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8th International
**advanced
automotive
battery
conference**

29 JANUARY - 1 FEBRUARY 2018 | CONGRESS CENTRUM MAINZ | MAINZ, GERMANY

2018 PROGRAMS



R&D Symposium 1
CHEMISTRY



R&D Symposium 2
RAW MATERIALS



R&D Symposium 3
LEAD-BASED



R&D Symposium 4
CHARGING & INFRASTRUCTURE



R&D Symposium 5
ENGINEERING



R&D Symposium 6
SUPERCAPS



Application Track 1
**HYBRID & ELECTRIC
VEHICLES**



Application Track 2
**SPECIALTY/PUBLIC
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Dear Colleague,

I am pleased to share with you the excitement about **AABC Europe 2018**, and to invite you to join us in Mainz, Germany, this coming January.

Three major events have greatly intensified EV battery development efforts over the last 2-3 years: i) the market success of Tesla, ii) the rapid growth of the Chinese EV market, and iii) the diesel scandal. The latter has brought about a sharp drop in tolerance on the part of both governments and consumers for a diesel fuel that turns out to be less than clean, and it is driving the push for an alternative powertrain, while the first two events have caused a change in the carmakers' assessment of the marketability of electrified vehicles. As a result, European carmakers are expanding their xEV development efforts while pulling in and increasing the volumes of production plans.

This chain of events has created significant opportunities for the xEV supply chain, but with those come notable risks. The carmakers' expectations for lower pricing, longer driving range, and fast charge capability are all demanding and, of course, durability and safety cannot be sacrificed.

We at AABC understand the opportunities and challenges and have created a program that will help you follow the trends, the issues, and the directions adopted by key players.

In addition to our renowned xEV battery sessions—which cover the xEV and xEV-battery markets, batteries for low- and high-voltage hybrids and full electric vehicles, and battery durability in automotive applications—the program will also feature sessions on:

1. Li-ion battery materials and chemistry
2. Alternative battery chemistries
3. Raw material supply and recycling
4. Lead-acid battery technology and application advances
5. Advances in supercap technology and applications
6. Charging technology and infrastructure
7. Battery safety and cell and battery engineering
8. Batteries for specialty, light, off-road vehicles, and public transportation

This is a pivotal time for the industry, with second-generation products hitting the market, and roadmaps for third-generation products being drawn—with expectations for considerable volume expansion. Join us in Mainz to start 2018 well-informed!



Best Regards,
Menahem Anderman
Conference Chair

Conference-at-a-Glance

MONDAY 29 JANUARY		TUESDAY 30 JANUARY		WEDNESDAY 31 JANUARY		THURSDAY 1 FEBRUARY	
R&D SYMPOSIA				CONFERENCE APPLICATION TRACKS			
Chemistry				Hybrid & Electric Vehicles			
Raw Materials							
Lead-Based							
Charging & Infrastructure		Engineering		Specialty & Public Transport EVs			
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INTERACTIVE TUTORIALS				TRAINING SEMINARS			
Three Tutorials				Battery Safety & Abuse Tolerance Validation		Lithium-Ion Battery Cell and Pack Technology	

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What Previous Attendees Have Said About



“People show what will be the future, but it’s also dealing with practical questions, it’s not just a dream.”

- Muriel Desaegeer, Ph.D., General Manager, R&D Center, Toyota Motor Europe

“This is a unique conference that brings together the industry experts for all kinds of automotive batteries, from 12-volt lead-acid to high-volt traction.”

- Eckhard Karden, Ph.D., Technical Expert Battery & Energy Storage Technology, Advanced Power Supply & Energy Management, Ford Research & Advanced Engineering Europe

“The annual visit of AABC is a must for any developer or scientist working on battery technologies for automotive applications.”

- Arnold Lamm, Ph.D., EU-Projects and Energy Systems Analyses, Daimler AG

“Must-attend conference if you are working on batteries for automotive electrification. It tells us always the latest and hottest topics, worldwide trends, and is a good networking opportunity.”

- Masato Origuchi, Electrical Energy Storage System Expert, Renault

“AABC is the event to get up to date with the state of automotive battery technology and meet the experts, suppliers and scientists. A unique opportunity for learning and networking.”

- Roland Mattheé, Technical Fellow Battery System & Manager Electrification Architecture, Opel Automobile GmbH

“Complete overview, from material to system.”

- Frank Moebius, Dr.-Ing., Department Manager of Technology Management and Forecast, BMW AG

“It brings together a number of the different OEMs, the tier one suppliers, the battery manufacturers, the battery chemists, the R&D people - it gets everybody together in one place.”

- Wasim Sarwar, Ph.D., Battery Systems Engineer, Williams Advanced Engineering (formerly Jaguar Land Rover)

“Good conference, best in class.”

- Udo Heim, Porsche AG

“Posters are great.”

- Johan De Backer, Senior Engineer, Toyota Motor Europe

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AABC Europe 2017 by the numbers

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Every level of the
supply chain represented

31 OEMs

49 TIER ONE Pack Integrators & Cell Manufacturers

51 TIER TWO Battery Component Providers

49 TIER THREE Battery Materials Developers

17 TIER FOUR Raw Material Suppliers

6 MANUFACTURING EQUIPMENT VENDORS

96% Stated the Event Met or Exceeded Expectations

75% Will Attend Again

28 Testing & Simulation Companies

40 UNIVERSITIES

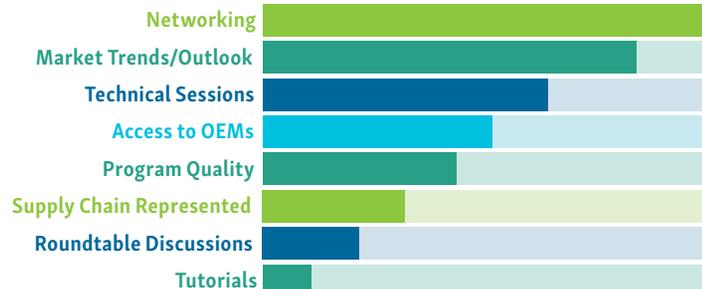
110 Technical Presentations

20% GROWTH IN ATTENDANCE over last year
50% GROWTH SINCE 2015

77 Scientific Posters

ATTENDEES TOLD US

what makes AABC so valuable



709 High-Level Delegates

54% Decision Makers

51 Sponsors, Exhibitors & Partners

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- One main conference registration

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- Coffee & Refreshment Break
- One main conference registration

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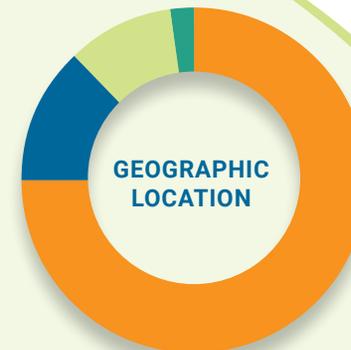
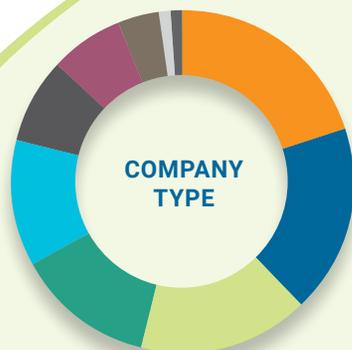
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Exhibitors will enjoy facilitated networking opportunities with all conference delegates, making it the perfect opportunity to launch a new product, collect feedback, and generate new leads from around the globe.

For additional information regarding sponsorship and exhibit opportunities, please contact:

Sherry Johnson, Manager, Business Development
781.972.1359 | sjohnson@cambridgeeneritech.com

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- Automotive & Other OEMs **20%**
- Battery Materials, Raw Materials, Mining & Recycling **18%**
- Battery, Capacitors & Fuel Cell Manufacturers **16%**
- Academic & Government Research Institutes **13%**
- Component Manufacturers **12%**
- Testing, Validation & Certification **8%**
- Other Commercial and Service Companies **7%**
- Press and Societies **4%**
- Utilities/Grid **1%**
- Financial **1%**

- Manager **28%**
- Executive/Director **26%**
- Scientist/Technologist **20%**
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- Assistant **6%**
- Professor **4%**

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 - United States **13%**
 - Asia **10%**
 - Rest of World **2%**
- European Breakdown**
- Germany 59%
 - Rest of Europe 10%
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 - France 7%
 - Belgium 6%
 - Switzerland 3%
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R&D SYMPOSIUM 1

LITHIUM BATTERY CHEMISTRY SYMPOSIUM

Advancements in Lithium-Ion and Beyond

MONDAY, 29 JANUARY

8:30 Symposium Registration and Morning Coffee

SOLID-STATE BATTERIES

10:00 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

10:05 FEATURED PRESENTATION: Ceramic Electrolytes and Electrodes for All-Solid-State Batteries with High Energy and Power Density – Environmentally Benign, Inexpensive, Safe and Long-Lasting

Werner Weppner, Ph.D., Professor, Engineering, Christian Albrechts University of Kiel
All present limitations of lithium ion batteries may be overcome by using fast solid electrolytes, which have recently been developed. These cells are safe, chemically stable, environmentally benign, made of readily available chemicals and have higher energy densities as well as much longer lifetime. The electrochemistry differs considerably from liquid electrolyte systems.

10:45 The Development of Solid State Batteries through Combinatorial Synthesis and High Throughput Screening

Brian E. Hayden, Ph.D., CSO, Ilika

The development of solid state batteries is reliant on the development of compatible and communicating functional materials within the composite device. These include the solid state electrolyte, interfacial mediators and mixed conductors. I will highlight how high throughput methodologies accelerate development through both materials and composite device based screening protocols.

11:05 Networking Coffee Break with Poster Viewing

11:35 Safe, High-Energy-Density, Solid-State Li Batteries

Eric D. Wachsman, Ph.D., Professor & Director, University of Maryland Energy Research Center; William L. Creutz Centennial Chair, Energy Research, University of Maryland

We have developed intrinsically safe, solid-state Li-ion batteries, by incorporating high conductivity garnet Li-ion electrolytes into tailored multi-layer microstructures. These structures, their ability to cycle Li-metal at high current densities with no dendrite formation, and results for Li-metal anode/garnet-electrolyte based batteries with a number of different cathode chemistries will be presented.

11:55 Towards a New Generation of Solid State Li Metal Rechargeable Batteries with Ionogel Electrolytes

Dominique Guyomard, Ph.D., Director, Energy Storage, CRNS

12:15 New Solid State Polymer with Room Temperature Conductivity – Higher Performing Solution

Mike Zimmerman, Founder, Ionic Materials

Ionic Materials has invented the world's first solid polymer electrolyte, that conducts lithium ions at room temperature. The material has demonstrated significant safety improvements in lithium ion batteries, and also enables new anode and cathode technology such as lithium metal. Performance and safety data of cells made with this material will be presented.

12:35 Talk Title to be Announced

Arno Kwade, Prof. Dr.-Ing., Battery LabFactory Braunschweig

12:50 Networking Lunch

14:15 Chairperson's 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

14:20 Solid State Batteries – A Progress Report

Jürgen Janek, Ph.D., Professor, Solid State Ionics & Electrochemistry, Justus Liebig University Giessen

15:00 An Industrial View on Challenges of Solid Electrolytes for Solid State Batteries

Andreas Roters, Ph.D., Senior Project Manager New Venture, Research and Development, SCHOTT AG

Solid electrolytes are a key material to enable solid-state batteries. From the viewpoint of an industrial material development, the main challenges are the appropriate design of the interface to enable a low resistant Li-ion transport on material level. For the integration into a cell, systems material and processing solutions must be found which allow Li transport on one side, but hinders side reactions of the material during processing at the other side. Stable and cost-effective processing routes from raw material and high-volume production to recycling. Glass ceramics have the potential to address these challenges.

15:20 PANEL DISCUSSION: Solid-State Batteries - Opportunity, Dream, or Nightmare?

Moderator: Martin Winter, Ph.D., Chair, Applied Material Science for Energy Conversion and Storage, MEET Battery, Research Center, Institute of Physical Chemistry, University of Muenster

16:00 Refreshment Break with Poster Viewing

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LITHIUM ION BATTERIES

16:35 Chairperson's Remarks

Egbert Figgemeier, Ph.D., Professor, Helmholtz Institute Muenster

16:40 Development of Novel Electrolyte Formulations for Use with High-Energy Cathodes

Dee Strand, Ph.D., CSO, Chemistry, Wildcat Discovery Technologies

Higher energy cathodes are required to meet automotive energy density targets. However, the use of these materials (higher nickel content, higher voltage) require parallel development of electrolytes with enhanced stability. Electrolyte additives that provided enhanced stability on the cathode need to be compatible with other formulation components, requiring significant development efforts. This presentation demonstrates the challenges and shows examples of improved electrolyte formulations.

17:00 Silicon-Dominant Anodes in Electromobility Chemistries for Extreme Fast Charge Capable Batteries

Benjamin Park, Ph.D., Founder and CTO, 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.

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17:20 Si-Based Anodes in Commercial Lithium-Ion-Cells – Aging Mechanisms and their Implications for Automotive Applications

Egbert Figgemeier, Ph.D., Professor, Helmholtz Institute Muenster

Silicon alloys have become a component of commercial high-energy Lithium ion battery cells with implications on their ageing characteristics. In order to further increase the amount of Silicon in the anode, volume changes and parasitic reactions need to be addressed and viewed under real use conditions. The presentation will show relations of drive cycles of electric cars and Silicon containing high-energy cells.

17:40 Late Breaking Presentation

18:00 Q&A

18:20 Welcome Reception with Poster Viewing

19:20 Close of Day

TUESDAY, 30 JANUARY

7:30 Symposium Registration and Morning Coffee

LITHIUM ION BATTERIES

8:30 Chairperson's Opening Remarks

Egbert Figgemeier, Ph.D., Professor, Helmholtz Institute Muenster

8:35 Electrolytes and Electrode Interphases in Lithium-Ion Batteries

Brett Lucht, Ph.D., Professor, Chemistry, University of Rhode Island

During the initial formation cycles, a Solid Electrolyte Interphase (SEI) is formed on the anodes of lithium ion batteries which is critical to the performance of lithium ion batteries. The electrolyte also reacts with the surface of the cathode, especially at high voltage, to generate a surface film. The nature of the electrolyte and the electrode surface films and the role they play in performance of lithium ion batteries will be presented.

9:15 Surface Modifications of Li-Ion Battery Active Materials with Polymers for Improved Performance

Nae-Lih Nick Wu, Ph.D., Distinguished Professor, Department of Chemical Engineering, National Taiwan University

The properties of the interfaces between the electrode active materials and electrolyte are known to play a crucial role in determining the electrochemical performance of Li-ion batteries (LIBs). This presentation reports the approach of using soft artificial solid-electrolyte interphases to modify the surface of LIB active materials for enhancing their cyclic and rate performance and safety properties.

9:35 Presentation to be Announced

9:55 Q&A

10:10 Grand Opening Coffee Break with Exhibit & Poster Viewing

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ALTERNATIVE CHEMISTRIES

11:00 Chairperson's Remarks

Maximilian Fichtner, Ph.D., Executive Director, Nanomaterials & Nano Mikrostructures, Helmholtz Institute Ulm for Electrochemical Energy Storage

11:05 Talk Title to be Announced

Maximilian Fichtner, Ph.D., Executive Director, Nanomaterials & Nano Mikrostructures, Helmholtz Institute Ulm for Electrochemical Energy Storage

11:45 Anode Materials for Sodium(-Ion) Batteries and the "Missing" SEI in Case of Graphite

Philipp Adelhelm, Center for Energy and Environmental Chemistry (CEEC), Friedrich-Schiller-University Jena

Sodium(-ion) batteries are potentially very attractive energy stores. This presentation will give an overview on the current development and remaining challenges of anode materials for SIBs with examples on sodium metal, alloys, cHiarbons, and a discussion on the SEI. Special focus will be on the peculiar behavior of graphite.

12:05 Presentation to be Announced

12:25 Solvay's Extended Offer for High Voltage Li-Ion Batteries

Thomas Mathivet, Ph.D., Business Development Manager Battery Europe, SOLVAY

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12:45 Q&A

13:00 Networking Lunch

14:15 Dessert Refreshment Break with Exhibit & Poster Viewing

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LITHIUM METAL CHEMISTRIES

15:00 Chairperson's Remarks

Stefan Kaskel, Ph.D., Professor, Department of Chemistry, Technical University Dresden, Fraunhofer Institute Materials and Beam Technology

15:05 Next Generation Low Weight Lithium Sulfur Batteries

Stefan Kaskel, Ph.D., Professor, Department of Chemistry, Technical University Dresden, Fraunhofer Institute Materials and Beam Technology

Lithium sulfur batteries are among the lightest accumulators today for applications in aviation and for high altitude pseudosatellites. However, their cycling stability is limited due to the use of elemental lithium as anode. Recent research focuses on alternative anode materials, such as silicon nanocomposites and thin films, and improved processing of thin lithium foils by melt processing. New anode processing technologies may also play a key role for solid state batteries in future.

15:45 Post and Beyond Lithium-Ion Materials and Cells for Electrochemical Energy Storage

Andreas Hintennach, Ph.D., Group Research Electrochemistry, Mercedes-Benz Research & Development, Daimler AG

Novel and sustainable electroactive materials can help to decrease the ecological impact of novel battery concepts in the near future. While on the one hand high energy density is required, the aspects of safety, lifetime get more important and often mean a challenge. All these requirements are met by very different approaches with different characteristics: all solid-state cells, high-energy materials, lithium-sulfur and even different systems e. g. Na- or Mg-Ion.

16:05 Developing High-Energy Rechargeable Lithium Metal and Lithium Sulfur Batteries

Jun Liu, Ph.D., Director, Energy Processes and Materials Pacific Northwest

National Laboratory

Energy storage is critical for grid modernization and electrification of transportation infrastructure. Among many options, two battery systems are identified to have the potential to reach a much higher energy density: Li metal anode coupled with high Ni NMC, and Li-S system. However, the materials and components need to be optimized to allow high-efficiency utilization of the active materials (high utilization). For both NMC and Li-S systems, several new approaches will be discussed to address the challenges in the high energy cells. Under high-utilization conditions, the fundamental failure mechanisms may also differ from the experimental conditions widely studied in the literature and will also be discussed.

16:25 Presentation to be Announced

Fanny Barde, Ph.D., Project Manager, Toyota Motor Europe

16:45 Q&A

17:05 Networking Reception with Exhibit & Poster Viewing

18:05 Close of Symposium

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R&D SYMPOSIUM 2

GLOBAL BATTERY RAW MATERIALS SYMPOSIUM

Balancing Supply, Demand & Costs for Battery Component Materials

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MONDAY, 29 JANUARY

8:30 Symposium Registration and Morning Coffee

GLOBAL MARKET DEMAND FOR RAW MATERIALS

10:00 Chairperson's Opening Remarks

Simon Moores, Managing Director, Benchmark Mineral Intelligence

10:05 Focus on Innovation to Lead a Rapidly Growing Technology Based Industry of LiB

Marina Yakovleva, Global Commercial Manager for New Product and Technology Development, FMC Corporation

This presentation will focus on the lithium industry outlook, FMC's product portfolio and technology Roadmap for high energy density technologies as well as lithium's future for beyond lithium ion applications.

10:25 Integrated Strategies Towards Reduction of Critical Metals in Cathode Materials for Lithium Ion Batteries

Hartmann Leube, Ph.D., Senior Vice President, BASF

Today, nickel and cobalt play an important role in typical current LiB cathode materials. Both metals contribute strongly to the electrochemical performance of cathode materials. This talk will present recent advances of BASF R&D in the development of both, low-Cobalt and low-Nickel cathode materials. This includes discussion of progress achieved by means of enabling electrolyte systems bringing these novel materials closer to commercialization.

10:45 Advanced Batteries – The Supply Chain Begins in Western Australia

John Atkins, Agent General, Government of Western Australia

Western Australia contains some of the world's largest hard rock deposits of lithium, including the world's largest in the Greenbushes' spodumene deposit and is also home to significant deposits of other battery materials such as nickel, rare earth elements and graphite. We would welcome closer, more direct investment and involvement in Western Australia by the European and North American battery sector, including battery production, to enable us to offer ourselves as an alternative route-to-market for the industry.

11:05 Networking Coffee Break with Poster Viewing

11:35 Dawn of the Lithium Ion Battery Megafactories: Real Raw Material Concerns

Simon Moores, Managing Director, Benchmark Mineral Intelligence

This presentation will cover the dawn of megafactories: lithium ion cell production capacity in the pipeline. In addition, the auto sector demand versus real expected cell capacity and falling behind: battery grade lithium, graphite, cobalt, nickel supply in the pipeline. Finally, benchmark's Lithium Price Assessments: high prices remain will be covered.

11:55 Resource Rich, Planning Poor: Scaling Battery Raw Material Production for Long-Term LiB Supply

Jose Lazuen, Analyst – Electric Vehicles, Battery and Supply Chain, Roskill Information Services Ltd.

Forecasts for lithium-ion battery (LiB) demand have increased dramatically since early 2017 as transformatory growth projections start to gather pace in key end-use sectors (EVs and ESSs). In the short-term, requirements for mined products used in active materials should be met by expansions and new capacity, with re-engineering of some existing assets underway to produce desired forms. Past volatility has led the LiB industry to begin de-risking future commodity prices through long-term agreements and hedging. However, while this may smooth the impact of any near-term supply/demand imbalances, the industry is faced with a longer-term problem: achieving scale. Lithium, the unsubstitutable part in LiB, is a case in point. The majority of producing assets have 20kt LCE capacity, which is fine if demand is 200kt and growth is 20ktpy. Some are larger, some can be built/made even larger, but what if demand becomes 40ktpy, 100ktpy? Most natural resources have never experienced such potential demand growth as the LiB industry presents, even the China and debt -fuelled commodity "super-cycle" only boosted demand of most mined materials to 5-10%py from 3-5%py, and for less than a decade. The LiB industry could see 20%py+ lasting a generation. Throw in post-LiB technology requirements like solid-state, Li-S or lithium-metal and even more uncertainty emerges on what will be required. This paper will present a longer-term outlook for LiB raw material demand, and highlight the issues surrounding scaling mined production of key inputs like lithium, cobalt, nickel and graphite. storage needed to meet climate goals.

12:15 The Further Contribution of Specialty Polymers to Energy Density and Safety

Thierry Baert, Solvay Specialty Polymers

Solvay has been increasingly contributing these last years, to the electrode formulations and to the separator composition. Beyond these materials that are used in the existing cell chemistries, advanced polymeric materials can be answer to a number of additional challenges. The modules and pack design still face the target of packs going to more safety and higher energy density. Namely, with modules and packs being more and more dense, the thermal management needs materials that can maximize both, the cooling efficiency and the safety.

12:35 Q&A

12:50 Networking Lunch

RAW MATERIALS SUPPLY – TRENDS AND ANALYSIS

14:15 Chairperson's Remarks

Jean-François Magnan, Technical Manager, Nemaska Lithium

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14:20 Lithium-Ion Battery Raw Material Supply and Demand 2017–2025

Christophe Pillot, Ph.D., Battery Survey Manager, Avicenne Energy, France

This presentation includes cathode, anode, electrolyte and separator demand. It will examine the major component suppliers and include a discussion on price evolution and major technical trends.

14:40 Why Do We Care about Lithium?

Emilio E. Bunel, PhD, Senior Analyst, SQM, Chile; Senior Advisor, Physical Sciences and Engineering Directorate, Argonne National Laboratory Argonne

From an industrial point of view, lithium has been described as the “oil of the future” or “the new gold rush” and the demand for lithium could exceed supply in 2020 by 25%. At that point, the world is expected to need over 380,000 tons of lithium carbonate and considering that the demand in 2014 was close to 190,000 tons, that is a 100% growth in demand over a six-year period and much of that growth will come from batteries. The lithium raw material in a Li-ion battery is only a fraction of one cent per watt, or less than 1 percent of the battery cost. What should Chile and the rest of the so-called lithium triangle do to take advantage of this precious mineral resource? In this presentation, we will highlight some of the past and recent activities in SQM to develop our lithium offerings for the industry, including standard lithium uses and energy storage.

15:00 Nemaska Lithium Whabouchi Mine and Transformation Plant Update

Jean-François Magnan, Technical Manager, Nemaska Lithium

Over the past few months, Nemaska Lithium has made significant progress with its Phase One Plant (P1P). This demonstration plant began producing and delivering high purity lithium hydroxide to Nemaska Lithium’s strategic partner Johnson Matthey. This presentation outlines the recent progress of the demonstration project as well as the development of the Whabouchi Mine and commercial Hydromet plant.

15:20 HPC and Cycle Life Results for 18650 Cells Assembly with Low Cost Graphite Produced by PUREgraphite

Edward R. Buiel, Ph.D., CEO, PUREgraphite, LLC

Graphite Blends that Increase Capacity, Electrode Density, and Power High-quality blended synthetic/natural graphite has been developed using a new environmentally friendly process that is suitable for production in the U.S. This graphite material has been coated, assembled in 18650 and tested using HPC, and compared with high quality 18650s that have been removed from Tesla Model S battery packs. Blends that increase capacity, electrode density, and power will be discussed.

15:40 Q&A

16:00 Refreshment Break with Poster Viewing

16:35 Chairperson’s Remarks

Franco Gonzalez, Senior Technology Analyst, IDTechEx

16:40 Impact of Booming Battery Industry on the Global Nickel Multiverse?

Denis Sharypin, Head of Market Research, MMC Norilsk Nickel

This presentation will cover the latest development of the Global Ni Supply & Demand. Complexity of Ni supply flows. How growing Ni demand in batteries can change the market balance in the long run.

17:00 Cobalt Conundrum: Securing More Battery Grade Volume in the Face of Structural and Social Challenges

Caspar Rawles, Analyst, Benchmark Mineral Intelligence

The cobalt supply pipeline versus battery grade material will be presented, along with understanding the difference: cobalt metal versus cobalt chemical. Benchmark’s cobalt sulphate price analysis - a step towards battery grade will also be covered.

17:20 Gearing Up to Feed EV Demand for Lithium

Keith Coughlan, Managing Director, European Metals Holdings Ltd.

17:40 Lithium Supply Opportunities in the Chinese Market and the Strategic Role of China in the Battery Value Chain

Anthony Tse, Managing Director, Galaxy Lithium

Galaxy is well-positioned as one of the few pure-play lithium companies with a diversified asset portfolio, to take advantage of the accelerating growth in the lithium sector. This presentation will share Galaxy’s perspectives on the potential of the China market, where it has grown a strong customer base and which currently has the largest and fastest growing electric vehicle sector worldwide, as well as the strategic role that China plays in the overall lithium materials and battery value-chain.

18:00 Q&A

18:20 Welcome Reception with Poster Viewing

19:20 Close of Day

TUESDAY, 30 JANUARY

7:30 Symposium Registration and Morning Coffee

RAW MATERIALS SUPPLY – TRENDS AND ANALYSIS

8:30 Chairperson’s Opening Remarks

Chris Berry, Founder, House Mountain Partners, LLC

8:35 PANEL DISCUSSION: How to Understand the Evolution of the Lithium Ion Supply Chain

Moderator: Chris Berry, Founder, House Mountain Partners, LLC

With almost anyone involved in the lithium ion supply chain revising their demand forecasts continually upwards, this begs the question: where are the “pinch points”? The rapid increases in lithium and cobalt chemical pricing would indicate that these markets are tight and expected to stay that way as the theme of vehicle electrification becomes more mainstream. This panel will offer a set of diverse views about how and why the lithium ion supply chain continues to grow and offer insights into potential stumbling blocks and opportunities.

9:15 Supply and Demand Fundamentals of the Global Graphite Market

Luke McFadyen, Market Analysis and Economics Manager, Syrah Resources, Ltd.

Syrah Resources began production in 2017 and by 2020 will be 40% of the world’s supply of flake graphite. This presentation will highlight the market views of the newest natural graphite miner in the world.

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9:35 Don't Forget the Nickel – A Supply Chain Analysis

Anne Oxley, Technical Director, Brazilian Nickel

The foreseen increase in EVs has already seen changes in the cobalt, lithium and graphite supply chains. With electric vehicle numbers expected to be 10% of all new vehicles sold by 2020 and many cathodes for Li-ion batteries now heading towards >80% nickel, what is the best source of supply for the cathode manufacturers. Brazilian Nickel has a view and an analysis of the nickel supply chain now, in 2020 and 2025 onwards to meet this new demand.

9:55 Q&A

10:10 Grand Opening Coffee Break with Exhibit & Poster Viewing

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ADVANCED BATTERY MATERIALS

11:00 Chairperson's Remarks

Christophe Pillot, Ph.D., Battery Survey Manager, Avicenne Energy, France

11:05 The Impact of Electric Vehicles in Future Global Copper Demand

Franco Gonzalez, Senior Technology Analyst, IDTechEx

We will provide a detailed presentation of the study commissioned by the International Copper Association and conducted by IDTechEx with the collaboration of BYD. The objective of the study was to quantify the intensity of use of copper in different types of electric vehicle powertrains and breaking it up to different components, paying particular attention to the copper content of batteries. We will present technology trends that will impact the intensity of copper in key electric vehicle components in the future. Finally, we will introduce our forecast of the impact on global copper demand derived from electric vehicles.

11:25 Challenges and Opportunities: Materials for Solid State Batteries in the Automotive Industry

Elizaveta Buch, New Materials, Solid-State Batteries, Daimler AG

The challenging process of vehicle electrification requires continuous improvement of current battery technologies. Solid state electrolytes can be categorized by material classes like polymers, glasses or ceramics, which can additionally be classified in bulk materials and thin films. The talk presents research directions of solid state batteries in general and take a closer look at the most common and promising materials. Finally, there will be an outlook to future applications of solid state batteries in the automotive industry.

11:45 Extreme Polymer Binders: A Small Amount Goes a Long Way in Green Electrification of Vehicles

Thomas Fine, Ph.D., Batteries Global Market Manager, Technical Polymers Business Unit, Arkema

Among the extensive portfolio of Arkema's materials for xEVs batteries, a particular focus will be made on PVDF, an extreme material at the heart of green electrification of cars. PVDF binders have a tremendous impact in the search for lowering \$/kWh as well as on the long-term reliability of xEVs batteries. New products associated to the technology of separator coating will be highlighted.

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12:05 A New Class of High-Performance, Low-Cost, Synthetic Graphite Anode Materials

Jeremy Schrooten, Ph.D., Senior Research and Development Engineer, Energy, Pyrotek, Inc.

Pyrotek is an innovator in high-temperature processing with over 60 years of experience. Our proprietary furnaces, designed and built by Pyrotek, produce a premium anode graphite at the competitive cost of \$5/kg, manufactured using 100% renewable energy, with very low emissions. This presentation reviews actual battery data detailing the performance of this commercially-available anode and its favorable comparison to other anode materials.

12:25 Talk Title to be Announced

Le Yu, PhD, CTO, Electrolyte Division, Guangzhou Tinci Materials Technology Co.Ltd

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12:45 Q&A

13:00 Networking Lunch

14:15 Dessert Refreshment Break with Exhibit & Poster Viewing

INNOVATIONS IN RECYCLING BATTERY MATERIALS

15:00 Chairperson's Remarks

Ajay Kochhar, President & CEO, Li-Cycle Corp.

15:05 Recycling of Li-Ion Batteries – Imperative for Sustainable E-Mobility

Christian Hagelüken, Ph.D., Director EU Government Affairs, Umicore AG & Co KG
Battery recycling is not only essential to broaden the supply base of battery metals, it's also a must in the context of sustainable material sourcing and lowering the ecological footprint of e-mobility. Efficient recycling technologies are already available today; the challenge will be to secure a comprehensive collection of end-of-life batteries and their proper recycling in facilities that are really capable to close the materials loop. The presentation will elaborate why in this context new business approaches and forms of stakeholder cooperation will become crucial for a sustainable e-mobility.

15:25 Recycling of Graphite and Reutilization in Anode Material in Lithium Ion Battery Cells

Sascha Nowak, Ph.D., Head of Analytics & Environment, University of Muenster
In our work, the possibility of graphite recovery from spent LIBs by means of three different methods was investigated. The conductive salt lithium hexafluorophosphate is of high production costs and can be reutilized after its purification. Although graphite is inexpensive in production, it has to be considered whether the utilization of recycled graphite, which is anyway a by-product, is more reasonable than its disposal effort.

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15:45 Processing 25,000 Tons of Device Batteries Annually and the Market for Recycling Lithium Ion Batteries from Electric Vehicles, Laptops and Mobile Phones

Eda Coskun, Quality and Environmental Manager, Redux Recycling GmbH

16:05 Opportunities and Challenges: Ramping Up Lithium-Ion Battery Recycling Capacity to 'Giga' Scale

Ajay Kochhar, President & CEO, Li-Cycle Corp.

This presentation explores the opportunities and challenges for the future of lithium-ion battery recycling. As megafactories for li-ion battery manufacturing continue to be ramped up, equivalent 'mega' scale recycling capacity will be required. The presentation concludes with discussion of Li-Cycle's patent-pending, validated, and scalable recycling solution for all spent lithium-ion batteries.

16:25 Profitable Near-Term Solution for End of Lithium Ion Battery Lifecycle

Michael Tamlin, COO, Neometals, Ltd.

The battery industry, car industry and grid storage industry all need a viable means to recover valuable metals from future used batteries but have limited options. Neometals has developed a complete, modular package that extracts cobalt, lithium, nickel and other materials that can be reused in battery manufacturing. Key features are small environmental footprint, compact dimensions, low capex and good operating economics that create a profit centre from an internal scrap processing operation.

16:45 Q&A

17:05 Networking Reception with Exhibit & Poster Viewing

18:05 Close of Symposium

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R&D SYMPOSIUM 3

CHEMISTRY & MATERIALS FOR LEAD-BASED BATTERIES

Next Generation Lead-Based Batteries for Electrified Vehicles

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MONDAY, 29 JANUARY

8:30 Symposium Registration and Morning Coffee

ADVANCED LEAD-BASED BATTERIES R&D ROADMAP

10:00 Chairperson's Opening Remarks

Paolina Atanassova, Ph.D., Global Applications Development Manager, Energy Materials, Cabot Corporation

10:05 OPENING KEYNOTE PRESENTATION: The Future of Automotive Batteries – Challenges and Opportunities for Lead-Acid

Eckhard Karden, Ph.D., Technical Expert Battery & Energy Storage Technology, Advanced Power Supply & Energy Management, Ford Research & Advanced Engineering, Europe

Lead-acid batteries as automotive low-volt storage technology are being challenged by new vehicle functions like electrified chassis systems, by growing powertrain electrification, and by maturing new storage technologies. This talk will provide an overview of changing requirements and competing storage system options. The process of deriving technology-specific component test methods and pass criteria from new or evolving vehicle or system requirements will be discussed.

10:45 Advanced Lead Batteries for Traditional and New Applications That Are Lighter with Longer Life

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

The growing battery market offers good opportunities for advanced, carbon enhanced lead batteries which are dominating the market in their traditional applications like starter and marine batteries, telecom, stationary and back-up power, renewable and grid support energy storage systems. In their effort to keep the strong position of lead batteries, researchers and manufacturers both in and outside ALABC are successfully developing new ways to make lead batteries lighter but more powerful, and extend by times their cycle and calendar life in traditional but also new, partial state of charge cycle operation.

11:05 Networking Coffee Break with Poster Viewing

TECHNOLOGY & INNOVATION: NEW BATTERIES

11:35 Innovations in Truck Batteries – The Silent Revolution

Thorsten Werle, Reg PL Lead, Design Engineering HD, Lead Acid Systems Engineering, Johnson Controls Power Solutions EMEA

Emission regulations beyond the present Euro 6 and 2017-EPA standards for light and heavy-duty trucks drive the electrification of auxiliary loads and power train components. JCI has developed the next generation of lead-acid truck batteries with higher robustness to the requirements. These innovations have been tested in our OE customers fleets and series application and provide significantly longer life times and reliability. In addition, we will conclude our paper with highlights in the progress of passenger car batteries leading the way for the increasing expectations of our customers.

11:55 Progress and Next Challenges with UltraBattery for 14-V Hybrids

Koshin Takemoto, R&D, The Furukawa Battery Co., Ltd.

The advantages of the 2nd Gen UltraBattery are its excellent charge acceptability and superior durability under HR-PSOC condition. The 2nd Gen UltraBattery has been adapted by new Japanese OE manufacturer. New applications of the 2nd Gen UltraBattery will be discussed.

12:15 New Technologies to Improve the Performance and Production of Lead-Acid Batteries

Bob Sullivan, CEO, iQ Power AG

Boris Shirov, Project Manager, Research and Development, TASC, Ltd.

Through use of innovative technologies, the performance of lead-acid batteries can be significantly improved and the production process can be optimized. By combining these innovations, synergies can be achieved and this presentation will show some examples.

12:35 Q&A

12:50 Networking Lunch

MARKET & APPLICATIONS

14:15 Chairperson's Remarks

Alistair Davidson, Ph.D., Products and Sustainability Director, International Lead Association

14:20 Multi-Use Concept for Uninterruptible Power Supply Systems: How Extra Revenues Could be Earned with a Security Back-Up

Julie Badeda, Ph.D., Stationary Storage Systems, BatterieIngenieure GmbH

The talk will go into details on current revenue streams for battery storage systems. On this basis, the application considering dimensioning of the UPS system as well as the resulting load profiles and aging characteristics will be elaborated. Furthermore, the control unit for a battery diagnostic and adaptive steering management system will be presented.

14:40 Lead Battery Technology: Future Opportunities for Automotive Applications

Alistair Davidson, Ph.D., Products and Sustainability Director, International Lead Association

There is a growing consensus of opinion which suggests that advanced stop start technology and low voltage mild hybrids will do more for vehicle exhaust emission reduction than pure EV and strong hybrid technology combined in the coming decade and beyond. Yet, the next generation of mild hybrids will offer more electrical functionalities and this favours a higher voltage electrical system – 48 volts. The paper will present new work undertaken, collecting performance data for advanced lead batteries under real world driving conditions, and also discuss the sustainability benefits of lead batteries.

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15:00 High DCA Lead-Acid Batteries, Field Test Evidences, Performance Evolution and Analysis of Benefits and Trade-Offs

Luca Brisotto, Director Project Management, Advanced Applications, Exide Technologies and Jesús Valenciano, Manager R&D Lab, Exide Technologies

15:20 Late Breaking Presentation

15:40 Q&A

16:00 Refreshment Break with Poster Viewing

MODIFIED ADDITIVES, MATERIALS & MODELLING

16:35 Chairperson's Remarks

Jochen Settelein, Ph.D., Research Scientist, Center for Applied Electrochemistry, Fraunhofer Institute for Silicate Research ISC

16:40 Approach to Lower Water Consumption: Modified Carbon Materials for Lead-Acid Batteries

Begüm Bozkaya, Ph.D., Scientist, Fraunhofer R&D Center Electromobility, Fraunhofer Institute for Silicate Research ISC

The electrochemical properties of carbon materials are mainly determined by the surface chemistry and accessibility of active sites. Incorporation of surface functional groups into the carbon materials attracts an attention in this context. This approach could be an efficient way for further optimization of carbon materials in order to reduce water consumption in lead carbon batteries. For that purpose, this presentation will focus on the investigation of carbon materials with different surface modifications and the electrochemical performance of the corresponding lead-carbon electrodes.

17:00 Simulation of a Thin Porous Lead-Dioxide Electrode with Fast and Inexpensive Computation Tool

Mikael Cugnet, Ph.D., Project Manager, CEA, France

Expensive finite element modeling tools are not necessary to achieve sufficiently accurate simulation results, as long as the geometry stays simple. There is still room to improve existing electrode models, even for such a mature technology as lead-acid. But believe it or not, physics-based modeling requires much more time and knowledge than money.

17:20 What Can We Learn from Electrode Surface Investigations for Battery Performance: An Overview of Various Battery Types and the Consequences for Lead Acid Batteries

Sven Ole Steinmueller, Ph.D., Instrumental Chemistry Specialists, Institute for Applied Materials, Energy Storage Systems, Karlsruhe Institute for Technology

Within the last year, a global-driven change of reducing energy consumption and increasing energy efficiency is still present and an ongoing challenge. Analysis examples from different finished and ongoing battery projects are presented including the surface analysis belonging to a project correlated with the design of artificial solid electrolyte interfaces revealing the analytical power of the combined approach with ToF-SIMS and XPS. At the end a comparison of the different battery systems and the conclusions for the investigation of lead acid and advanced lead acid battery systems are presented.

17:40 Performance Improvements from Discrete Carbon Nanotube Additives in Advanced Automotive Lead-Acid Batteries

Paul Everill, Ph.D., Vice President, Research and Development, Black Diamond Structures

Discrete carbon nanotubes can be dispersed in an aqueous solution and added directly to the pasting mix for either negative or positive lead-acid battery plates. These additives markedly improve the ability for batteries to be charged quickly without gassing, and to withstand many characteristic cycling protocols. These nanotubes, known as MOLECULAR REBAR®, can easily be incorporated into existing pasting lines. They have yielded benefits in full-scale production batteries in automotive applications. We show results for both flooded and VRLA configurations, and discuss the implications on battery design and performance in the field.

18:00 Q&A

18:20 Welcome Reception with Poster Viewing

19:20 Close of Day

TUESDAY, 30 JANUARY

7:30 Symposium Registration and Morning Coffee

TECHNOLOGY & INNOVATION: DCA VS. HIGH-TEMPERATURE DURABILITY

8:30 Chairperson's Opening Remarks

Eberhard Meissner, Ph.D., Senior Technical Leader, Electrochemistry, Johnson Controls Power Solutions

8:35 Investigation of Water Consumption Mechanism of Flooded Type ISS Batteries to Balance with Charge Acceptance

Daisuke Hosaka, Staff Engineer, Global R&D Department., Advanced Battery & System Development Center, R&D Headquarters, Hitachi Chemical Co., Ltd.

Gases generated from batteries were analyzed to investigate the water consumption mechanism during static over charge and micro cycling. The results will be compared and discussed to find a way to balance water consumption property and charge acceptance.

8:55 New PBX® Performance Additive for High DCA Start Stop Batteries

Paolina Atanassova, Ph.D., Global Applications Development Manager, Energy Materials, Cabot Corporation

Carbon additives are successfully used in commercial start-stop lead acid batteries for achieving high charge acceptance and cycle life, but higher emphasis on dynamic charge acceptance (DCA) and high temperature operation are needed to compete with Li-ion batteries and to maintain a competitive advantage of lead acid batteries for next generation micro-hybrid cars. PBX® 52 carbon additive is a formulated material that delivers excellent DCA and can provide up to 50% less water loss compared to Cabot's PBX 51 carbon additive.

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9:15 ArcActive's Carbon Fibre-Based Negative Electrode: Latest Data

Stuart McKenzie, CEO, ArcActive, Ltd.

ArcActive began developing its novel Carbon Fibre-based negative electrode in 2011 with the ambition of delivering an LAB that delivered high and sustained DCA. Since this time, many technical challenges have had to be addressed, including scale up, achieving good performance on all standard tests (not just DCA) and manufacturing solutions. At this talk, the latest data, demonstrating excellent DCA (both sustained and WLTP) while delivering low water consumption, along with other test results, will be shared.

9:35 Development of an Improved Dynamic Charge Acceptance (DCA) Test for European Standardization

Jonathan Wirth, Research Associate, Chair for Electrochemical Energy Conversion and Storage Systems, RWTH Aachen University

New additives and innovative plate designs can significantly improve dynamic charge acceptance (DCA) of automotive lead-acid batteries and help to further reduce CO₂ emissions. Existing lab tests, however, do not always accurately predict real-world performance of these lead-acid batteries in a run-in state. The presented study focusses on the development of a simplified DCA test for European norm EN 50231-6 while improving correlation to run-in performance in a 11 weeks reference test.

9:55 Q&A

10:10 Grand Opening Coffee Break with Exhibit & Poster Viewing

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TECHNOLOGY & INNOVATION: DCA VS. HIGH TEMPERATURE DURABILITY

11:00 Chairperson's Remarks

Eberhard Meissner, Ph.D., Senior Technical Leader, Electrochemistry, Johnson Controls Power Solutions

11:05 Scalability of Impedance and DCA for Different Sizes of Lead-Acid Cells

Julie Kowal, Ph.D., Research Scientist, University of Berlin

Cells with different electrode configurations are tested and compared concerning impedance and charge acceptance. The cells are cut from commercial starter batteries. The aim of the investigation is to analyze if measurements from smaller cells are representative for larger batteries.

11:25 The External Surface Area of Carbon Additives as Key to Enhance the Dynamic Charge Acceptance of Lead-Carbon Electrodes

Jochen Settelein, Ph.D., Research Scientist, Center for Applied Electrochemistry, Fraunhofer Institute for Silicate Research ISC

Specially synthesized carbon powders with a variation in the specific external surface area were investigated for the use as additive in the negative active material. Results from cyclic voltammetry on negative electrodes reveal that the external surface area of amorphous carbons exhibits a clear correlation to the electrochemical activity of lead-carbon electrodes. Higher DCA values can be observed for higher external surface area carbons.

12:05 Investigation on the Impact of Additives Given to Active Material in Order to Improve DCA of EFB with High Cycling Performance

Boris Steiner, Manager, Development and Product Management, MOLL Batterien

Over the past years, MOLL developed advanced EFB fulfilling the significantly increased technical requirements of car manufacturers for Micro-Hybrid Batteries. These batteries have virtually the same performance level as AGM design. This is contrary to the generally held belief that only AGM design can fulfill the rather difficult combinations of various technical requirements, particularly the combination of high cold cranking power and very good cycling performance. This paper gives new results of detailed investigations on the impact of additives on DCA, and about latest developments for further improvements of EFB.

12:25 Late Breaking Presentation

12:45 Q&A

13:00 Networking Lunch

14:15 Dessert Refreshment Break with Exhibit & Poster Viewing

THE FUTURE OF LEAD-ACID BATTERIES IN THE FACE OF MARKET AND ENVIRONMENTAL CHALLENGES

15:00 Chairperson's Remarks

Christian Rosenkranz, Ph.D., Vice President, Engineering & Product Development EMEA, Johnson Controls Autobatterien GmbH

15:05 PANEL DISCUSSION: Automotive Lead-Acid: Advancing Technology to Compete with Lithium-Ion

Moderator: Christian Rosenkranz, Ph.D., Vice President Engineering & Product Development EMEA, Johnson Controls Autobatterien GmbH

The growth in start-stop batteries for the vehicle market has provided lead acid with opportunities for growth. This panel will examine what the technological advancements that will allow lead-based batteries to gain market share and compete effectively in the energy storage marketplace.

15:45 Leveraging Bipolar Batteries for High DCA 48V Hybrid Systems

Dan Moomaw, Lead Mechanical Engineer, Engineering, Gridtential Energy

As next-tier emissions regulations go into effect, 48V mild hybrid systems will proliferate the market, especially in the EU. Currently, lead batteries have difficulty addressing this market due to challenges with DCA and packaging restrictions. This presentation will detail recent test results in high-power automotive applications. Lead batteries remain a compelling solution for 48V mild hybrid powertrains when leveraging lightweight and efficient bipolar architectures.

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16:05 Improvement of Lead Acid Battery Performance by Morphological Control and DCA Improvement Using SUPERSOFT-HYCYCLE™ and Specific Carbon Additives

Matthew Raiford, Ph.D., Process Engineer, RSR Technologies

The growth in grid storage and hybrid vehicle markets has presented many possibilities for lead acid batteries. However, improvements in cycling, gassing activity (water loss), and dynamic charge acceptance (DCA) must be achieved to adequately fulfill performance requirements. Water loss measurements and DCA-centered studies showed that improvements in DCA are possible from the leady oxide alone. Further improvements in DCA will be presented focusing the qualification and improvements offered by different carbon additives.

16:25 Lead Acid Batteries - Safety and Environmental Considerations

Juergen Garche, Ph.D., CEO, FCBAT

Lead acid battery production numbers are still growing, therefore quantitatively, also safety and environmental problems. Environmental problems during production and recycling of LABs still occur in developing countries but these problems are strongly reduced in industrial countries. But caused by general health problems of lead, the European Commission gives for the production of LABs only temporary derogations, which will be extended every 5 year as long there is unavailable a more health compatible and economically competitor product (Li-ion battery).

16:45 Q&A

17:05 Networking Reception with Exhibit & Poster Viewing (Sponsorship Opportunity Available)

18:05 Close of Symposium

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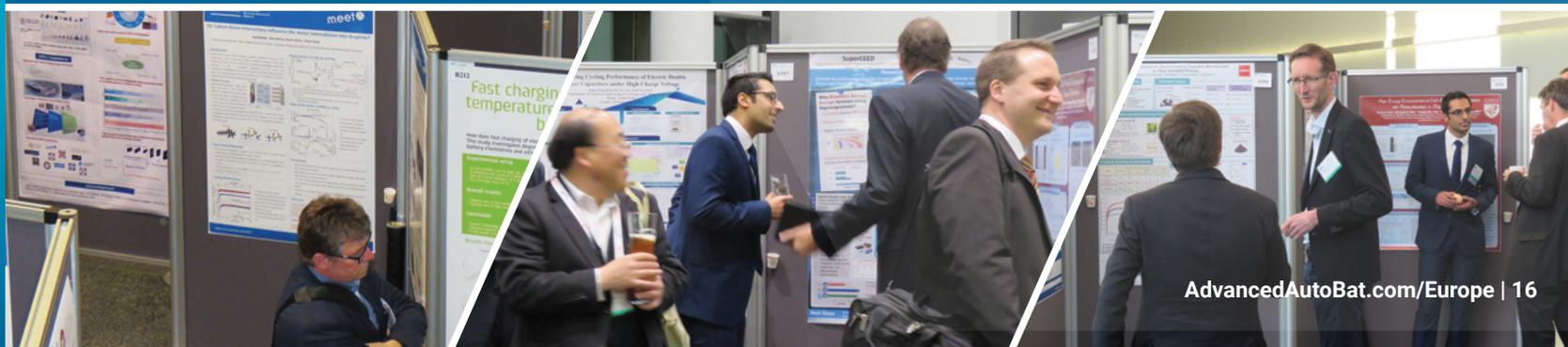
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MONDAY, 29 JANUARY

8:30 Symposium Registration and Morning Coffee

INFRASTRUCTURE

10:00 Chairperson's Opening Remarks

Michael Keller, Head of Volkswagen Group R&D Coordination Battery & Charging, K-GEEH, Volkswagen AG

10:05 Charging - Is the Infrastructure Ready?

Michael Keller, Head of Volkswagen Group R&D Coordination Battery & Charging, K-GEEH, Volkswagen AG

Analysing the open topics and "problem" regarding the usage of long distance travel. How to make it easy to use for everybody. How to get the connection to the grid. How to control the power and availability.

10:45 PEV Charging Interaction with the Grid

Barney Carlson, Research Engineer, Advanced Vehicles, Idaho National Lab

The presentation will show laboratory results from Level 2 and DCFC evaluation during typical operation (uncontrolled/uncoordinated charging) as well as during undesirable grid dynamic events. From these response characteristics, advanced coordinated control systems are being developed to mitigate negative impacts on the grid, with emphasis on high-penetration and higher power charge systems.

11:05 Networking Coffee Break with Poster Viewing

11:35 PANEL DISCUSSION: The Future of Infrastructure

Moderator: Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.

This panel will explore the latest advancements in electric vehicle charging and infrastructure. Strategies to create viable electric vehicle infrastructure, such as utilizing existing infrastructure networks will be discussed.

12:15 Late Breaking Presentation

12:35 Q&A

12:50 Networking Lunch

CHARGING

14:15 Chairperson's Remarks

Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.

14:20 xEV Industry Trends of Charging & Battery Systems

Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.

Lithium-ion battery systems are an enabling technology in the propagation of xEVs with longer range and higher-energy-density batteries. Further enabling public acceptance are convenient and time-effective charging options. This presentation will review a large number of xEVs currently in production and discuss trends and

diversity in the subsystem design choices that were implemented in each production system including charge capabilities. Different charging protocols and standards across the globe will be discussed with trends analyzed, as well as improvements to user convenience including faster DC-charging and wireless charging.

15:00 Novelty Solutions in Over-Current Protection of HV DC Circuit of Battery-Powered Vehicles

Mitja Koprivšek, Strategic R&D Manager, R&D, ETI Elektroelement d.d.

Presented proposal will show how to solve several safety and technical problems in breaking the main HV DC circuit of battery-powered vehicles. Proposal is using the combination of "pyroswitch" and "melting fuse" technologies and provides answers to all technical and safety requirements. These requirements are related to the speed of disconnection of main HV DC battery circuit and maximum DC current breaking capacity, as well as to the optimum durability behaviour at different current profiles during vehicle driving. Presented proposal ensures also lowest product weight and optimum product and installation costs, both requirements are strongly wished by automotive industry.

15:20 Long Life Lithium Batteries with Stabilized Electrodes

Wenquan Lu, Ph.D., Principal Chemical Engineer, Argonne National Laboratory

15:40 Q&A

16:00 Refreshment Break with Poster Viewing

16:35 Chairperson's Remarks

Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.

16:40 Engineering Fast-Charging Batteries: Understanding Transport in Lithium Ion Batteries Using Tomographic Analysis

Vanessa Wood, Ph.D., Professor, ETH Zurich

Rate performance of lithium ion batteries is strongly influenced by lithium ion transport through the pore space of the electrodes and separators. In this talk, I will describe the different types of tomographic imaging that can be applied to achieve 3D reconstructions of battery electrodes and separators. I will then discuss how these reconstructions can be used to quantify electrode and separator microstructure and determine how the structure influences lithium ion battery performance.

17:20 Talk Title to be Announced

Christopher Michelbacher, Ph.D., Battery Performance & Research Design Scientist, Energy Storage & Transportation, Idaho National Laboratory

18:00 Q&A

18:20 Welcome Reception with Poster Viewing

19:20 Close of Symposium

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R&D SYMPOSIUM 5
BATTERY ENGINEERING

Building Better Batteries

TUESDAY, 30 JANUARY

7:30 Symposium Registration and Morning Coffee

SAFETY

8:30 Chairperson's Opening Remarks

8:35 Battery Calorimetry of Li-Ion Cells to Prevent Thermal Runaway and Develop Safer Cells

Carlos Ziebert, Ph.D., Head of the Battery Calorimeter Center Thermophysics and Thermodynamics Group, Karlsruhe Institute of Technology

The thermal behaviour of lithium-ion cells and their active materials depends on a large variety of internal and environmental physicochemical parameters, which are still not deeply understood. Additionally, the specific materials design and the use of nanoscale materials influences heat generation and heat dissipation during operation of the electrochemical cells. Therefore, thermal characterization of the cells, batteries and their individual active and passive materials is required in combination with multiscale electrical electrochemical, thermal and thermodynamic modelling to obtain quantitative and reliable thermal and thermodynamic data.

8:55 Deformation in 18650 Li-Ion Cells Observed by Micro X-Ray Computed Tomography

Andreas Pfrang, Ph.D., Scientific Officer, Joint Research Centre, European Commission

Irreversible mechanical deformations were systematically found in 18650 cells with graphite anode, both in failed cells and also in cells that still had a significant remaining capacity. The latter may indicate that the occurrence of such deformations does not necessarily trigger a sudden death of a cell. Nevertheless, being linked to volume variations of the anode, the deformations will increasingly contribute to performance degradation during cycling. Deformations were observed mainly close to the cathode current collector, which suggests that rather small inhomogeneities in the cell structure at beginning of life.

9:15 Safety Testing for xEV Batteries

Michael Geppert, Head of Laboratory, TÜV SÜD Battery Testing GmbH

This presentation will compare various test standards and validation processes, focusing on 1. Comparing test standards and homologation processes in Europe, North America, and China, 2. The lessons learned and future developments, 3. Current examples of safety validation tests, and 4. ECE R 136.

9:35 Presentation to be Announced

9:55 Q&A

10:10 Grand Opening Coffee Break with Exhibit & Poster Viewing

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PACK ENGINEERING

11:00 Chairperson's Remarks

Volker Hennige, PhD, Head, Global Battery Competence Team, AVL List GmbH

11:05 Multifunctional Battery Housings and Their Helpful Application for Thermal and Mechanical Tasks

Jobst H. Kerspe, Consultant, GVI, König Metall GmbH & Co. KG

Thermal management should be embedded in the battery housing, just to save space and weight and to separate cooling devices from cell chemistry. This also means the housing should provide the right thermal conditions for the battery independent from outside thermal conditions. Moreover, the housing should keep the battery safe under all operating conditions, such as vibrations caused by the driving car, as well as crash conditions.

11:25 Continued Glimpses into xEV Batteries on the Market – AVL Series Battery Benchmarking

Wenzel Prochazka, Ph.D., Product Manager, Global Battery Management Team, AVL List GmbH

The Program provides a database for objective comparison in technical attributes as well as in engineering methodology with market competitors for clear system target definition of high performing, reliable and safe batteries. 270 different criteria are evaluated through AVL benchmarking metrics displayed in 8 high level attributes. The found integrated system performance values in cell, mechanical and electrical system are pointed out to support current and future development programs. Example vehicles are the Mitsubishi Outlander, Tesla Model X and Chevrolet Bolt.

11:45 Presentation to be Announced

Scott Trimboli, Ph.D., Assistant Professor, College of Engineering & Applied Sciences, University of Colorado, Colorado Springs

12:05 Presentation to be Announced

Gaetan Damblac, Battery Solution Manager, CD Adapco

12:25 Dow Solutions for Battery Packs and Control Units Assembly and Cooling

Le Yu, PhD, CTO, Electrolyte Division, Guangzhou Tinci Materials Technology Co.Ltd

Long lasting battery packs require best materials for their assembly. Silicone materials have the proven reputation of keeping their sealing function operational in extreme environments. As thermally conductive, they have the benefit of evacuating heat or bringing in additional heat to maintain the battery packs at best possible working conditions.

12:45 Q&A

13:00 Networking Lunch

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14:15 Dessert Refreshment Break with Exhibit & Poster Viewing

CELL ENGINEERING

15:00 Chairperson's Remarks

Robert Spotniz, President, Battery Design LLC

15:05 Industrial Viable Water-Based Processing for Ni-Rich NMC Cathodes

Stella Deheryan, Ph.D., Applications Engineer, Emerging Technologies, JSR Micro NV

Lately, although there are strong demands for water-based processing of cathodes in a viewpoint of environmental and economic aspect, most battery makers have produced Ni-rich NMC cathodes by solvent (NMP) systems because the water based slurry of Ni-rich NMC has led to the corrosion of the aluminum foil due to the dissolution of alkaline components from active materials. In this presentation, we would like to introduce the water-based approach with our binder material specially designed for this process; demonstrated to be easy and straightforward, even for Ni-rich cathode materials.

15:45 New Generation of Current Collectors Enhance Battery Performance

Thierry Dagron, Business Development Director, ARMOR Films for Batteries, ARMOR

Things are quite complex at the interface metal-electrode, a lot of chemical,

physical and electrochemical phenomena occur: internal resistance increase, corrosion attacks, lack of adhesion, solvent attacks, etc. It is very dependent on the electrochemistry and process, and requires a customized approach. We demonstrate how primed current collectors (Al or Cu foils with a protective and conductive primer) solve these problems. For LFP cells for instance, the internal resistance can be reduced by 40% and the adhesion increased by 70% (peeling strength at 180°).

16:25 Manufacturing of Low-Cost Nano-Coatings for High-Performance Battery Materials

James Trevey, Ph.D., Vice President, Engineering, Forge Nano

As mobility and portability requirements grow, so does the need for higher energy density materials, higher power density systems, and enhanced lifecycles of devices, all of which create additional stresses at interfaces within energy storage modules such as lithium-ion batteries, fuel cells, and supercapacitors. ALD is a means to engineer an energy storage future on an atomic level, and with the newly developed semi-continuous high-throughput ALD production system a viable commercialization path now exists to realize the benefit of ALD on a commercial scale.

16:45 Q&A

17:05 Networking Reception with Exhibit & Poster Viewing (Sponsorship Opportunity Available)

18:05 Close of Symposium

AABC and Cambridge EnerTech Are Proud to Recognize Their OEM Fellows

Key automotive OEMs have played a special role in the success of AABC for more than 18 years, and the OEM Fellowship was created to reaffirm that this unique relationship will continue in the future. Additional OEM Fellows will be announced in the near future.



Oliver Gross

Technical Fellow - Energy Storage systems



Eckhard Karden, Ph.D.

Technical Expert for Battery & Energy Storage Technology



Arnold Lamm, Ph.D.

Head of eDrive Technologies



Roland Matthé

Technical Fellow Battery System & Manager Electrification Architecture



Ted Miller

Senior Manager of Energy Storage Strategy and Research



Masato Origuchi

Expert, Electrical Energy Storage Systems

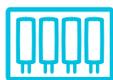


Mark Verbrugge, Ph.D.

Director, Chemical and Materials Systems Laboratory



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R&D SYMPOSIUM 6

ELECTROCHEMICAL (EC) CAPACITORS

Advances in Capacitor Materials, Design & Applications

TUESDAY, 30 JANUARY

7:30 Symposium Registration and Morning Coffee

ADVANCES IN EC CAPACITOR MATERIALS & CELL DESIGN

8:30 Chairperson's Opening Remarks

Katsuhiko Naoi, Ph.D., Professor of Chemistry, Institute of Symbiotic Science & Technology, Tokyo University of Agriculture & Technology

8:35 Next-Generation Asymmetric Capacitors Using Intercalated Metal-Organic Framework Electrodes with High-Volume Energy Density

Nobuhiro Ogihara, Ph.D., Senior Researcher, Battery Materials and Processing Lab, Toyota Central R&D Lab

In this talk, we will introduce next-generation lithium-based asymmetric capacitors consisting of negative electrode material of intercalated metal-organic framework (iMOF), which is novel electrode material and operates in the potential range of 0.7–0.8 V vs. Li/Li+ with remarkable small volume change (0.33 %), and activated carbon positive electrode. The proposed iMOF electrode suppresses the Li plating problem and enables high-voltage design and therefore realizes high-volumetric-energy capacitors.

8:55 The Impact of New Electrolyte Components on the Performance of High Voltage Electrochemical Double Layer Capacitors

Andrea Balducci, Ph.D., Professor, Institute for Technical Chemistry and Environmental Chemistry, Center for Energy and Environmental Chemistry (CEEC), Friedrich-Schiller-University Jena

The development of innovative electrolytes is of fundamental importance for the realization of high voltage and safe electrochemical double layer capacitors (EDLCs). In this presentation, the impact of several new electrolyte components on the performance of high voltage electrochemical double layer capacitors will be analyzed and critically discussed. Particular attention will be dedicated to the influence of the anodic dissolution of Aluminum current collectors on the stability of high voltage EDLC during float test.

9:15 Ni(OH)₂ Based Aqueous Asymmetric Condensator with Increased Energy Density

Olaf Böse, Ph.D., Deputy Head of Division, Center for Solar Energy and Hydrogen Research, Baden-Württemberg (ZSW)

An alkaline-aqueous asymmetric double layer capacitor based on activated carbon and nickel hydroxide on a developed nanostructured current collector is able to provide increased charge and discharge rates. Due to specific adapted activated carbon with specific capacities of 146mAh g⁻¹ (or 525F g⁻¹) we could also achieve enhanced energy densities at cell level. The very high specific capacity of the activated carbon is thought to be based on surface-near oxygen functionalities. Furthermore, based on the very stable materials substantial cycle number above 250.000 full cycles could be achieved.

9:35 Two-Dimensional Titanium Carbide MXene Colloidal Solution: Oxidation Stability and Application in Transparent Energy Storage Devices

Matthias Kremer, Research Assistant, School of Chemistry, Trinity College Dublin

Two-dimensional materials have attracted huge research attention in recent years, particularly MXenes. While most studies focused on the non-transparent MXene films or electrodes in supercapacitors or batteries, none of the reports talk about the transparent MXene films for energy storage. Here we studied systematically of the transparent MXene films as advanced supercapacitor electrodes and devices, with excellent electrochemical performances.

9:55 Q&A

10:10 Grand Opening Coffee Break with Exhibit & Poster Viewing

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11:00 Chairperson's Remarks

Katsuhiko Naoi, Ph.D., Professor of Chemistry, Institute of Symbiotic Science & Technology, Tokyo University of Agriculture & Technology

11:05 Li-Ion Based Hybrid Supercapacitors and Their Functional Ultrafast Materials

Katsuhiko Naoi, Ph.D., Professor of Chemistry, Institute of Symbiotic Science & Technology, Tokyo University of Agriculture & Technology

Energy storage devices are some of the most important environmental technologies that are highly influential in advancing our life in future society. In recent years, the structural/textural properties of oxides, including particle size, crystallinity, defects, and porosity, are successfully fine-tuned to achieve both high rate performance (>300 C) and long cycleability (>10,000 cycles). The present paper will describe pseudo-capacitive nanosized oxides prepared with *in situ* synthetic means of "ultracentrifugation" showing ultrafast electrochemical response even more than EDLC.

11:25 Recent Advances in Prelithiation of Lithium-Ion Capacitors

Thierry Brousse, Ph.D., Professor of Materials Science, Institut des Matériaux Jean Rouxel (IMN), Université Polytechnique Nantes

Lithium-ion capacitors (LICs) are intermediate devices between lithium-ion batteries (LIBs) and electrical double-layer capacitors (EDLCs), and as such address quite a wide range of applications. However, this interesting concept is mitigated by the need of a sacrificial prelithiation compound that serves on the first charging cycle as the lithium source. This implies the use of a dedicated first charging step which is a key step for further good use of the device. Our new strategy envisions the use of low CO₂ footprint material easily recyclable and which paves the way toward simpler and safer Li-ion capacitors.

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11:45 Charge Storage Mechanisms in Capacitive Porous Carbons and 2D MXene Pseudocapacitive Materials

Pierre-Louis Taberna, Researcher, Université Paul Sabatier

The charge storage mechanism porous carbon and 2D MXene electrodes have been studied in non aqueous electrolytes by combining X Ray diffraction and scattering and modelling. We will show during this talk the ion adsorption in carbon nanopores leads to a partial breaking of the coulomb interaction between ions of the same charge, thus leading to an increase in capacitance. In 2D MXene materials, a different charge storage mechanism was observed during positive and negative sweeps, based on cation intercalation and ion exchange.

12:05 In-Operando Study of Carbon/Carbon Supercapacitors Ageing by Electrochemical On-Line Mass Spectrometry

Paula Ratajczak, Ph.D., Professor, Power Sources Group, Poznan University of Technology, Poland

The main observable ageing symptom of supercapacitors (SCs), initiated by increasing voltage is the formation of gases and decomposition products blocking the porosity of carbon, with related decrease of capacitance and increase of resistance. In the study, electrochemical on-line mass spectrometry (EOMS) will be applied to analyze the amounts of gases which are produced during potentiostatic floating of SCs, in order to quantitatively correlate gas formation with the leakage current, while taking into account pressure records and electrodes surface oxidation.

12:25 High Performance Electrochemical Capacitors Based on Conductive Two-Dimensional Metal-Organic Frameworks

Maria Lukatskaya, Ph.D., Department of Chemical Engineering, Stanford University

12:45 Q&A

13:00 Networking Lunch

14:15 Dessert Refreshment Break with Exhibit & Poster Viewing

NEW EC CAPACITOR PRODUCTS & APPLICATIONS

15:00 Chairperson's Remarks

Andrew F. Burke, Ph.D., Institute of Transportation Studies, University of California, Davis

15:05 Creating New Materials and Architectures for High Rate Energy Storage

Bruce Dunn, Ph.D., Department of Materials Science and Engineering, University of California, Los Angeles

The prospect of developing materials with the energy density of batteries and the power density and cycle life of supercapacitors is an exciting direction that has yet to be realized. This paper will review our work on identifying Li⁺ conducting materials which exhibit redox behavior at high charge/discharge rates as well as electrode architectures where the small diffusion distance for Li⁺ enables surface-like charge storage kinetics rather than the semi-infinite diffusion of traditional battery materials.

15:25 Development of Nanohybrid Capacitor for Automotive and Railway Applications

Satoru Tsumeda, Supervisor, Products R&D Department, R&D Headquarters, Nippon Chemi-Con Corporation

Nippon Chemi-Con has been working on the development of various new capacitors to meet market demands. One of the new capacitors is a LIC named Nanohybrid capacitor. Nanohybrid capacitor is expected as an energy storage device in automotive and railway applications because of its unique properties, especially high safety comparable with EDLC.

15:45 New Tests of State-of-the-Art Supercapacitors Using Aqueous and Organic Electrolytes and a New Application with Lithium Batteries

Andrew F. Burke, Ph.D., Institute of Transportation Studies, University of California, Davis

New tests of state-of-the-art carbon/carbon supercapacitors using aqueous and organic electrolytes were performed. All the devices were tested over ranges of constant current, constant power, and pulse currents. The application of supercapacitors combined with a lithium-ion battery in plug-in hybrid vehicles having ranges up to 50 miles was investigated in detail via Advisor simulations. Comparisons were made between energy storage using a power battery and using an energy battery combined with supercapacitors. The economics of the use of the supercapacitor was most favorable for the 50 mile range PHEVs.

16:05 Advanced Supercapacitor and Its Application on Transit Systems

Dianbo Ruan, Ph.D., Senior Engineer and Chief Technologist, CRRC Corp. Ltd. (CRRC), China

With increased energy density and decreased manufacturing costs, supercapacitors are regarded as one of the most important technologies for applications in public transit energy storage. This talk will present the latest advancements in using high performance supercapacitors as the main source of power for transit systems.

16:25 From Li-Ion to Na- and K-Ion Capacitors - A Perspective

Sonia Dsoke, Group Leader, Material Synthesis Group, Institute of Applied Materials – Energy Storage Systems (IAM-ESS), Karlsruhe Institute of Technology

Li-ion capacitors represent an appealing hybrid technology, realizing high power and energy. Alternative to lithium are other cheaper metals, like Sodium and Potassium which, similarly to lithium, are able to reversibly insert into the structures of some intercalation-type materials. This presentation will give a perspective overview on the possibility to employ hybrid capacitors based on carbonaceous materials and Na-ion or K-ion insertion materials. Particular focus will be dedicated on the behavior of organic electrolytes containing Li (Na and K)-salts on activated carbon electrodes.

16:45 Q&A

17:05 Networking Reception with Exhibit & Poster Viewing (Sponsorship Opportunity Available)

18:05 Close of Symposium

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TUTORIALS

MONDAY, 29 JANUARY

10:45 – 12:45 TUT1: Li-Ion Battery Design and Simulation

Tutorial will cover topics including:

- A Brief Survey of Software Tools
- Battery Design Basics (Energy & Power)
- Cell Design (Components, including electrodes, separators, electrolytes, collectors; Stacked Plate and Spiral; Empirical Models; Macro-Homogeneous Models; Microstructural Models)
- Module Design (Series/Parallel; Cooling Strategies)
- Simulation of Ageing
- Simulation of Abuse

Instructor: Robert Spotnitz, Ph.D., President, Battery Design LLC

13:30 – 15:30 TUT2: Effect of Electrode and Cell Production Steps on Lithium Ion Battery Cell Performance and Costs

Topics to be covered include:

- Overview process chain for electrode and cell production (conventional and alternatives) – dry mixing, wet dispersing, coating, drying, calendering, final drying, slitting, cell assembling, electrolyte filling, formation
- Importance of mixing and dispersing step for later cell performance, especially c-rate performance and cycle stability
- Critical aspects in coating and drying of LIB electrodes
- Calendering and final drying to improve cell performance and volumetric energy density
- Cell assembly for high reproducibility and low costs
- Electrolyte filling and formation as time consuming and performance relevant production steps
- Process-structure-performance relationships as tools for optimization of lithium ion battery cells
- Virtual cell design to determine cell performance as function of important production parameters
- Cell cost calculation based on detailed process chain consideration
- Ecological impact of battery cell production

Instructor: Arno Kwade, Prof. Dr.-Ing., Battery LabFactory Braunschweig (BLB), TU Braunschweig

16:20 – 18:20 TUT3: The Rechargeable Battery Market: Value Chain and Main Trends 2017 - 2027

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, 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 2017-2027 will be discussed.

Instructor: Christophe Pillot, Ph.D., Battery Survey Manager, Avicenne Energy, France

TRAINING SEMINARS

WEDNESDAY, 31 JANUARY | 9:00-18:00

TS1: Battery Safety & Abuse Tolerance Validation

Batteries have become daily use components for many applications. New growing segments like EV and grid storage batteries extend the traditional ordinary battery applications. In the race for energy density, we should not forget the safety (e.g., the Samsung Galaxy Note 7 battery safety case). Unfortunately, we face daily safety events with injuries and severe damage. This training program focuses on portable, stationary and automotive battery safety along the battery cycle life (acceptance, testing, assembly, use, transportation and disposal). The training incorporates Shmuel De-Leon's and other experiences on battery safety representing over 26 years of work in the field. The motivation behind the training is to provide attendees with the knowledge needed to safely handle the batteries in their organization and to support reduction in safety events.

Instructor: Shmuel De-Leon, CEO, Shmuel De-Leon Energy, Ltd.

TOPICS TO BE COVERED:

- Primary Cells and Batteries
- Battery Safety Design
- Battery Essentials
- Battery Disposal
- Rechargeable Cells & Batteries
- Battery Transportation
- Battery Safety Hazards
- Battery Safety Standards & Testing
- Battery Safety Guidelines
- EV Battery Safety
- Battery Safety Equipment

THURSDAY, 1 FEBRUARY | 9:00-17:00

TS2: Lithium-Ion Battery Cell and Pack Technology

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.

Instructors:

Bob Spotnitz, President, Battery Design LLC

Kevin Konecky, Battery Systems Consultant, Total Battery Consulting, Inc.

TOPICS TO BE COVERED:

- 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

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PLENARY SESSIONS

31 JANUARY - 1 FEBRUARY 2018

WEDNESDAY, 31 JANUARY

OPENING PLENARY SESSION: MARKET EXPANSION OF xEVs AND THEIR BATTERIES

8:35 Chairperson's Opening Remarks

Menahem Anderman, Ph.D., President, Total Battery Consulting, Inc.

8:40 Renault EV and Its Battery

Masato Origuchi, Electrical Energy Storage System Expert, Renault

Since the launch of the first mass market electric vehicle ZOE at the end of 2011, Renault is continuously evolving its performances especially the battery energy which has been drastically increased to 41kWh in the new ZOE ZE40. Up to now the most of the efforts has been made to increase the energy density for extending the insufficient driving range and it is true that it was the key to success for the expansion of the EV market. But from now in order to create the real EV era, optimization of the battery among different aspects becomes crucial in order for EV and the batteries to be sustainable. This presentation will show Renault's EV and its battery perspectives based on the ZOE experiences.

9:00 Can California and the Federal Government Get Along? The Future of GHG, CAFE and ZEV Regulations for Light-Duty Vehicles

Robert Bienenfeld, Assistant Vice President, American Honda Motor Co., Ltd.

The Trump Administration is picking up the pieces of the mid-term evaluation for the Federal GHG program. California has threatened to withdraw from the One National Program agreement and go their own way for GHG regulation. While the federal regulators are trying to focus on rules through 2025, California is pushing aggressively towards new regulations for 2030 and 2035. Will we have divergent or convergent regulations? This presentation will seek to address the current state of regulations in the US (including California!).

9:20 Developments in EU Policy and Implications for the Electrification of Transport

Greg Archer, Program Manager, European Federation for Transport & Environment (T&E)

9:40 What's the Next Step? Proposed & Forecasted Future Changes in the Chinese xEV/Battery Market

Mark Lu, Ph.D., Certified Senior Industrial Analyst, Industrial Economics & Knowledge Center (IEKC), Industrial Technology & Research Institute (ITRI)

In the past five years, the Chinese xEV market has become the biggest in the world. The question is what will happen in the future. Therefore, this presentation aims to include predictions on which types of vehicle will become popular as well as information showing future targets regarding capacity, cost etc. In addition, information regarding future incentives to the end user will be given. Finally this presentation will outline the new CAFC+NEV regulations and how they may affect the companies within the whole industry.

10:00 Coffee Break with Exhibit & Poster Viewing (Sponsorship Opportunity Available)

10:50 Vehicle Electrification: Is the Path to Mass Market Open?

Menahem Anderman, Ph.D., President, Total Battery Consulting, Inc.

This presentation will discuss electrified-vehicle market expansion and battery technology and market development. Expansion of the BEV market will depend primarily on governmental regulations and incentives as well as on the customers' willingness to pay a premium over gasoline-powered vehicles for vehicles with range and charge-time limitations. Battery performance enhancement and cost reduction will be examined vis-à-vis metal pricing increase and battery durability, reliability, and safety, and we will review market trends in Europe, the U.S., China, and Japan.

11:30 Assessment of Direction and Requirements for PEV Market Expansion

Stephanie Schenk, Senior Research Analyst, Advanced Industries - Automotive & Assembly, McKinsey & Company

This presentation will provide an overview on the attraction of plug-in hybrid electric vehicles (PHEVs) compared to pure battery electric vehicles (BEVs) in different markets around the world. After outlining the current drivers of each technological solution (including the role of regulations and incentives, consumer requirements and automaker strategies), a scenario-based outlook on future electric vehicle (EV) adoption will be given. Results from a recent consumer survey among existing and prospective EV owners will highlight key buying criteria (e.g., design, cost, performance, etc.) for future market expansion.

11:50 Q&A

THURSDAY, 1 FEBRUARY

CLOSING PLENARY SESSION: LOGISTIC ASPECTS OF VEHICLE ELECTRIFICATION

15:50 Chairperson's Remarks

15:55 Legal Aspects of High-Voltage Battery Safety

Juergen Wilhelmy, Product Safety HV Battery, Audi AG

High-voltage Li-ion battery technology is comparatively new in the automotive industry and field experience covering the whole vehicle life-cycle outside of controlled conditions is limited. Accidents were reported, and high-voltage Li-ion batteries also present risks hitherto unknown in the industry, which has increased the manufacturer's responsibility in relation to customers. What additional requirements must be met by car manufacturers and their suppliers? We discuss product liability in relation to power-train high-voltage battery, and examine the boundaries between functional safety, technical compliance, and product safety.

16:15 The Low Emission Mobility Package and Implications for the Battery Market in the EU

Stefaan Vergote, Advisor to the Director for Climate Strategy, Governance and Emissions of Non-Trading Sectors

Later in 2017, the European Commission will come forward with the Low Emission Mobility package, comprising the following elements: i) a legislative proposal regarding the CO₂ performance of new cars and vans in a 2030 perspective, ii) an Alternative Fuels Infrastructure Plan, addressing the deployment of charging infrastructure in the EU, iii) a Batteries Initiative, to support EU projects along the

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battery value chain. We will outline the key elements of these initiatives and consider the potential implications for the future development of the battery market in the EU.

16:35 Transport Regulations for Li-Ion Batteries and the Impact on the Automotive Market

Paul Horner, Manager, Dangerous Goods Standards, Cargo Safety & Standards, International Air Transport Association

Safety concerns raised by air transport regulators have now been taken up by the UN Subcommittee of Experts on the Transport of Dangerous Goods with a view to develop a more comprehensive hazard-based approach to the classification of lithium batteries. This presentation will look at potential developments to revise the transport regulations applicable to Li-ion batteries across all modes of transport with then a focus on air transport.

16:55 Q&A

17:10 Closing Remarks

PRESENT A POSTER **SAVE €150**

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Reasons you should present your R&D findings at this conference:

- Your poster will be seen by this exclusive group of technical and business development executives from major European and international OEMs, battery companies, automotive technology centers and the global materials and energy industries.
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- Your poster abstract will be published in our conference materials.

**Full-time graduate students including Masters, Ph.D. candidates and post-docs are eligible for the student poster rate. A poster is required. Students not eligible for the additional €150 poster discount.*

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55116 Mainz, Germany

Host Hotel:

Hilton Mainz
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Phone: +49-6131-2450

Discounted Room Rate: €179 single / €199 double

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Discounted Cut-off Date: 13 January 2018



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APPLICATION TRACK 1

xEV BATTERY TECHNOLOGY, APPLICATION, & MARKET

WEDNESDAY, 31 JANUARY

8:00 Conference Registration & Morning Coffee

8:35 Opening Plenary Session (please see page 15 for details)

12:20 Networking Lunch (Sponsorship Opportunity Available)

13:30 Dessert Break with Exhibit & Poster Viewing

BATTERIES FOR LOW-VOLTAGE HYBRIDS

14:15 Chairperson's Remarks

Eckhard Karden, Ph.D., Technical Expert Battery & Energy Storage Technology, Advanced Power Supply & Energy Management, Ford Research & Advanced Engineering Europe

14:20 48V Batteries on their Way to Series Production

Onur Colhan, Developer 48V Battery Systems, Daimler AG

Daimler's green strategy is based on fuel-cell technology and xEVs (48V Hybrids, Plug-in Hybrids and electric vehicles). It is a promise to find green, better, effective and cost optimized solutions to achieve the CO2 commitments in the fleet and to reduce emissions. The 48V technology is the best compromise between consumption and emissions towards a conventional drivetrain and the costs compared with other solutions like Hybrid & Plug-In systems. Furthermore due to the increasing electrification in upper-size class of cars, like S- or E-class, with future autonomous driving functions, more electric energy is needed upside the 12V-supply system on board. This presentation will discuss the new 48V system and its most crucial part, the 48V battery.

14:40 Is a 12V Battery Needed on xEVs?

Fabian Fogelberg, HW Responsible 48 V Li-Ion Battery, Volvo Car Corporation

With the electrification of powertrains, a second energy and power source is available besides the 12 V battery. How are requirements on 12 V Lead-acid batteries affected by xEVs and could the need for a 12 V battery be removed completely?

15:00 UltraBattery® Demonstration Projects - Low Cost for Emission Reductions

Bernd Engwicht, Director Auto Battery Application International Automotive Battery Division, East Penn Manufacturing Co.

There are currently various separate demonstration projects featuring the East Penn UltraBattery® as part of the energy storage system. Demonstrations using the East Penn UltraBattery® began in 2011. In the past six years, multiple projects with a range of 12V and 48V solutions have been added with new opportunities every year. Results from some of these projects will be reviewed and future applications will be presented.

15:20 Late Breaking Presentation

15:40 Refreshment Break with Exhibit & Poster Viewing

16:30 How Ultracapacitors Enable Current and Future High-Power Automotive Applications

Stefan Werkstetter, Systems Applications Engineering Manager, Maxwell Technologies, Inc.

This presentation will give an insight into current and future ultracapacitor-based energy storage systems for various applications at 12V and 48V, like electric anti-roll control, electric power steering, electric turbo chargers and autonomous driving.

16:50 LGC's Low-Voltage Cell Development

Yo-Jin Kim, Ph.D., Low-Voltage Cell Development Team Leader, LG Chem

This presentation will introduce LGC's recent developments in cells for 12V and 48V applications. It will discuss i) the capabilities and limitations of LFP and LTO chemistry for 12V applications in terms of not only performance but also cost, and ii) give an introduction of LGC's next gen 48V cell based on the analysis of recent specifications from global OEMs.

17:10 Progress of Toshiba SCiB™ with LTO Anode for Automotive Applications

Koji Ishiwa, Senior Manager, Automotive Systems Division, Toshiba Infrastructure Systems & Solutions Corporation

The role of the Lithium-Ion Battery (LIB) is expanding not only as a highly reliable power source in EVs and PHEVs, but also in low-voltage HEVs and conventional vehicles. However, current LIBs still have several challenges such as safety or life. As a solution, Toshiba adopted LTO anode technology, which has excellent performance such as safety and long life, since 2008. This presentation will cover updated information about SCiBTM and its direction of development for automotive applications.

17:30 High Durability of LTO/NCM Battery for 14 V System at 80°C

Keigo Hoshina, Ph.D., Specialist, Battery Development, Toshiba Infrastructure Systems & Solutions Corp.

Low-voltage systems such as 12 V and 14 V battery require thermal stability because the battery pack is put under high temperature environment in a car. LTO-based lithium ion batteries have high temperature durability since the decomposition of liquid electrolyte unlikely occurs at the working potential of LTO at around 1.55 V vs. Li /Li[+]. Furthermore, the LTO-based battery shows excellent charge acceptance performance due to no lithium plating at quick charging. Therefore, an LTO-based battery combined with 4 V-class cathode is suitable for 12 V and 14 V system. We reported that improvement of high temperature durability of LTO-based battery by using polyacrylonitrile (PAN) binder. It has been reported that conventional PVdF binder was deteriorated at high temperature of 80 °C. We attempted to improve the high temperature durability of LTO-based battery by using a thermally stable polymer as a binder. LTO-based batteries are degraded due to the deterioration of cathodes. Therefore, it is effective that a thermally stable polymer is applied to a binder of the cathode. Li-ion battery with LTO anode was constructed with NCM cathode. PAN was applied to a binder of the NCM cathode. The LTO/NCM cell showed a high capacity retention of 94.2 % after 10 C cycling between 20-80%SOC under a high temperature condition of 80°C for 3000 hours which correspond to 11500 cycles. High temperature storage test was also

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carried out. The recovery capacity of the LTO/NCM cell stored at 100 %SOC at 80°C for 3000 hours were kept high of 96.2 %. Moreover, gas generation was negligible during 80°C operation. These results exhibited the LTO/NCM cell using PAN binder excellent high temperature durability. It is considered that PAN binder suppressed the decomposition of liquid electrolyte at the surface of the NCM cathode and the degradation of the NCM particle surface. LTO-based battery has outstanding high temperature performance and enables the battery pack to reduce the cooling system. The battery pack with LTO-based cells is suitable for low-voltage systems.

17:50 Q&A

18:20 Networking Reception with Exhibit & Poster Viewing

19:20 Close of Day

THURSDAY, 1 FEBRUARY

7:30 Registration Open

8:00 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.

BATTERIES FOR PHEVs AND EVs

9:00 Chairperson's Opening Remarks

Roland Matthé, Technical Fellow Battery System & Manager Electrification Architecture, Opel Automobile GmbH

9:05 Cell and Module Strategy for Low-Cost EV Powertrains

Thomas Soczka-Guth, Ph.D., Team Leader Research Li-Ion Cell and Battery, Daimler AG

The different aspects of battery design and layout, such as cell design, cooling concepts, safety measures and battery housing are of great importance for the overall functionality of the battery system and require further optimization. However, all technical solutions known far represent small incremental steps in improving the battery performance, and these steps only marginally contribute to a further cost optimization. A major breakthrough in the technology could be only achieved with more drastic changes in the battery design concept. But of course safety, longevity, durability, performance and energy densities aspects provide some hurdles and barriers for new battery concepts and still strongly influence the trade-off of battery vehicle integration. In this presentation an overview on some different known battery integration concepts for different vehicle applications will be given – but new developments in more or less “classical” lithium ion cells might change the basic set of properties in such way that path for new battery integration concepts might be open in the near future.

9:25 EV Battery Technology and Charging Strategies - An Optimization Approach

Roland Matthé, Technical Fellow Battery System & Manager Electrification Architecture, Opel Automobile GmbH

To increase the market success of electric vehicles, the EV range is increased, using large lithium-ion batteries, and short recharge time is needed. The increase in charge power has an impact on battery system design, battery cell design, and chemistry. We will study the challenges of optimizing electric vehicles for long range, short charging time, and low cost, focusing on battery technology. Customer requirements, battery technology, and infrastructure effects should be balanced to make BEVs commercially successful.

9:45 Seven Technical Challenges of the Battery for New-Generation EVs

Gwennaëlle Pascaly, Battery Technology Development Group Leader, Renault

During the last years, Renault battery group was focused in upgrading their batteries to increase the energy density with the introduction of the longer driving range version of ZOE, Kangoo and SM3 in 2017. Now, the environment of the next generation EVs is evolving. EVs will belong to a global ecosystem which imply additional functions and give new constraints on battery design. In parallel, product targets become more and more challenging and the arrival of new regulations also bring new challenges to overcome. The purpose of this presentation is to share 7 technical challenges of the battery for the next generation EVs.

10:05 Battery Pack Designs for Modern (PH)EV Architectures

Christoph Fehrenbacher, Managing Director Europe, A123 Systems

As battery prices continue to decline, next-generation plug-in vehicles will be “born electric”, having been designed for electric drivetrains and the major electrified components having been packaged in the vehicle design from the start. The high-voltage battery will often be under floor. This drives a low-height, flat-pack battery design, which presents opportunities for module standardization across vehicle programs. We will discuss battery-design trends for next-generation plug-ins, corresponding module and cell requirements, and present a case study based on A123's high-voltage module portfolio.

10:25 Coffee Break with Exhibit & Poster Viewing

11:10 Progress with EV Battery Cost and Performance: How Far and How Fast?

Menahem Anderman, Ph.D., President, Total Battery Consulting, Inc.

The question proposed in the title is key to the proliferation of battery-powered electric vehicles. In this presentation, we will discuss i) the current status and anticipated pace of advances in the development of Li-ion batteries with higher performance and lower cost, ii) how close alternative battery chemistries are to supersede Li-ion in EV applications, and iii) the implications of both points above for the expansion of the EV market.

11:30 Challenges, Risks, and Opportunities for a Rapid Expansion of xEV Batteries

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Sachiya Inagaki, Industrial Technology Unit, Yano Research Institute, Ltd.

It is expected that the xEV market will grow faster and larger than expected thanks to severe regulations on vehicles emissions. But, can we really expect such high expanding of this market? Can we totally rely on the governmental policies for growing this market? I would like to make some remarks on how we should see this market and how we should make it grow in a healthy way.

11:50 Enhancing Mileage, Lifetime and Safety by Predictive BMS Operation Strategy

Andreas Braun, Ph.D., Project Manager Battery, Engineering Center Ingolstadt, AVL Deutschland GmbH

BMS operation strategies today use static limits for derating or cooling. A predictive operation strategy can allow to make these limits dynamic. Depending on the driving situation and the forthcoming route topology an algorithm can maximize usability of the battery while driving. At the same time durability and safety can be enhanced. The approach makes use of navigation data and GPS (e-horizon), environment sensor information (ADAS) and intelligent learning algorithms to determine upcoming route topology and driving behavior.

12:10 Q&A

12:40 Networking Lunch

13:25 Dessert Break with Exhibit & Poster Viewing

BATTERY RELIABILITY AND DURABILITY IN xEV APPLICATIONS

13:55 Chairperson's Remarks

Arnold Lamm, Ph.D., Project Leader EDrive 2025, Daimler AG

14:00 Ageing of Batteries: Deterioration Mechanisms of Cell Chemistries

Andreas Hintennach, Ph.D., Group Research, Mercedes-Benz, Daimler AG

Novel and sustainable electroactive materials can help to increase safety as well as efficiency of lithium-ion and post-lithium ion batteries. While on the one hand high energy density is required, the aspect of lifetime got more important and can be supported by e.g. solid-state electrolytes.

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14:20 Inhomogeneities in Lithium-Ion Batteries

Andreas Jossen, Ph.D., Professor, Electrical Engineering and Information Technology, Technical University Munich (TUM)

Increasing the electrode thickness, reducing the porosity, increasing the specific capacity of the active material, and increasing the electrode size are methods to increase the energy density. However, most of these design parameters result in a more inhomogeneous operation and aging. Measurement methods with special designed multi-tab and multi-layer cells are presented and compared with simulation results. Additionally the inhomogeneous state of aged cells is shown by optical and XRD analysis. Especially in cells with flat discharge curves, reversible effects, for example resulting in capacity recovery, are observed.

14:40 Advanced Battery Ageing Analyses Based on High Precision Coulometry

Peter Keil, Ph.D., Research Associate/Founder, Institute for Electrical Energy Storage Technology, Technical University Munich (TUM)

The presentation will show the identification of typical side reactions causing battery degradation and demonstrate how HPC can accelerate the development process of optimized operational strategies, e.g., for fast charging or avoiding battery damage when operating at low temperatures.

15:00 Improving the Lifetime of Li-Ion Batteries by Understanding Their Degradation Mechanisms

Emilie Bekaert, Ph.D., Line Manager, Post Mortem, CIC Energigune

The development of LIB has been accompanied by technological failures, ranging from premature end of life to more concerning safety hazards such as explosions. In order to predict the behaviour of new technologies prior to their commercialization, it is necessary to study the degradation mechanisms occurring in a specific system via aging of the cells. In this talk, we will discuss the effect of highly demanding condition of operation which can lead to degradation of the pristine cell and participate in its failure.

15:20 Q&A

15:35 Refreshment Break

15:50 Closing Plenary Session (please see page 16 for details)

17:15 Close of Conference

Announcing AABC's Founding Academic Fellow



Professor Martin Winter is the founding director of the Helmholtz Institute "Ionics in Energy Storage" as well as of the MEET Battery Research Center, University of Münster. Martin holds a unique position as passionate teacher to industry and governments on science and technology of batteries and energy storage.

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APPLICATION TRACK 2

EV TECHNOLOGY FOR SPECIALTY & PUBLIC TRANSPORTATION

Advanced High-Energy Battery Development for Bus, Truck, Bike, Rail and Marine Applications

WEDNESDAY, 31 JANUARY

8:00 Conference Registration & Morning Coffee

8:35 Opening Plenary Session (please see page 15 for details)

12:20 Networking Lunch (Sponsorship Opportunity Available)

13:30 Dessert Break with Exhibit & Poster Viewing

COMMERCIAL xEVs & THEIR BATTERY SYSTEMS

14:15 Chairperson's Remarks

Axel Thielmann, Ph.D., Deputy Head, Competence Center for Emerging Technologies, Fraunhofer ISI

14:20 Inhomogeneities in Lithium-Ion Batteries

Alexandre Desneux, Project Manager, Bluebus Entreprise du Groupe Bolloré
Increasing the electrode thickness, reducing the porosity, increasing the specific capacity of the active material, and increasing the electrode size are methods to increase the energy density. However, most of these design parameters result in a more inhomogeneous operation and aging. Measurement methods with special designed multi-tab and multi-layer cells are presented and compared with simulation results. Additionally the inhomogeneous state of aged cells is shown by optical and XRD analysis. Especially in cells with flat discharge curves, reversible effects, for example resulting in capacity recovery, are observed.

14:40 Thermal Characterisation & Modelling of Li-Ion Cells for HD xEVs

Jens Groot, Ph.D., ESS Specialist – Cell Characterisation & Modelling, Electromobility Sub-systems, Volvo Group Trucks Technology (GTT) Advanced Technology & Research

This presentation will address measurement of thermal cell properties such as anisotropic thermal conductivity and specific heat capacity. Quantification of reversible and irreversible heat generation. Modelling the thermal behaviour of large cells under realistic conditions.

15:00 Industrial Battery Applications for Forklift, Cranes, and Construction Equipment with Master Modul, Battery, Lifetime, and Performance Improvements

Sven Bauer, General Manager, BMZ, GmbH

15:20 Late Breaking Presentation

15:40 Refreshment Break with Exhibit & Poster Viewing

LIGHT ELECTRIC VEHICLE (LEV) BATTERY SYSTEMS

16:30 Outlook for LEV Market and Standard 18650/21700 Cylindrical Li-Ion Battery Developments

Mo-Hua Yang, General Manager, TD HiTech Energy, Inc.; President, EnergyBus e.V.

The huge demand of Li-ion battery in EVs market leads to the standard 18650 Li-ion battery develops rapidly in performance improvement and cost down in the last decade. In order to overcome the material limitation in the further capacity increasing and battery pack system cost down, a new form factor of standard battery 21700 has been proposed by battery and EV manufacturers. In spite of the blooming of EVs, LEV (E-bike) as E-personal mobility has received attention in the urban mobility for the first and last mile connection to the public transportation system. The LEV market trend and 18650/21700 Li-ion battery dev. status will be discussed.

16:50 Lightweight Vehicles - As They Should Be

Pavel Calderon, Director, New Materials, Uniti - Ingenious EV

This presentation will provide an overview of Uniti, a Swedish startup developing an electric city car, optimized for high performance and agility in urban environments. Utilizing the electrification and redefining the future of transportation with environmental sustainability in focus.

17:10 Battery Engineering for Extreme Off-Road Conditions

Rob Sweney, Director of Engineering, Drivetrain, Alta Motors

Alta Motors has developed an electric off-road motorcycle that can beat out the best ICE competitors. Several innovations have enabled extreme energy density and a highly robust and compact battery pack that makes this vehicle possible.

17:30 Battery System Design for EV Motorsport

Wasim Sarwar, Ph.D., Battery Systems Engineer, Williams Advanced Engineering

As OEMs transition to electrified vehicles, motorsport is undergoing a revolution, as many automotive manufacturers are turning to motorsport as a marketing tool to publicly showcase their technological prowess, and accelerate the pace of development and innovation. This talk will outline how we adapt our F1 design philosophy to electric motorsport, the key differences between automotive and motorsport battery pack design using real examples, and a review of our continuous improvement process to use learning from race data to improve battery software and hardware design.

17:50 Q&A

18:20 Networking Reception with Exhibit & Poster Viewing

19:20 Close of Day

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Advanced High-Energy Battery Development for Bus, Truck, Bike, Rail and Marine Applications

THURSDAY, 1 FEBRUARY

7:30 Registration Open

8:00 Breakfast Roundtable Discussions (see website for details)

ADVANCED MATERIALS, DESIGN & ENGINEERING

9:00 Chairperson's Opening Remarks

Jens Groot, Ph.D., ESS Specialist – Cell Characterisation & Modelling, Electromobility Sub-systems, Volvo Group Trucks Technology (GTT) Advanced Technology & Research

9:05 A Modular Energy Storage Solution for Transit and Transportation

Tomasz Poznar, Ph.D., Vice President, Transportation, Ener1/EnerDel

In this presentation, EnerDel will present its next-generation chemistry and modular pack approach to providing energy storage for large transit vehicles. EnerDel products today power over 500 hybrid buses in North America, Korea, and Europe as well as a series of fully electric bus, truck and rail applications. This presentation will focus on the evolution from a HEV ESS chemistry to a BEV ESS chemistry, discussing chemistry, modular packaging, and thermal management systems.

9:25 Commercial Vehicle BMS Design Goals: Safety, Scalability & Costs

Stefan Goede, Managing Director Research & Development, Munich Electrification GmbH

The market for electric truck and special utility vehicles is expected to grow strongly. This talk presents challenges and opportunities for commercial vehicle battery management systems. Some questions to be discussed include: What are relevant BMS requirements for truck and other utility vehicles – can we just use standard BMSes from an electric passenger vehicle? ASIL B, C or D - how to apply ISO26262 correctly in commercial vehicle BMS development? We need flexible battery architectures which support cost-efficient and safe scalability – do we need a gateway ECU? Outlook: How does an ideal BMS for a mass-market utility vehicles look like?

9:45 Advanced Sealing Components for Lithium Batteries

Peter Kritzer, Ph.D., Senior Application Manager, Sales Automotive/E-mobility, Freudenberg Sealing Technologies

We will present an overview of innovative components for Li battery systems. Besides “seals”, we will also present new products for pressure and thermal management.

10:05 Lessons Learned after More Than Three Years in Battery Life Cycle Management

Dirk Spiers, President, Spiers New Technologies

What did we learn in Life Cycle Management after three years for some of the major OEMs? From remanufacturing to repurposing (second life) battery packs, everything has a place in a constantly evolving market. We will be talking about the importance of grading battery packs, sections and modules, case studies and best applications for repurposing battery packs.

10:25 Coffee Break with Exhibit & Poster Viewing

SPECIALTY EV MARKET DEMAND

11:10 Battery Development and Market Demand for Specialty Electric Vehicles

Axel Thielmann, Ph.D., Deputy Head, Competence Center for Emerging Technologies, Fraunhofer ISI

The talk will provide an overview on the development of key battery performance parameters and which battery technology will be suitable for upcoming EV applications such as buses, trucks, bikes, marine applications, etc. The current state of market demand and future prospects are assessed across the different applications in order to provide an overview of size and dynamics of these emerging markets until 2025/2030 and beyond.

11:30 Truck & Bus: Technologies Challenges of the Battery System to Meet Different Customer Needs

Alessandro Bernardini, Director, Alternative Traction & Electrification, Commercial Vehicles - Product Development, CNH Industrial

We'll share output of a few field activities and different real life testing experiences done by IVECO. We'll highlight some key performances for different kinds of commercial vehicles and different mission profile. The aim is to highlight some specific needs that are asking different development effort compared to passenger car industry.

11:50 The Future of Electric Busses – A Market and Technology Analysis

Markus Hackmann, Partner, E-Mobility, P3

The assessment of future market and technology developments as well as the associated business models for electric busses in the public transport sector is the focus of this contribution and will be described by a morphological analysis and resulting key findings for the three main factors electric powertrain, battery system and charging infrastructure.

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EV TECHNOLOGY FOR SPECIALTY & PUBLIC TRANSPORTATION

Advanced High-Energy Battery Development for Bus, Truck, Bike, Rail and Marine Applications

12:10 Towards High Performance Powertrain Solutions

Árpád Imre, Ph.D., Powertrain Systems Engineering, E-Mobility, Bosch Engineering GmbH

12:30 Q&A

12:40 Networking Lunch

13:25 Dessert Break with Exhibit & Poster Viewing

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SPECIALTY EV MARKET DEMAND (CONT.)

13:55 Chairperson's Remarks

Dirk Spiers, President, Spiers New Technologies

14:00 Specialty EV Market Overview and Related Battery Demand

Lorenzo Grande, Ph.D., Technology Analyst, IDTechEx

This presentation will provide an assessment of the state of market development of specialty electric vehicles, focusing on electric buses, electric trucks, electric mining vehicles, two wheelers and electric marine ships and vessels. We will provide an overview of the types and size of batteries (chemistry) that these types of vehicles are using. We will provide a 10 year forecast of these electric vehicle categories and a corresponding forecast of the battery demand for these categories.

14:20 Scalable Cell Module Design for EVs & Plug-Ins

Christian Brommer, Manager, Cluster Mechanical Engineering, Deutsche ACCUmotive

14:40 New Battery Technologies for Electric Vehicles - What Will We See on the Road?

Jens Tübke, Ph.D., Director, Applied Electrochemistry, Fraunhofer Institute for Chemical Technology

The talk will provide an overview of battery technologies that are currently under development and which might be suitable for use in vehicles. These different technologies are evaluated and their usability is shown for different mobile applications. In particular, suitable technologies are also discussed for niche applications such as specialty vehicles.

INFRASTRUCTURE, COMPLIANCE & REGULATION

15:00 13MW Charge Infrastructure in Amsterdam

Koen van Haperen, Business Development Manager, Heliox B.V.

The world's largest opportunity and depot charging network for 100 electric buses. What will the future bring us in charge power and what expectations are there from the heavy duty & industrial market?

15:20 Q&A

15:35 Refreshment Break

15:50 Closing Plenary Session (please see page 16 for details)

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AdvancedAutoBat.com/Europe

OFFICIAL MEDIA PARTNER



MEDIA PARTNERS



Register by
19 January
SAVE UP TO €200!

How to Register: AdvancedAutoBat.com/Europe
reg@cambridgeenertech.com | P: 781.972.5400 or Toll-free in the U.S. 888.999.6288

Please use keycode
AABEF when registering!

Pricing and Registration Information

COMMERCIAL

	4 Days	3 Days	2 Days	1 Day
Advance Rate Until 19 January	€2049	€1749	€1499	€999
Late Rate After 19 January	€2249	€1849	€1599	€1099

ACADEMIC/GOVERNMENT

	4 Days	3 Days	2 Days	1 Day
Advance Rate Until 19 January	€1499	€1299	€1099	€799
Late Rate After 19 January	€1599	€1349	€1149	€899

MONDAY 29 JANUARY	TUESDAY 30 JANUARY	WEDNESDAY 31 JANUARY	THURSDAY 1 FEBRUARY
R&D SYMPOSIA		CONFERENCE APPLICATION TRACKS	
Chemistry		Hybrid & Electric Vehicles	
Raw Materials			
Lead-Based			
Charging & Infrastructure	Engineering	Specialty & Public Transport EVs	
	Supercaps		
INTERACTIVE TUTORIALS		TRAINING SEMINARS	
Three Tutorials		Battery Safety & Abuse Tolerance Validation	Lithium-Ion Battery Cell and Pack Technology

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Gold Sponsors



Bronze Sponsor



29 JANUARY - 1 FEBRUARY 2018
CONGRESS CENTRUM MAINZ
MAINZ, GERMANY

ADDITIONAL REGISTRATION DETAILS

Group Discount

Groups of 4 or More (must register at the same time), 15% discount

Additional Registration Details

19% VAT will be added to each registration.

Save €150 by presenting a poster at AABC Europe

Register online and indicate that you would like to present a poster. Once your registration has been fully processed, we will send an email with a unique link and instructions for submitting your abstract using our online abstract submission tool. Poster abstracts are due by **15 December 2017**. Students* presenting a poster can attend AABC Europe for as little as €199. The Student* poster rate is not eligible for €150 poster discount. *Full-time graduate students including Masters and Ph.D. candidates are eligible for the student poster rate.

Want to Register by Phone?

Contact our Registration department at 781-972-5400 or Toll-free in the US 888-999-6288.

Ways to SAVE!

Group Discounts are Available! Special rates are available for multiple attendees from the same organization. For more information on group discounts contact Joseph Verange at 781-247-6263.

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