential strategies to overcome them will be highlighted.

11:40 Challenges of the Electrode /Electrolyte Interphase in Lithium Metal Batteries
Mustafa Musameh, Ph.D., CSIRO Manufacturing
Lithium metal has the highest specific energy (3800 mAh.g-1) of all anode materials, making it extremely attractive for use in the next generation of lithium batteries. In order to be able to utilize Lithium metal as an anode in a lithium battery, it is necessary to develop electrolytes where a "stable" SEI can be established to allow reversible plating and stripping under typical device conditions. In this presentation, we will highlight CSIRO's research into lithium metal anodes using electrolytes based on ionic liquids. We will describe our work in understanding how these electrolytes interact with lithium and how this translates to devices, such as Li-S.

12:00 pm Q&A

12:20 Networking Lunch

1:05 Dessert Break in the Exhibit Hall with Poster Viewing

2:00 Close of Symposium

R&D SYMPOSIUM 2
Battery Engineering for Automotive Applications

TUESDAY, JUNE 14

8:00 am Registration Open and Morning Coffee

BATTERY PACK ENGINEERING

9:00 Chairperson's Opening Remarks
Oliver Gross, Technical Fellow – Energy Storage Systems, Fiat Chrysler Automobiles

9:05 How to Design a Battery Cell and a Battery Module with CAE Tools
Gaetan Damblanc, Technical Lead, CD Adapco
With an ever-increasing demand for higher energy density and power density on the cell, without compromising on weight, volume, aging and safety all the way through the pack, it makes designing cells and packs a highly complex multi-parameters challenge. This presentation will show how today's CAE can help in the design process and contribute to optimised design for better cost and turnaround time.

9:25 Battery Pack Thermal Design
Ahmad Pesaran, Ph.D., Energy-Storage Group Manager, National Renewable Energy Laboratory
Battery temperature in xEVs should be controlled to meet performance, durability, safety, and cost requirements. A battery thermal management system must be designed to meet thermal requirements, such as maximum temperature and cell-to-cell temperature difference, and integrate with other components seamlessly. We will discuss tools needed to build battery thermal management systems and provide examples of the latest designs.

9:45 Progress and Challenges Associated with Determining the State of Charge, Power, and Health of Battery Systems
Charles Wampler, Project Leader, Global Battery Systems Engineering, General Motors
Determining the SOC, SOP, and SOH for conventional lithium-ion batteries is challenging at lower temperatures, where the system behavior is highly nonlinear. Accuracy of state estimation at lower temperature is particularly important in that cold-temperature performance often determines the size of the battery needed. We propose a solution to this problem and we discuss challenges relative to emerging traction batteries employing silicon negative electrodes.

10:05 Grand Opening Coffee Break in the Exhibit Hall with Poster Viewing
Sponsored by TOYO SYSTEM USA, Inc.

11:30 Comparing a Physics-Based to an Equivalent Circuit-Based Method for Battery SOC/SOH Determination
Gregory Plett, Ph.D., Professor, University of Colorado, Colorado Springs
Battery-management systems require sets of equations (i.e., models) that describe battery-cell behaviors in order to estimate SOC, SOH, and to predict available power. Historically, equivalent-circuit models have been used because of their simplicity, but recent advances in reduced-order modeling have made physics-based models computationally feasible as an alternative. This presentation will discuss some tradeoffs between the two approaches.

11:50 An Open Systems Architecture Approach to BMS HIL Testing
Peter Blume, President and Founder, Bloomy
Hardware-In-the-Loop (HIL) testing is the standard approach to validating xEV systems including the battery management system (BMS). There exist vendor-defined or "closed", as well as user-defined or "open" approaches to the implementation of HIL test equipment. In this presentation, Peter Blume presents an open systems architecture approach to HIL test systems using commercial off-the-shelf hardware and software and case studies.

12:10 pm Novel SOC/SOH Sensor for Improving Li-Ion Life and Predictions
Joe Steiber, Principal Engineer, Energy Storage Technology Group, Engine, Emissions, and Vehicle Research Division, Southwest Research Institute
The estimation of the state-of-charge (SOC) and the state-of-health (SOH) of a lithium-ion battery are topics of great importance and interest to battery-management-system (BMS) developers and vehicle integrators. Although considerable progress has been made in terms of estimation algorithms by utilizing signals such as voltage, current, temperature, and physics models of the cell in various applications, SwRI's research demonstrated a more direct and practical *in situ* detection of degradation.

12:30 Q&A

12:50 Sponsored Presentation *(Opportunity Available)*

1:05 Networking Lunch

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

LITHIUM-ION CELL ENGINEERING

3:00 Chairperson's Remarks
Robert Spotnitz, Ph.D., President, Battery Design LLC

3:05 Rate-Limiting Steps in Porous Electrodes
Robert Spotnitz, Ph.D., President, Battery Design LLC
A number of studies have used porous electrode models to optimize coating properties for some metrics such as discharge rate. Very early on, modeling predicted an optimum coating thickness for a given rate. Later, the effects of porosity and particle size were considered, as well as type of active material. More recently, some benefits of multi-layer coatings have been explored. This presentation will review past work and present new results on the use of different multilayer coatings.

3:25 Atomic-Scale Modeling: A Path to Innovation in Batteries
Roman Tarnovsky, Global Marketing Director, Materials Design, Inc.
Atomic-scale modeling opens new opportunities in exploring and optimizing of structural, dynamic and electrochemical properties of materials and interfaces in batteries. This is now possible thanks to a modeling environment MedeA®, integrating best simulation methods with structural databases and efficient computing. Illustrative examples will include the design of zero-strain cathode materials, understanding the diffusion in solid state electrolytes as a function of nano-topology, and the simulation of anode materials.

3:45 From Packs to Pores: Characterizing Li-Ion Batteries in 2D, 3D, and 4D
Jeff Gelb, Senior Applications Development Engineer, Carl Zeiss X-Ray Microscopy

In recent years, much attention has been paid to the proliferation of Li-ion batteries, supported by the developments made by engineers worldwide. Here, we will present new advancements in microstructure-based characterization of LIBs with 3D X-Ray Microscopy (XRM), as a unique pathway for studying performance characteristics and failure mechanisms. This information sheds new light on both how and why failures may be occurring.

4:05 Ceramic-Coated Separator, Li-Ion Safety and Performance
John Zhang, Ph.D., CTO, Celgard

4:25 Q&A

4:45 Networking Reception in the Exhibit Hall with Poster Viewing

Sponsored by Johnson Controls

5:45 Close of Day

WEDNESDAY, JUNE 15

8:30 am Morning Coffee

BATTERY AND VEHICLE SAFETY AND ABUSE TOLERANCE

9:00 Chairperson's Remarks
Ted Miller, Senior Manager of Energy Storage Strategy and Research, Ford Motor Company

9:05 Virtually Proving a Battery is Safe
Ted Miller, Senior Manager of Energy Storage Strategy and Research, Ford Motor Company
Dr. Jim Marcicki, Ford Motor Company
The use of Li-ion batteries is ubiquitous throughout the world, from consumer devices such as smart phones, tablets, and handheld games/players to transportation, including aircraft, drones, bikes, hoverboards, trucks and cars. The technology offers significant advantages – high energy density, high efficiency, low self-discharge, and the prospect of lower cost. However, Li-Ion battery implementation requires a detailed understanding of its safety and response to adverse conditions. The Ford Energy Storage Research Team has been focused on this challenge and is now developing battery safety performance simulation capability.

9:25 Safety Issues for Lithium-Ion Batteries: From Materials to Complete Cells
Margret Wohlfahrt-Mehrens, Ph.D., Senior Research Scientist & Project Leader, ZSW
Safety is a key factor for the application of lithium-ion batteries. Exothermal decomposition, initial thermal runaway reactions and resulting gas formation have been studied for various anode/cathode combinations. Lithium plating has a strong impact on safety. The presentation includes studies on detection and characterization of lithium plating in lab cells, commercial 18650 cells and 40 Ah pouch cells. Standardized safety tests are performed for cells with and without lithium plating. A nondestructive method for prediction of lithium plating will be discussed.

9:45 Diagnostic Tool Set Development to Determine Safety Stability and Health of an Isolated Li-ion Battery Pack
Phil Gorney, Vehicle Safety Research Engineer, National Highway Traffic Safety Administration (NHTSA)
In this presentation, the ongoing projects of the National Laboratories to develop a diagnostic tool set capable of determining the Safety Stability and Health of an isolated Li-ion Battery Pack is discussed. These technologies such as an INL a Rapid Impedance Box technology are validated with laboratory methods such as Complex Impedance Spectroscopy. The long-term objective of these projects is to identify and develop methods and technology which can be integrated into a RESS.

10:05 Coffee Break in the Exhibit Hall with Poster Viewing

11:00 Safety Modeling and Evaluation during Pack Development Process
Dr. Uwe Wiedemann, Senior Product Manager, Global Competence Team, AVL List GmbH
Dr. Berhard Brunnsteiner, Analysis Engineer, Engineering and Technology Powertrain Systems, AVL List GmbH

11:20 Overcharge Battery Response
Al Masias, Research Engineer, Ford Motor Company
The overcharge behavior of various automotive-sized lithium-ion batteries will be presented. This presentation will review the overcharge response for a variety of different cell chemistries, case designs and hardware levels under a large range of currents. This work was performed as part of a US DOT NHTSA supported research project into Battery Safety Test Procedure development.

11:40 Understanding Mechanical Abuse of Batteries
John Turner, Ph.D., Group Leader, Computational Engineering & Energy Sciences, Oak Ridge National Lab & UT-Battelle
An integrated program including manufacturing, experiments, and simulation is under way at Oak Ridge National Lab. We report on progress understanding phenomenological effects of mechanical abuse of batteries leading to short-circuits and thermal runaway. Results using the Virtual Integrated Battery Environment (VIBE), a high-fidelity simulation environment for batteries, will be used to illustrate insights gained based on analysis of benchmark and experimental test data.

12:00 pm Q&A

12:20 Networking Lunch

1:05 Dessert Break in the Exhibit Hall with Poster Viewing

2:00 Close of Symposium

Submit a Poster

Present your latest R&D findings to this exclusive group of technical and business development executives from major American and international battery companies, automotive technology centers and the global materials and energy industries. Accepted poster presenters also receive a $150 discount off their registration fee. We are particularly interested in posters covering the following topics:

- Next-Generation Battery Chemistries
- Pack and Cell Engineering
- xEV Battery Technologies
- Fuel Cell Applications
- Lead-Based Batteries

The deadline to apply for priority consideration is **April 22**

Please visit AdvancedAutoBat.com/US for more information and to submit your abstract for review

TRACK 1
xEV Battery Technology, Applications, and Market

WEDNESDAY, JUNE 15

12:00 pm Conference Registration Open

12:20 Networking Lunch

1:05 Dessert Break in the Exhibit Hall with Poster Viewing

2:00 Opening Plenary Session – see page 5 for details

5:30 Networking Reception in the Exhibit Hall with Poster Viewing

Sponsored by TOYOTA

7:00 Close of Day

THURSDAY, JUNE 16

9:00 Continental Breakfast Roundtable Discussions
Join your colleagues and fellow delegates over breakfast for a focused, informal discussion moderated by a member of our speaking faculty. A small group format allows participants to meet potential collaborators, share examples from their own work and discuss ideas with peers. Visit our website to see the full listing of topics and moderators.

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

BATTERIES FOR PHEVS AND EVS

11:00 Chairperson's Opening Remarks
William Wallace, Director, Global Battery Systems, General Motors Co.

11:05 Battery System for the Chevy Bolt
Greg Smith, Engineering Manager BEV Battery Packs, General Motors

11:25 Design and Integration of the Chrysler Minivan PHEV High Voltage Battery System
Steven Clark, Senior Manager Energy Storage & HV Systems, Fiat Chrysler Automobiles
The Chrysler Minivan PHEV embodies a balanced set of functions, responding to the needs of both consumers and regulatory requirements. The battery for the PHEV was designed to satisfy multiple global requirements, and meet the stringent functional and environmental requirements demanded by the vehicle.

11:45 Features of Outlander PHEV and Requirements of its Battery
Hiroyuki Sakai, EV/Powertrain System Engineering Department, Development Engineering Office, Mitsubishi Motors Corporation
In order for SUVs, requiring long cruising distance and stable all-wheel-drive performance, to have high environmental performance of EV and high quality driving performance, the twin motor 4WD plug-in hybrid (PHEV) system was developed and Outlander PHEV with this system has been launched onto the markets. Features of this vehicle as an EV, in conjunction with battery specifications required by the PHEV system including future systems, are presented.

12:05 pm xEV Battery System Trend Assessment
Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.

12:25 Q&A

12:40 Networking Lunch

Sponsored by A123 SYSTEMS

1:30 Dessert Break in the Exhibit Hall with Poster Viewing

ENERGY STORAGE FOR HYBRIDS

2:15 Chairperson's Remarks
Monique Richard, Senior Principal Engineer Material Engineering Division, Toyota Motor Engineering & Manufacturing North America

2:20 Battery Development for the New Prius
Koji Takahata, Toyota Motor Corporation
The 4th Generation Prius offers a Li-ion battery pack. The state of the art battery in the Prius represents Toyota's most improved Li-ion battery developed purposefully for strong hybrid traction application. This presentation will discuss the results from evaluation (related to safety and reliability) of the Li-ion battery pack and introduce the design concept and evaluation results of the new Li-ion battery cell.

2:40 Development of Battery System for the New NSX
Junji Uetake, Automobile R&D Center, Honda R&D Co., Ltd.
Honda has developed a flagship Sport-Hybrid System with a high dynamic performance. Battery packs (IPU:Intelligent Power Unit) of NSX are compact and have light weight packaging. Battery performance of NSX is of high energy and lithium-ion based. The direct connection with HVAC cools the battery effectively in NSX's new system.

3:00 48V, a Cost-Effective Approach to Reducing Real-World Diesel Passenger Car NOx and CO_2 Emissions?
Lawrence Alger, Ph.D., Technical Manager, EV/HV Engineering, Denso Corporation
Light Electrification, which can reduce engine out NOx emissions, may present not only an affordable solution to ever-tighter emissions legislation, but also one that, unlike emissions aftertreatment, offers a reduction in CO_2 emissions. Furthermore, by actively supporting the engine during transient operation it would help to reduce the sensitivity to different real-world driving styles and deliver genuine reductions off-cycle as well as on-cycle. Using a diesel plant model capable of accurately simulating transient emissions, the technical specifications required for 48V B-ISG system to meet future NOx emissions were investigated.

3:20 Refreshment Break

3:40 Lead Acid Solution for Low-Voltage Hybrid Vehicles
Jun Furakawa, Ph.D., Senior Fellow, Furakawa Battery Company
The UltraBattery comprises a capacitor integrated with lead-acid cell. The second-generation UltraBattery was developed for the newest low-voltage hybrid vehicles equipped with integrated starter-generator (ISG) for power-assist function during acceleration and enhancing regeneration function. The advantages of the second-generation UltraBattery for low-voltage hybrid vehicles will be discussed.

4:00 Toshiba "SCiB™" with LTO Anode for Low-Voltage Hybrid Systems
Koji Ishiwa, Senior Manager, Automotive Systems Division, Toshiba Corporation
Low-voltage hybrid systems such as 12V-dual, 12V-single and 48V are highly focused from the viewpoints of total environment and fuel economy. In the presentation, recent development activities of Toshiba SCiB™ for such applications will be presented.

4:20 Safety Requirements for Low-Voltage Systems
Jeff Kessen, Vice President, Corporate Strategy, A123 Systems
As the number of micro-hybrid development programs continues to grow around the world, a wide diversity of battery safety requirements is emerging despite the broad application of common energy storage technologies. To gain perspective on safety trends in low voltage batteries, example OEM requirements will be compared to typical safety requirements of both high-voltage lithium-ion batteries as well as lead-acid starter batteries. Multiple dimensions of safety performance will be explored including vehicle crash considerations.

4:40 Q&A

5:00 Close of Day

FRIDAY, JUNE 17

8:30 am Morning Coffee

xEV BATTERY RELIABILITY AND DURABILITY

9:00 Chairperson's Remarks
Bob Taenaka, Technical Leader, Advanced Battery Systems, Ford Motor Company

9:05 Predicting and Validating Battery Life in xEV Applications
Bob Taenaka, Technical Leader, Advanced Battery Systems, Ford Motor Company
A combination of testing and modeling is used at Ford to predict battery life for all xEV applications; a high-level overview of this process will be presented. Additionally, key life tests and actual customer field data are used to validate battery life predictions – a couple of examples will be presented for illustration.

9:25 Battery System Design Considerations between the Chevrolet Spark EV and the Bolt EV
JT Guerin, Engineering Specialist, General Motors
The design considerations behind the Chevrolet Spark EV and the Chevrolet Bolt EV will be discussed focusing on the thermal design and battery life. The presentation will contrast the battery designs of the Spark and Bolt EV, highlighting how the differences between vehicles influenced the system design, while meeting performance and life requirements.

9:45 Development of robust 'real world' usage cases for electric vehicles
Paul Haney, Manager Advanced Energy Storage, Low Carbon Vehicles Research, Jaguar Land Rover Ltd.
OEMs must ensure the robustness of their electric vehicles in terms of quality and performance. Therefore it is essential to determine the performance of the batteries in test conditions as close as possible to 'real world' use. This presentation will describe the process followed to develop these 'real world' usage cases which aim to limit the number of future warranty claims that may arise from battery performance related issues.

10:05 Coffee Break

10:30 New Material Development for Enhanced Life of High Energy Lithium-Ion Batteries for xEV
Jong Hun Kim, Ph.D., Research Fellow & Team Leader, PHEV/EV Cell Development, LG Chem
High-energy materials are absolutely needed to maximize energy density for longer AER and reduce cost per energy, though sometimes they cause accelerated performance degradation and make life shorter. New battery materials were developed to enhance durability and life of high energy lithium-ion batteries. New anode material minimized battery swelling and mechanical stress on batteries could be easily controlled, and new electrolyte additives reinforced SEI layer.

10:50 Optimizing Battery Usage and Management for Long Life
Kandler Smith, Ph.D., Senior Researcher, Energy-Storage Group, National Renewable Energy Laboratory
This presentation discusses the impact of system design factors on battery aging and end of life. Topics include sizing of the SOC operating window, cell balancing and thermal management systems and their value in reducing pack degradation rates and cell imbalance growth over lifetime.

11:10 Calendar Life Performance of Hitachi Power Cell
Kenji Nakai, Group Leader, LIB Cell Development Department, Hitachi Automotive Systems
Cell chemistry is one of the most effective design points to accomplish the performance of battery desired from HEV field. Based on chemistry generation change in the Hitachi power cell product, the results of calendar life tested at various temperatures and SOC, will be discussed.

11:30 Q&A

11:50 Networking Lunch

Sponsored by
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BATTERY CHARGING TECHNOLOGY AND SECONDARY USAGE

1:20 pm Chairperson's Remarks
Christian Jung, Ph.D., Development Engineer, Porsche AG

1:25 EVs and PHEVs Charging Habits
James Francfort, Program Manager, Energy Storage and Transportation Systems, Idaho National Laboratory
Idaho National Laboratory has collected driving and charging profiles and preferences from 8,000 electric and plug-in hybrid electric vehicles, and 17,000 charging units in order to benchmark drivers' vehicle operations and recharging preferences when using Level 2 and DC Fast Chargers in residential, public and workplace locations. In this presentation, these preferences and use rates will be discussed.

1:45 The Future of EVs and Fast Charging at 800V
Christian Jung, Ph.D., Development Engineer, Porsche AG
Most of today's electric vehicles show a realistic electric range of less than 200 km - enough for most of the daily drives. Nevertheless experience shows that this approach doesn't satisfy all customer expectations. The success factor for e-mobility is an electric range comparable to ICE vehicles in combination with comfortable and fast charging. These demands can be met by implementation of the 800 Volt technology. Based on motor sport experience, Porsche started to transfer this technology into series development. Thereto some components have to be adjusted, 800 V infrastructure must be rolled out and standards have to be expanded. This presentation discusses advantages and the strategic importance of this innovation.

2:05 Secondary Use EV/PHEV Batteries for Grid Markets
Ben Ollis, R&D Staff, Oak Ridge National Laboratory
An important aspect to wide-scale energy storage acceptance for the utility industry is verification of the performance and life of energy storage systems. In support of this objective, a testing platform has been developed at Oak Ridge National Laboratory (ORNL) to test energy storage units in real-world applications and analyze key performance metrics. ORNL has utilized electricity market prices to optimally dispatch a grid connected energy storage unit consisting of used EV/PHEV batteries.

2:25 Q&A

2:40 Refreshment Break

2:55 Closing Plenary Session – see page 5 for details

4:20 Closing Remarks

4:30 Close of Conference

TRACK 2
Fuel Cell Technology and Applications

WEDNESDAY, JUNE 15

12:00 pm Conference Registration Open

12:20 Networking Lunch

1:05 Dessert Break in the Exhibit Hall with Poster Viewing

2:00 Opening Plenary Session – see page 5 for details

5:30 Networking Reception in the Exhibit Hall with Poster Viewing

Sponsored by TOYOTA

7:00 Close of Day

THURSDAY, JUNE 16

9:00 Continental Breakfast Roundtable Discussions

Join your colleagues and fellow delegates over breakfast for a focused, informal discussion moderated by a member of our speaking faculty. A small group format allows participants to meet potential collaborators, share examples from their own work and discuss ideas with peers. Visit our website to see the full listing of topics and moderators.

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

11:00 Chairperson's Opening Remarks

Alan Lloyd, Ph.D., President Emeritus, International Council on Clean Transportation; Senior Research Fellow, Energy Institute, University of Texas at Austin

11:05 OPENING KEYNOTE PANEL DISCUSSION: Overcoming the Barriers to Achieving Low Cost, High Durability and Performance for Automotive Applications

Moderator: Robert Bienenfeld, Assistant Vice President, Environment and Energy Strategy, American Honda Motor Co., Inc.
Panelists: Bill Elrick, Executive Director, California Fuel Cell Partnership
Reducing cost and increasing durability are the greatest technical barriers to the development of widely available fuel cell vehicles. This panel will focus on the technical advancements, strategies for commercialization and regulatory updates from the key government, academic and industry stakeholders involved in fuel cell systems development for automotive applications.

11:45 FC-PAD Consortium for Performance and Durability

Rod Borup, Ph.D., Program Manager, Fuel Cells, Los Alamos National Laboratory
The FC-PAD (Fuel Cell – Performance and Durability) consortium coordinates national laboratory activities related to fuel cell performance and durability, provides technical expertise, and integrate activities with industrial developers. Consortium members include Argonne National Laboratory, Lawrence Berkeley National Laboratory, Los Alamos National Laboratory, the National Renewable Energy Laboratory and Oak Ridge National Laboratory. This presentation will provide an update on the consortiums activities.

12:05 Membrane Electrode Assemblies for High-Temperature PEM Fuel Cells

Hans Aage Hjuler, Ph.D., Managing Director and CEO, Danish Power Systems
The work presented here focuses on recent results obtained by Danish Power Systems (DPS) regarding the degradation of PBI membranes used in membrane electrode assemblies (MEAs) under various operating conditions in addition to the latest developments on achieving an increased platinum utilization. Investigations on platinum cluster size and growth during fuel cell operation will also be presented.

12:25 pm Q&A

12:40 Networking Lunch

Sponsored by A123 SYSTEMS

1:30 Dessert Break in the Exhibit Hall with Poster Viewing

ADVANCED MATERIALS, COMPONENTS & SYSTEMS

2:15 Chairperson's Remarks

James Fenton, Ph.D. , Director, Florida Solar Energy Center; Professor, Mechanical, Materials and Aerospace Engineering, University of Central Florida

2:20 Prospects of Non-Noble Metal Catalysts for Fuel Cells

Sanjeev Mukerjee, Ph.D., Professor of Chemistry and Chemical Biology; Director, Northeastern University Center for Renewable Energy Technology, Northeastern University
This presentation will provide a perspective in terms of our new results where our focus has been on non noble metal catalysts for fuel cell applications.

2:40 Manufacturing Considerations for Fuel Cell Components: Impact of Manufacturing on Gas Diffusion Layers Properties

François Girard, Ph.D., Thrust Leader – Fuel Cell Manufacturing, Vehicle Propulsion Technologies Program, National Research Council Canada/ Government of Canada
Cost reduction for fuel cell vehicles depend on industrialization of the manufacturing processes and the development of a strong supply chain. This paper will discuss the characterization of gas diffusion layers in order to understand the influence of manufacturing processes, develop standard measurement methods for quality control and support the definition of specifications for this component.

3:00 Advances in MEA Development: Automotive Application, Low PGM, Durability, Materials by Design Approach

Madeleine Odgaard, CEO, IRD Fuel Cells, LLC, Denmark
The prime focus of the work presented is development of high-performing MEAs aimed for automotive applications through materials R&D and process optimization. The aim is to fulfill OEM requirements with respect to cost, performance and durability. Development of low-PGM-loading electrodes with catalysts based on stable support materials is addressed in the work.

3:20 Refreshment Break

3:40 Technology Development for Corrosion Resistant Metal Bipolar Plates for PEM Fuel Cell Stacks

Conghua Wang, Ph.D., Vice President and CTO, Treadstone Technologies
Metal bipolar plates have the advantage of lighter weight and smaller volume over graphite-based bipolar plates for automobile PEM fuel cell stacks. Low cost, corrosion resistant coating has to be developed to ensure the long term durability of metal bipolar plates in PEM fuel cell application conditions. In this presentation, various technologies will be reviewed, and the latest technology developed at TreadStone will be reported.

4:10 Fuel Cell Vehicles: Can We Avoid Another Hype Cycle?

Alan Lloyd, Ph.D., President Emeritus, International Council on Clean Transportation; Senior Research Fellow, Energy Institute, University of Texas at Austin
This paper will look behind the headlines to examine the commercialization plans of fuel cell passenger car manufacturers, and compare those plans against the expectations and needs of the regulatory community and

governments. Nearly $1 billion has been committed to date to build fueling stations, and hydrogen is being increasingly pursued in other efforts to decarbonize the energy sector. Regulators are anxious for the benefits of FCVs to be realized but risks for full commercialization remain. What are they and can another hype cycle be avoided?

4:40 Q&A

5:00 Close of Day

FRIDAY, JUNE 17

8:30 am Morning Coffee

NEW VEHICLE DEVELOPMENT: ACHIEVING LOW COST, HIGH DURABILITY & PERFORMANCE

9:00 Chairperson's Remarks
Sanjeev Mukerjee, Ph.D., Professor of Chemistry and Chemical Biology, Director Northeastern University Center for Renewable Energy Technology, Northeastern University

9:05 KEYNOTE PRESENTATION: Enabling Sustainable Mobility – The Toyota Mirai
Justin Ward, General Manager, Powertrain System Control Department, Toyota Technical Center, Toyota Motor Engineering & Manufacturing, North America, Inc.
Toyota is dedicated to offering our customers a diverse portfolio of solutions to address climate change, petroleum dependency and air quality. Included in the portfolio is the Toyota Mirai - a 300 mile all electric vehicle that refills with hydrogen in minutes. The in-house development of the Mirai spanned two decades and ran in parallel to the development of the Toyota Hybrid Synergy Drive system. Through various technical advancements and cost reductions the Mirai reached maturity for commercialization in 2015 demonstrating Toyota's innovation and commitment toward sustainable mobility.

9:25 Fuel Cells and Hydrogen Status and Recent Progress under the U.S. Department of Energy Fuel Cell and Hydrogen Program
*John Kopasz, Ph.D, Chemist, Argonne National Laboratory**
Fuel cell development has come a long way and the fuel cell market is growing, with the industry exceeding $2billion in sales in 2014. The status of fuel cell technology and results from recent DOE funded work will be reviewed and future targets and plans described.
**With contributions from Dimitrios Papageorgopoulos, Nancy Garland, Donna Lee Ho, U.S. Department of Energy*

9:45 Remaining Technical Challenges in R&D for Automotive Fuel Cell Systems - Diagnostic Analysis and Simulation
Shinichi Hirano, Principal Research Engineer, Fuel Cell Research, Ford Motor Company
Cost and durability are still significant challenges to the commercialization of automotive fuel cell technology. Significant R&D efforts to develop advanced fuel cell materials and cell concepts have been pursued. To fill the gap to the target, further R&D is necessary to fully develop advanced fuel cell technology. Improvement of performance in not only catalyst material activity but also other factors such as mass transport overpotential are critical. Therefore, research focus is extended from materials to cell characterization. The technical outlook and research approaches for the remaining challenges of automotive PEMFC's will be discussed.

10:05 Coffee Break

INNOVATIONS IN FUELS, DISTRIBUTION AND INFRASTRUCTURE

10:30 Analysis of the Current and Future Technologies for the Hydrogen Refueling Stations From Manufacturing Competitiveness and Supply Chain Perspectives
Ahhmad Mayyas, Ph.D., Research Scientist, Strategic Energy Analysis Center, NREL
This study focuses on the manufacturing cost and global supply chain analysis for hydrogen refueling stations (HRS) as the major part of the required hydrogen infrastructure to support the fuel cell vehicles deployment. We collected/analyzed data from 335 HRS installations in the past 10 years and found that more government support is required in the coming years to spread the HRS's to accommodate the increasing number of fuel cell vehicles.

10:50 Update on Fuel Cell Bus Technology and Infrastructure
Steve Sokolsky, Program Director, CALSTART
The U.S. Federal Transit Administration has invested substantial amounts to advance the use of fuel cells in transit buses. CALSTART was awarded funds to develop the American Fuel Cell Bus together with Ballard, BAE, and El Dorado. We will present a status report on AFCB deployments and next steps. CALSTART also recently completed a Best Practices in Hydrogen Fueling and Maintenance Facilities for Transit Agencies publication for the FTA.

11:10 Development of California's Retail Hydrogen Network
Shane Stephens, Ph.D., Chief Development Officer and Principal, FirstElement Fuel Inc.
FCEVs represent the next-generation of zero emission automobile technology for reducing impact on energy and the environment without any compromise to the customer experience. FirstElement Fuel Inc. is developing the world's first network for retail, customer-focused charging stations for fuel cell electric vehicles. The talk will outline FirstElement Fuel's strategy and vision, as well as lessons learned during the process of launching our True Zero branded network of hydrogen chargers.

11:30 Q&A

11:50 Networking Lunch

Sponsored by Ford

APPLICATIONS IN FUEL CELL & BATTERY HYBRIDIZATION

1:20 pm Chairperson's Remarks
Rod Borup, Ph.D., Program Manager, Fuel Cells, Los Alamos National Laboratory

1:25 How Hydrogen Fuel Cell Electric Vehicles are Addressing Transportation Challenges Today
Jennifer Kurtz, Hydrogen and Fuel Cell Systems Engineering Group Manager, National Renewable Energy Laboratory
Transportation challenges such as GHG emissions and dependence on petroleum are drivers for NREL's RD&D work with sustainable transportation technologies. A component of the all-of-the-above solution set for these transportation challenges are hydrogen fuel cell electric vehicles (FCEVs). NREL's National Fuel Cell Technology Evaluation Center is analyzing on-road FCEVs and disseminating current performance (e.g.durability, fuel economy, range, and fill time) and progress over time.

1:45 Development and Demonstration of Fuel Cell-Powered Transport Refrigeration Units for Refrigerated Trucks
Kriston Brooks, Chief Engineer, Pacific Northwest National Laboratory
Replacing the diesel engine in a transport refrigeration unit (TRU) of a commercial refrigerated truck will result in improved efficiency, reduced noise, and a reduction in CO2 and criteria pollutant emissions. This presentation will provide a project update and describe the system development work, business case, and testing that has been performed.

2:05 Battery and Fuel Cell EVs, PV and Your Home
James Fenton, Ph.D. , Director, Florida Solar Energy Center, Professor, Mechanical, Materials and Aerospace Engineering, University of Central Florida
There are over 20 models of electric vehicles that are so efficient they cost the gasoline equivalent of $0.99 a gallon to operate. An introduction will be provided to the concepts that allow the transportation and grid infrastructures to work together, so that PV, EVs and energy efficient buildings can significantly decrease our dependency on fossil fuels, mitigate climate change and increase energy and transportation security.

2:25 Q&A

2:40 Refreshment Break

TRACK 3
Lead-Based Battery Technology and Applications

WEDNESDAY, JUNE 15

12:00 pm Conference Registration Open

12:20 Networking Lunch

1:05 Dessert Break in the Exhibit Hall with Poster Viewing

2:00 Opening Plenary Session – see page 5 for details

5:30 Networking Reception in the Exhibit Hall with Poster Viewing

Sponsored by TOYOTA

7:00 Close of Day

THURSDAY, JUNE 16

9:00 Continental Breakfast Roundtable Discussions

Join your colleagues and fellow delegates over breakfast for a focused, informal discussion moderated by a member of our speaking faculty. A small group format allows participants to meet potential collaborators, share examples from their own work and discuss ideas with peers. Visit our website to see the full listing of topics and moderators.

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

11:00 Chairperson's Opening Remarks

Allan Cooper, European Project Coordinator, Advanced Lead-Acid Battery Consortium (ALABC)

11:05 Advanced Lead Batteries - The Sustainable Choice for Automotive Applications

Alistair Davidson, Technical Manager, International Lead Association

Lead batteries are the most widely used energy storage system in the world due to their proven safety, performance, low-cost and excellent recycling. This presentation will highlight the positive role the lead battery can play in sustainable development and explain why they are the most sustainable choice for automotive applications.

11:25 Recent Advancements in Automotive Lead Batteries and the ALABC Program for Further Increasing of Lead Battery Performance

Boris Monahov, Ph.D., Program Manager, Advanced Lead-Acid Battery Consortium (ALABC) – a program of the International Lead Association (ILA)

This presentation will focus on the excellent recent results of the ALABC research, and on the new 2016-2018 Program. Given the range of benefits of lead batteries compared to alternative technologies, every improvement in dynamic charge acceptance and stability through the life of a battery is expected to contribute to making lead batteries the most attractive option in automotive applications.

11:45 Demonstrating Advanced Lead Carbon Batteries in 48V Vehicles

Allan Cooper, European Project Coordinator, Advanced Lead-Acid Battery Consortium (ALABC)

Recent ALABC work has demonstrated that advanced lead-carbon batteries are the most effective and cost efficient way to meet automotive emission requirements. This work, conducted in combination with OEMs has focused on the 48V mild-hybrids which fall below the 60V threshold where additional safety requirements become necessary. Results will be presented showing 15-20% CO2 emission reductions when utilizing advanced lead carbon batteries in mild hybrid applications.

12:05 Surface Modifications of Carbon Materials for the Fabrication of Lead-Carbon OHMIC Contacts

Yi-Ren Tzeng, Ph.D., Associate Engineer, Institute of Nuclear Energy Research

Lead-Carbon (PbC) batteries have been considered a promising candidate for low cost energy storage applications, ranging from hybrid vehicles to large-scale power plants. It is made by electrically connecting a porous carbon component to the negative plate of the lead-acid battery. This presentation will describe two surface modification methods, one by oxidation treatment and the other by co-deposition of lead with tungsten, to enhance the bonding between lead and carbon while reducing the contact resistance. We will demonstrate that the storage efficiency is above 90% for a PbC battery incorporating surface modified carbon monolith electrodes. The lifetime of this PbC battery is at least five times longer than the conventional counterpart.

12:25 pm Q&A

Sponsored by A123 SYSTEMS

12:40 Networking Lunch

1:30 Dessert Break in the Exhibit Hall with Poster Viewing

ADVANCED MATERIALS FOR NEXT-GEN LEAD BATTERIES

2:15 Chairperson's Remarks

Boris Monahov, Ph.D., Program Manager, Advanced Lead-Acid Battery Consortium (ALABC) – a program of the International Lead Zinc Research Organization (ILZRO)

2:20 Performance Advances in Flooded Type ISS Battery

Takayuki Kimura, Energy Devices and Materials Development Center, Tsukuba Chemical Laboratory, Hitachi Chemical Co., Ltd.

Hitachi Chemical, by using the new separator design, has developed the flooded-type ISS battery with equal durability to European VRLA. And its charge acceptance was more than 200 % of that of European VRLA.

2:40 Carbon Additives in Advanced Lead-Acid Batteries

Aurelien Du Pasquier, PhD., Senior Scientist, Cabot Corporation

Carbon additives are a critical part of the solution for improved performance of lead-acid batteries and are gaining broad market adoption. Addition of carbons to the negative active mass leads to pronounced changes in the morphology and electrochemically active surface area and allow for increased dynamic charge acceptance and cycle life for AGM and EFB automotive batteries and in energy storage applications.

3:00 A Geometrically Optimized VRLA Battery for Power and Thermal Management in HEV Applications

George Brilmyer, Ph.D., Partner, HighWater Innovations, LLC

A Geometrically Optimized (GO) VRLA cell has been developed for use in high power battery packs for hybrid electric vehicles. The key to the "GO Battery" technology is a low aspect ratio / low resistance grid and an open central cooling-core. Several "GO Battery" HEV pack designs will be presented for comparison to existing battery pack size and weight targets.

3:20 Refreshment Break

3:40 Highly-Refined Secondary Lead for Critical Applications
Timothy W. Ellis, Ph.D., President , RSR Technologies, Inc.
RSR Technologies has developed a highly-refined secondary lead with very low levels of impurities to reduce gassing in lead-acid batteries. Grey and red oxides have been produced from this new material and contain up to 50 ppm silver and up to 200 ppm bismuth. RSR in North America and EcoBat facilities in Europe and South Africa have developed the capability to produce this material in normal operations.

4:00 Lead's Second Life: Advancements in Sustainable Storage
Daniel Moomaw, Mechanical Engineer, Gridtential Energy, Inc.
The most recycled element on the planet, lead offers a uniquely sustainable solution for energy storage. With hundreds of gigafactories and recycling facilities in existence, lead-acid is poised to continue its reign as the most successfully battery chemistry on the market. In this presentation we will discuss how Gridtential is leveraging two established industries – lead and silicon - to offer a better battery at 1/3 the cost of lithium-ion.

4:20 Increased Service Life and Power Output of Lead Batteries as a Result of Active Mass Optimization by Leit Modulation During Plate Production and Operation
Boris Shirov, Project Manager, Research and Development, TASC, Ltd.
The technological steps involved in lead-acid battery production have a strong impact on the performance parameters of the battery. In this presentation research results about the influence of applying an external physical treatment based on low energy modulated magnetic field on the electrochemical and crystallization processes in lead-acid batteries will be shown.

4:40 Q&A

5:00 Close of Day

FRIDAY, JUNE 17

8:30 am Morning Coffee

ADVANCED LEAD BATTERIES IN START-STOP AND MILD HYBRID ELECTRIC VEHICLES

9:00 Chairperson's Remarks
Andy Bush, Ph.D, Managing Director, International Lead Association

9:05 Next-Generation EFB and AGM Technology to Support Growing Start-Stop Demand
Tom Watson, Vice President & Technical Fellow, Powertrain & Vehicle Systems, Johnson Controls
In the next five years batteries in new vehicles will evolve in order to meet more stringent global emission regulations. The growing demand in performance for the next generation of EFB and AGM technology will be the focus of this presentation as well as solutions from new material development to improve key characteristics such as DCA (dynamic charge acceptance), cycle life and cranking capability at broad range of temperature.

9:25 Novel Negative Electrode for High DCA Performance
Stuart McKenzie, CEO, ArcActive Ltd.
OEM's want batteries for micro hybrid vehicles that can accept as much current as possible during braking events to reduce CO2 emissions and improve fuel economy. Typically however, lead-acid batteries suffer a significant drop in dynamic charge acceptance (DCA) early in the batteries life, thereby degrading the fuel saving potential of the micro hybrid system. ArcActive batteries enjoy high and sustained DCA over the life of the battery.

9:45 Advanced Lead-Acid Batteries for Micro and Mild Hybrid Systems
Perry Kramer, Research Scientist, East Penn Manufacturing
A review of the most advanced lead-acid battery solutions for lower voltage hybrid systems will be presented. Examples of charge sustaining technology will be reviewed.

10:05 Coffee Break

10:30 Dynamic Charge Acceptance in High Carbon Lead-Acid Cells: Variation with Environmental Conditions and Test Parameters
Matthew Stone, Post Graduate Researcher, Department of Electronic and Electrical Engineering, University of Sheffield, UK
This study investigated the Dynamic Charge Acceptance (DCA) performance of a batch of 2 V, high-carbon, VRLA, HEV cells at different States of Charge (SoC), across a range of temperature conditions and test parameters. The results show DCA is heavily influenced by varying external and test conditions, and is not necessarily an intrinsic parameter of the cell.

10:50 Performance Testing of Various Advanced Lead-Acid Battery Products using USABC Battery Test Manual For 12V Start/Stop Vehicles
Donald Karner, President, Battery Test & Development, Electric Applications Incorporated
Presentation of work sponsored by the Advanced Lead-Acid Battery Consortium and the US Department of Energy to baseline the performance of advanced lead-acid batteries using USABC test procedures. Test results include initial baseline tests (e.g. constant power capacity, HPPC, etc.) as well as ongoing results of life-cycle testing for six representative battery models including VRLA, EFB.

11:10 Bipolar Lead-Acid Battery Significantly Reduces Weight and Advances Performance for Automotive Applications
Edward Shaffer, Ph.D, CEO, Advanced Battery Concepts
Advanced Battery Concepts GreenSeal® technology is the first-ever, commercial, bipolar lead-acid battery that matches existing automotive battery size and performance specifications. Verified benefits include lower weight / higher energy density (>50 Wh/kg), higher power (1,200W/kg), 3X longer cycle life, smaller, more robust and can be built in voltages from 2V to 200V.

11:30 Q&A

11:50 Networking Lunch

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NEXT-GEN LEAD APPLICATIONS

1:20 pm Chairperson's Remarks
Robert Flicker, COO, East Penn Manufacturing

1:25 Thin-Plate Pure Lead AGM Batteries for Heavy Duty Truck Applications
Jerry Hoffman, President, Northstar Battery
How the fast-charge and cycling capabilities of thin-plate pure-lead AGM batteries are making an impact in the large truck market in the United States. We're battling weight, but we have the advantage with price and durability. The final story has yet to be determined.

1:45 PANEL DISCUSSION: Next-Gen Lead-Based Batteries and the Global Marketplace
Moderator: Boris Monahov, Ph.D., Program Manager, Advanced Lead-Acid Battery Consortium (ALABC) – a program of the International Lead Zinc Research Organization (ILZRO)
Lead-based battery demand continues to grow worldwide despite the inroads being made from other battery chemistries such as Li-ion. The demand from the automotive industry is one of the key drivers to this market. This panel of experts will discuss the global lead-based market and the continued prospects for growth and innovation.

2:25 Q&A

2:40 Refreshment Break

2:55 Closing Plenary Session – see page 5 for details

4:20 Closing Remarks

4:30 Close of Conference

On-Line Registration Closes June 10

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- □ The Rechargeable Battery Market | 8:30 – 10:30 AM
- □ Recent Advances in Solid State Electrolytes for Energy Storage | 11:00 AM – 1:00 PM
- □ ~~Electric Machines and Power Electronics for Electric and Hybrid Vehicles | 11:00 AM – 1:00 PM~~
- □ Battery Safety and Abuse Tolerance Validation | 3:00 – 5:00 PM
- □ ~~Vehicle-to-Grid (V2G) Technologies | 3:00 – 5:00 PM~~

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