

FINAL DAYS TO REGISTER



22nd ANNUAL
advanced
automotive
battery
conference

FINAL AGENDA

DECEMBER 5-8, 2022 SAN DIEGO, CA | HOTEL DEL CORONADO



2022 PROGRAMS

SYMPOSIA



CHEMISTRY



ENGINEERING



HEAVY-DUTY



BATTERY
INTELLIGENCE



RECYCLING

CONFERENCES



XEV



RAW MATERIALS

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-  RECORDED SESSIONS
-  INTEGRATED SCHEDULER
-  POSTER SESSIONS



ROOM LOCATION: Cabana A/B Ballroom
TUT1: Technoeconomic Analysis

Instructor:
Thomas D. Gregory, Owner and Consultant, Borealis Technology Solutions LLC
This tutorial will cover factors that impact successful commercialization of battery materials, technological feasibility vs. economic practicality, market need/company capability intersection. As well as technoeconomic analysis methodology, focusing on the critical early stages of a project where product design and process chemistry and development occur amid significant technical and economic uncertainty.

ROOM LOCATION: Cabana C Ballroom

TUT2: Na-ion Batteries: Materials and State-of-Art (instructor will be presenting virtually)

Instructor:
Philipp Adelhelm, PhD, Professor, Institute of Chemistry, Humboldt University Berlin
Na-ion batteries (SIB) are rapidly developing as potential alternatives to complement Li-ion battery (LIB) technology. The energy densities of SIB are close to LIB but at the same time they avoid or reduce the amounts of many critical elements used for LIB. This tutorial gives an overview on Na-ion battery development with the focus on materials (anode, cathode) and electrolytes.

ROOM LOCATION: Cabana A/B Ballroom

TUT3: Design & Modeling (instructor will be presenting virtually)

Instructor:
Robert Spotnitz, PhD, President, Battery Design LLC
This seminar will provide of 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.

ROOM LOCATION: Point Loma A/B

TUT4: Lithium Metal Anodes: Benefits and Challenges to Batteries

Instructor:
Dee Strand, PhD, CSO, R&D, Wildcat Discovery Technologies, Inc.
This tutorial will cover energy density improvements with lithium metal anodes as well as key challenges: Formation of dendrites and high surface area lithium and SEI volume expansion during cycling and approaches to mitigate challenges in addition to solid vs liquid cells using lithium anodes and "Anode-free" approaches.

ROOM LOCATION: Mezzanine 1-3

TUT5: Materials For Next-Generation Batteries (instructor will be presenting virtually)

Instructor:
George Crabtree, PhD, Director, Joint Center for Energy Storage Research (JCESR), Argonne National Laboratory
This tutorial will cover the materials and performance challenges for next-generation batteries for electric vehicles and the electricity grid. The needs and use cases for storage in these two applications will be analyzed, and the possibilities of advanced lithium-ion, lithium-sulfur, and multivalent batteries for vehicles will be presented. Lithium and magnesium anodes, wide electrochemical window electrolytes, and high-voltage cathodes will receive special attention.

ROOM LOCATION: Ocean Ballroom

TUT6: The Rechargeable Battery Market: Value Chain and Main Trends 2022-2032

Instructors:
Olivier Noel, Senior Business Advisor, Avicenne Energy
Christophe Pillot, PhD, Director, Avicenne Energy
This tutorial will present the 10-year automotive market forecasts from Avicenne and other analysts (micro|Hybrid|P-HEV|EV). Other coverage will include car makers' strategies and advanced energy storage (advanced lead acid|supercap|NiMH|LIB). Additionally, LIB design for P-HEV & EV markets (cylindrical, prismatic, pouch|wounded, stacked, Z fold cells) and LIB cell, module & pack cost structure will be discussed.

ROOM LOCATION: Mezzanine 1-3

TUT7: Solid-State Batteries

Instructor:
Venkataraman Thangadurai, PhD, Professor, Chemistry, University of Calgary
In this tutorial lecture, the development of state-of-the-art solid state Li ion and Na ion electrolytes for all-solid state batteries with emphasise on ionic conductivity and chemical and electrochemical stabilities will be discussed.

ROOM LOCATION: Ocean Ballroom

TUT8: Battery Safety & Abuse Tolerance Validation

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

ROOM LOCATION: Point Loma A/B

TUT9: Li-ion Cell Design And Manufacturing: Processes, Equipment, and Quality Control

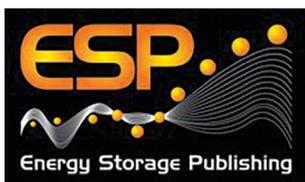
Instructor:
James Kaschmitter, CEO, SpectraPower LLC
This tutorial will begin with an overview of Li-ion cell design for performance and manufacturability, including contrasting the performance and characteristics of commonly used materials. The tutorial will then lead to a detailed review of Li-ion cell manufacturing from incoming raw materials through final cell formation, aging, and shipment.

ROOM LOCATION: Cabana C Ballroom

TUT10: Science & Economics for Second-Life Batteries

Instructors:
Steven Chung, CoFounder CEO, ReJoule
Jessica Dunn, PhD, Senior Analyst, Union of Concerned Scientists
Antoni Tong, CEO, Smartville, Inc.
Mary Ann Brown, Executive Director, Conferences, Cambridge Healthtech Institute
This interactive tutorial covers what's next for the battery when an electric vehicle (EV) comes off the road? As electric vehicles production grows exponentially, the strategies for second-life EV batteries repurposing and reuse must also expand. To enable widespread reuse of EV batteries policy, economics, and science all play an important role.

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ROOM LOCATION: Cabana A/B Ballroom

TUT11: In-Depth Analysis of the Chinese xEV Battery Industry – From Applications to Upstream Materials (instructor will be presenting virtually)

Instructor:

Mark H.L. Lu, PhD, Senior Industrial Analyst, Industrial Economics & Knowledge Center, Industrial Technology Research Institute

As the world's biggest EDV market, Chinese xEV industry has become the most important pioneering target. However, specially planned economy, localized regulations, and multiple business models exist and make the international companies' decision-making more difficult. Therefore, this tutorial will try to provide a whole picture of the Chinese EDV battery market including policies & regulation, future forecasts, competitive analysis, battery technology strategies, upstream supply chain, and positioning for foreign enterprises.

ROOM LOCATION: Cabana C Ballroom

TUT12: Improving the Energy Density of Batteries with Silicon-Based Anodes

Instructor:

Dee Strand, PhD, CSO, R&D, Wildcat Discovery Technologies, Inc.

The key challenges in use of silicon-based anodes as well as progress in implementation of silicon and what can we expect in the future. The latest improvements in other battery components required to maximize the benefit of silicon-based anodes.

ROOM LOCATION: Ocean Ballroom

TUT13: Battery Management Systems

Instructors:

Christianna N. Lininger, PhD, Application Engineer, Voltaiq, Inc.

Nicole Schauser, Battery Data Scientist, Voltaiq

This tutorial will cover machine learning and how it can be used in lifecycle prediction and anomaly detection. Also discussed is the critical need for battery data for intelligent machine learning algorithm development. In this vein, we present open-access battery data, and data science tools that will enable the battery community to develop innovative machine learning (ML) models to unlock the significant advances needed in battery yield, energy density, and lifetime that the industry is calling for."

ROOM LOCATION: Point Loma A/B

TUT14: Cell & Pack Design for xEVs

Instructor:

Kevin Konecky, Battery and Energy Storage Systems Consultant, Total Battery Consulting

This tutorial will give an overview of battery systems design. An overall product development process will be discussed for a typical system. Design aspects of each individual subsystem will be explored with cost impacts of different design choices. Testing, validation, and designing for safety will be other key areas of discussion.

ROOM LOCATION: Mezzanine 1-3

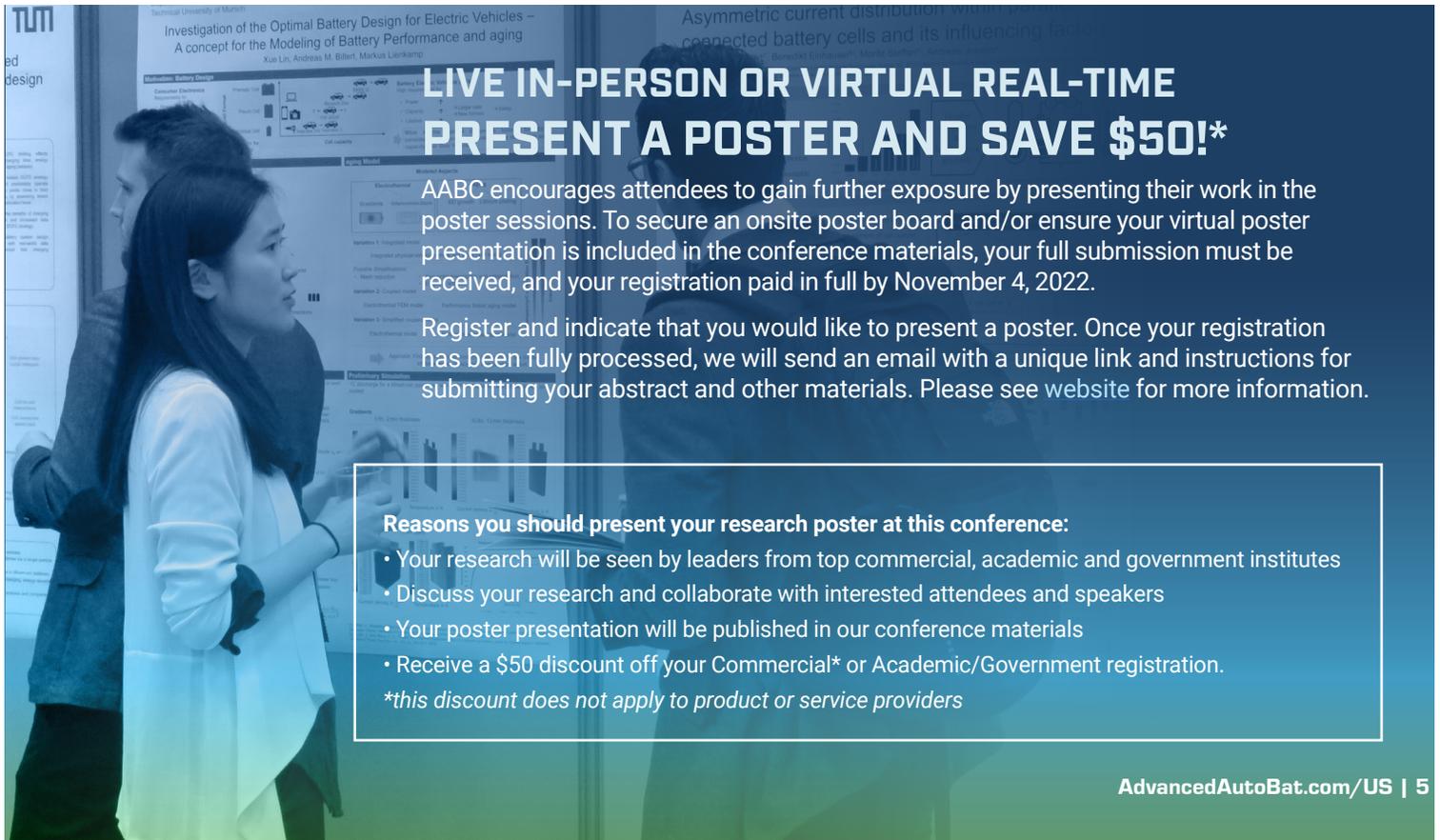
TUT15: Li-ion Battery Safety & Thermal Runaway

Instructor:

Ahmad A. Pesaran, PhD, Chief Energy Storage Engineer, National Renewable Energy Laboratory

This tutorial/seminar is provided by Dr. Ahmad Pesaran with 25+ years' experience in lithium-ion battery R&D&D including safety testing and modeling with perspectives of his participation at USABC Technical Advisory Committee. He will provide the audience with information and understanding needed to handle li-ion batteries safety in both their work at their companies and in products they deliver to the market.

* All Access or separate registration required for Tutorials



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Battery Chemistries for Automotive Applications

Recent Advancements in Battery Chemistries

MONDAY, DECEMBER 5

8:00 am - 4:30 pm Conference Tutorials

Choose from 15 tutorials to maximize your networking and educational opportunities

TUESDAY, DECEMBER 6

7:30 am Registration and Morning Coffee (Power Plant)

8:30 Organizer's Remarks

ROOM LOCATION: Ocean Ballroom
LITHIUM METAL ANODES

8:35 Chairperson's Remarks

Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

8:40 Li Metal Battery: Chemical and Thermal Stability

Hong Gan, PhD, CSO, Lithium Metal Rechargeable Batteries, SES AI Corp.

Lithium metal rechargeable battery is considered as next generation battery technology due to its higher energy density over the benchmark Li-ion battery technology. SES is pioneering in development and manufacturing of lithium metal battery technology and continuing improve the cell safety and electrochemical performance. The relationship of electrolyte formulation design and lithium metal cell thermal stability will be discussed.

9:00 Lithium Metal Anodes

Odysseas Paschos, PhD, Director, European Business, Wildcat Discovery Technologies

This talk will discuss energy density improvements with lithium metal anodes and the key challenges.

9:20 Three Strategies for Unlocking the Future of Solid-State Batteries

Alex Yu, PhD, Co-Founder and President, Factorial Energy

Factorial Energy is one of the key innovators in the battery field with its lithium metal solid-state batteries being among the most promising options for use in next-generation electric vehicles. Lithium metal solid-state cells behave uniquely therefore strategies are taken to address these challenges. The expected improved safety behavior allows rethinking battery cell/module/pack of future electric vehicles



9:40 MODERATED Q&A: Session Wrap-Up

Moderator: Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

Panelists:

Hong Gan, PhD, CSO, Lithium Metal Rechargeable Batteries, SES AI Corp.

Odysseas Paschos, PhD, Director, European Business, Wildcat Discovery Technologies

Alex Yu, PhD, Co-Founder and President, Factorial Energy

9:55 One D Battery Break Sponsor Intro

10:00 Grand Opening Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)



CATHODES AND APPLICATIONS

10:35 Chairperson's Remarks

Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

10:40 Cost Optimized Designs for EVs: Status and Outlook for Mn Rich Systems – Offering NMC-Like Energy Density at LFP-Like Cost

Michael Kruff, Global Director Applied Technology, Research & Technology Center, Umicore

Introduced 10 years ago as the ultimate option for high energy density systems,

Mn-rich cathode materials never made it to mass production. This was mainly due to intrinsic performance issues and better value proposition from competing chemistries Hi Nickel-based systems. The race towards more affordable vehicles, translated into lower US/kWh shed new light on these materials which appear to be very suitable candidate for cost-optimized designs.

11:00 Advanced Li-ion Batteries for Electric Vehicles

Wangmo Jung, PhD, Department Leader of Battery Materials, LG Energy Solution

LG Energy Solution has been leading the market and technology for long range electric vehicle, in particular, World's first application of NCM622 and NCMA as cathode material. Now we are expanding production capacity globally to meet customers' needs. For future EV's key values, mid Ni NCMA and Li/Mn-rich cathode materials are developed for cost and safety, as well as high Ni NCMA for high nergy density (driving range).

11:20 High Loading Cathode Electrodes with NMP/PVDF-Free Processing for High Energy Density EV Batteries

Ben Cao, Vice President of R&D, Nanoramic Laboratories

At Nanoramic we've developed Neocarbonix at the Core electrode technology that can achieve high loading (> 6 mAh/cm²) and coating speeds over 3X faster than conventional PVDF/NMP based cathode electrodes using the same slot-die coating machine set-up. This is possible by replacing PVDF binder and toxic NMP solvent used in conventional battery manufacturing, enabling EV batteries with higher energy density (~900 Wh/L) and lower costs while maintaining high-power & fast-charging performance.



11:40 MODERATED Q&A: Session Wrap-Up

Moderator: Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

Panelists:

Michael Kruff, Global Director Applied Technology, Research & Technology Center, Umicore

Wangmo Jung, PhD, Department Leader of Battery Materials, LG Energy Solution

11:55 Ascend Elements Luncheon Sponsor Intro

12:00 pm Networking Lunch (Southpointe Lawn)

SOLID-STATE BATTERIES



12:55 Chairperson's Remarks

Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

1:00 All Solid-State Batteries – Chemistry, Electrochemistry, and Mechanical Concerns

Shirley Meng, PhD, Professor, University of Chicago; Chief Scientist, Argonne Collaborative Center for Energy Storage Science, Argonne National Laboratory

Lithium (Li) metal has been considered an ideal anode for high-energy rechargeable Li batteries while Li nucleation and growth at the nanoscale remains mysterious as to achieving reversible stripping and deposition. A few decades of research have been dedicated to this topic and we have seen breakthroughs in novel electrolytes (liquid or solid) in the last few years, where the efficiency of lithium deposition is exceeding 99.6%.

1:20 Enabling High-Rate Lithium Metal Anodes by Tailored Structures and Interfaces

Eric D. Wachsman, PhD, Professor & Director, Materials Science & Engineering, University of Maryland College Park

Solid-state Li-batteries are a transformational and safe energy storage solution due to their non-flammable ceramic electrolyte that enables the use of Li metal anodes and high voltage cathodes. However, progress has been limited due to electrode/electrolyte interfacial issues, concerns over dendrites, and the requirement for elevated temperature and high stack pressure. To eliminate these concerns a rational design of tailored structures and interfaces will be presented.

1:40 Solid-State Lithium Metal Batteries for EVs

William Hudson, PhD, Vice President of Product, QuantumScape

Advances in battery technology are critical for improving electric vehicle performance in order to enable mass-market adoption of zero-emissions vehicles. QuantumScape developed the industry's first anode-free cell – using a nonflammable, noncombustible solid-state separator – designed to simultaneously extend driving range, charge faster, and operate more safely than today's EVs.

2:00 MODERATED Q&A: Session Wrap-Up

Moderator: Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

Panelists:

Shirley Meng, PhD, Professor, University of Chicago; Chief Scientist, Argonne Collaborative Center for Energy Storage Science, Argonne National Laboratory

Eric D. Wachsman, PhD, Professor & Director, Materials Science & Engineering, University of Maryland College Park

William Hudson, PhD, Vice President of Product, QuantumScape

2:15 Sabic Break Sponsor Intro

2:20 Refreshment Break in the Exhibit Hall with Poster Viewing (Southpointe Center)



ELECTRODES

2:55 Chairperson's Remarks

Venkat Srinivasan, PhD, Director, Center for Collaborative Energy Storage Science, Argonne National Laboratory

3:00 Liquefied Gas Electrolytes for Next-Generation EV Batteries

Cyrus S. Rustomji, Founder & CEO, South 8 Technologies

South 8 Technologies is developing a novel liquefied gas electrolyte for lithium batteries. These electrolytes are a platform technology to develop a variety of next-generation high-energy electrode chemistries to achieve >400 Wh/kg and have demonstrated significant safety improvements with the elimination of thermal runaway while maintaining excellent cycle life and temperature operation. South 8 has started sampling cylindrical cells to Tier 1 automotive and cell manufacturing groups.

3:20 Single Crystal Ni-Rich Cathode: Synthesis, Scaleup, and Validation

Jie Xiao, PhD, Battelle Fellow, Pacific Northwest National Laboratory

Single crystalline Ni-rich cathode has a great potential to address the challenges present in its polycrystalline counterpart by reducing phase boundaries and materials surfaces. However, synthesis of high-performance single crystalline Ni-rich cathode is very challenging, not mentioning a fundamental linkage between over-potential, microstructure, and electrochemical behaviors in single crystalline Ni-rich cathodes. This talk will explore cost-effective synthesis approaches for industry manufacturing and propose validation strategies for Ni-rich single crystals.

3:40 Lithium-Sulfur Cell Chemistry Unlocked by 3D Graphene for Next-Generation Energy Storage

Karel Vanheusden, Vice President, Product Development, Lyten

The lithium-ion battery market is running into insurmountable constraints related to mineral resources and performance improvements. For decades, lithium-sulfur cell chemistry has been pursued as the best low-cost high-performance alternative, but no company has managed to commercialize them.

Lyten has been developing 3-dimensional graphene to significantly improve battery performance at the fundamental materials level. When formulated into lithium-sulfur cells, they provide enhanced performance and unlock the potential of lithium-sulfur energy storage.

4:00 MODERATED Q&A: Session Wrap-Up

Moderator: Venkat Srinivasan, PhD, Director, Center for Collaborative Energy Storage Science, Argonne National Laboratory

Panelists:

Cyrus S. Rustomji, Founder & CEO, South 8 Technologies

Jie Xiao, PhD, Battelle Fellow, Pacific Northwest National Laboratory

Karel Vanheusden, Vice President, Product Development, Lyten

ANODES

4:15 Chairperson's Remarks

Shirley Meng, PhD, Professor, University of Chicago; Chief Scientist, Argonne Collaborative Center for Energy Storage Science, Argonne National Laboratory

4:20 Powering the EV Revolution – Reimagining the Future of Batteries

Jerry W. Schwartz, JD, LLM, Founder & Chairman & CEO, Ecellix, Inc.

Ecellix has created a breakthrough silicon anode material called eCell that enables next-gen Li-ion batteries ("Lithium Next"). EV battery packs incorporating eCell's 100% Si active materials will benefit from 30% increased energy capacity for extended range and significant reductions in pack volume/weight. Produced with a 2-step proprietary scalable process with inexpensive commodity materials, eCell is a true drop-in replacement for graphite positioned to be the price leader in anode materials.

4:40 Replacing Graphite with Sila's Silicon: Shipping and Validating Today

Kurt Kelty, Vice President, Automotive, Sila Nanotechnologies, Inc.

Kurt Kelty, Sila's VP of Commercialization, will discuss how innovative drop-in-replacement nanocomposite, silicon-based anode powder enables up to 20% more energy density today over state-of-the-art lithium-ion cells with graphite, without performance compromise. This material is not only shipping today but it is ready to scale to meet larger demand and power EVs by the middle of this decade.

5:00 Binder Networking Made Easy: Drop-In Cross-Linker Additives for Silicon Containing Anodes

Manuel Wieser, Head of Energy Business, AnteoTech

Anode chemistry is rapidly evolving with anodes featuring silicon/carbon composites, silicon oxide and micro-silicon all being considered as potential pathways to boost capacity. The integrity of the anode network is largely facilitated by the binder, which plays an even greater role with more silicon being incorporated. AnteoTech offers unique cross-linker additives (ANTEO X), for pairing with conventional and advanced water-based binders, that improve the performance of silicon containing anodes.

5:20 Sponsored Presentation (Opportunity Available)

5:40 MODERATED Q&A: Session Wrap-Up

Moderator: Shirley Meng, PhD, Professor, University of Chicago; Chief Scientist, Argonne Collaborative Center for Energy Storage Science, Argonne National Laboratory

Panelists:

Jerry W. Schwartz, JD, LLM, Founder & Chairman & CEO, Ecellix, Inc.

Kurt Kelty, Vice President, Automotive, Sila Nanotechnologies, Inc.

Manuel Wieser, Head of Energy Business, AnteoTech

5:55 Clarios Networking Reception Sponsor Intro

6:00 Welcome Reception in the Exhibit Hall with Poster Viewing (Southpointe Center)



7:00 Close of Day

WEDNESDAY, DECEMBER 7

7:45 am Registration and Morning Coffee (Power Plant)

8:00 Interactive Roundtable Discussions

Roundtable discussions are informal, moderated discussions with brainstorming and interactive problem-solving, allowing participants from diverse backgrounds to exchange ideas and experiences and develop future collaborations around a focused topic.

TABLE 1: Innovations in Recycling Battery Materials & Second Life

Moderator: Steven E. Sloop, President, OnTo Technology LLC

TABLE 2: Battery Cost vs CO2 Footprint & Lifetime Warranty – What Will the Proposed Legislation Bring?

Moderator: Wenzel Prochazka, Senior Product Manager, Battery Systems, AVL

List GmbH

TABLE 3: High Percentage Silicon-Content Anodes and Cells

Moderator: Benjamin Park, PhD, Founder & CTO, Enevate

TABLE 4: Li-ion NMC Fast Charging New Cells for E-Mobility

Moderator: Shmuel De-Leon, CEO, Shmuel De-Leon Energy, Ltd. **TABLE 5: Battery Raw Materials Supply Chain**

Moderator: Rob Privette, Business Development Manager, North America, Umicore

TABLE 6: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President of Battery Solutions, ESource

TABLE 7: Battery Pack System Cost and Safety – Will Future xEV Battery Packs Increase in Complexity or Simplify and How Will Cost and Safety Be Impacted?

Moderator: Kevin Konecky, Battery and Energy Storage Systems Consultant, Total Battery Consulting

TABLE 8: Cathode Materials, Technology, & Development

Moderator: Carl Thoemmes, Business Development, Koura

ROOM LOCATION: Ocean Ballroom

NOVEL CELL AND ELECTRODE DESIGN

8:55 Chairperson's Remarks

Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

9:00 Unlocking Silicon – Controlling Expansion

Surya Moganty, PhD, CSO, Sionic Energy

The main obstacle with the use of silicon is that in reaction with lithium during charging it expands over 300% in volume, which heavily damages the battery life. Our patented anode architecture combined with proprietary electrolyte design produce an expansion-controlled silicon-based Li-ion battery with a long lifespan. This talk will showcase the multilayer pouch cell (Si-811) performance data.

9:20 100% Active Silicon Anode Battery

Ashok Lahiri, CTO, ENOVIX Corp.

Enovix is the leader in advanced silicon-anode lithium-ion battery development and production. This presentation will describe the company's 3D cell architecture which enables the use of an anode that is 100% active silicon anode and mitigates the traditional problems experienced with silicon in lithium-ion batteries: volume expansion, formation lithium loss, and break-up of silicon during cycling leading to poor cycle life.

9:40 Vertically Aligned Carbon Nanotubes, 3D Nanotechnology to Improve Lithium Battery Fast Charge

NAWA TECHNOLOGIES

Pascal Boulanger, PhD, MBA, CTO and Company Founder, Research and Innovation, NAWA Technologies

Vertically Aligned carbon nanotubes are a fantastic material for ultra-fast electrodes. NAWA has unlocked the industrial manufacturing of VACNT to make it available for the lithium battery industry. Combining high energy density with ultra-fast charging capability, NAWA's revolutionary electrodes would allow for fast charging EVs. Conference aims at presenting latest scientific updates based on NAWA Technologies research.

10:00 MODERATED Q&A: Session Wrap-Up

Moderator: Martin Winter, PhD, Director & Professor, Electrochemical Energy Technology, University of Muenster

Panelists:

Surya Moganty, PhD, CSO, Sionic Energy

Ashok Lahiri, CTO, ENOVIX Corp.

8:00 Presentation to be Announced

10:15 Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)

10:45 Close of Symposium & Transition to the Plenary Keynote Program

ROOM LOCATION: Ocean Ballroom

PLENARY KEYNOTE

10:45 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

10:50 General Motors ULTIUM Architecture & Value Chain Overview

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

General Motors believes in an all-electric future and plans to launch 30 new EVs by 2025 leveraging the innovative Ultium Platform, GM's next-generation BEV architecture. Tim will present the Ultium Architecture, deep dive the Cadillac Lyriq embodiment, and discuss the battery value chain securing, scaling and sustaining our cell supply.

11:10 Battery Materials – Managing the Risk and Creating Opportunity

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

OEMs worldwide have committed to unprecedented investments in the transition to clean transportation and renewable energy. There is a clear realization that materials, and battery materials in particular, will be the key enabler to success in these endeavors. The scale required for a comprehensive move to electric vehicles means rethinking virtually every aspect of the battery supply chain from material mining and processing to manufacturing scrap and spent battery recycling.

11:30 The Battery Imperative – The Challenges of Building a Sustainable and Competitive Advanced Battery Industry in the U.S. and Why It Needs to Happen

Craig Rigby, Vice President, Technology, Clarios

The long-awaited growth in EV adoption is finally happening and, in parallel, the need for advanced battery technology in energy storage applications is accelerating at an unprecedented pace. This talk will focus on challenges across the value chain as well as some ways they can be addressed to position the country for long-term, sustainable manufacturing, and technology leadership.

11:50 Panasonic's LIB Technology Evolution

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

Panasonic has continuously evolved its lithium-ion battery technology over the past 30 years. This is not the history of Panasonic, but the history of accumulating technological development with various equipment manufacturers and material supply chains. Now that we have entered a new growth period for xEVs. In order to achieve their essential objective, Panasonic as a cell manufacturer needs to change the axis of direction of the technology development.

12:10 pm MODERATED Q&A: Session Wrap-Up

Moderator: Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

Panelists:

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

Craig Rigby, Vice President, Technology, Clarios

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

12:25 USABC & National Instruments Luncheon Sponsor Intro

12:30 Networking Lunch (Southpointe Lawn)

1:15 Dessert Break in the Exhibit Hall with Poster Viewing (Southpointe Center)





ENGINEERING

SYMPOSIUM

Battery Engineering for Automotive Applications

Building Better Batteries

December 6-7, 2022 | San Diego, CA & Online (PST)

MONDAY, DECEMBER 5

8:00 am - 4:30 pm Conference Tutorials

Choose from 15 tutorials to maximize your networking and educational opportunities

TUESDAY, DECEMBER 6

7:30 am Registration and Morning Coffee (Power Plant)

8:30 Organizer's Remarks

ROOM LOCATION: Point Loma A/B

PREVENTING THERMAL RUNAWAY

8:35 Chairperson's Remarks

Rohit Bhagat, PhD, Professor, Centre Director for Centre for E-Mobility and Clean Growth Research, Coventry University UK

8:40 Advanced Automotive Battery Diagnostics

Rohit Bhagat, PhD, Professor, Centre Director for Centre for E-Mobility and Clean Growth Research, Coventry University UK

Advanced battery diagnostics are key to understanding battery state and residual value for second-life applications. At Coventry University we are developing advanced diagnostic methods based on impedance spectroscopy and embedded sensors. This allows for rapid assessment of batteries as compared to conventional methods such as capacity measurement. Here we also present our work done in collaboration with LEVC under an Advanced Propulsion Centre-funded project.

9:00 Influence of Aging and Abuse Methods on Thermal Runaway Behavior of Cylindrical LIB

Sebastian Ohneseit, Group Batteries Calorimetry and Safety, Institute for Applied Materials – Applied Materials Physics (IAM-AWP), Karlsruhe Institute of Technology (KIT)

New and aged cylindrical type 21700 cells with different chemistries, such as NMC, NCA and LFP have been studied in thermal runaway investigations by means of accelerating rate calorimetry. Mechanical and thermal abuse on new cells was compared for different states of charge. Depending on the active material, the aging behavior and thermal runaway performance, as well as critical temperatures, are different and will be described.

9:20 Thermal Runaway Detection with Multiple Diagnostic Strategies

Loraine Torres-Castro, PhD, Senior Technical Staff, Power Sources R&D, Sandia National Labs

This talk details a collaborative project between Sandia and Idaho National Laboratories to develop a diagnostic demonstration platform. As part of this, we describe the development and operation of a tool used to integrate battery failure diagnostics into battery modules and attempt to detect induced failures with various diagnostic tools. As a secondary goal we look to evaluate the ability of various diagnostic strategies to detect and arrest battery failure.

9:40 MODERATED Q&A: Session Wrap-Up

Moderator: Rohit Bhagat, PhD, Professor, Centre Director for Centre for E-Mobility and Clean Growth Research, Coventry University UK

Panelists:

Sebastian Ohneseit, Group Batteries Calorimetry and Safety, Institute for Applied Materials – Applied Materials Physics (IAM-AWP), Karlsruhe Institute of Technology (KIT)

Loraine Torres-Castro, PhD, Senior Technical Staff, Power Sources R&D, Sandia National Labs

9:55 One D Battery Break Sponsor Intro

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



MATLAB BATTERY MANAGEMENT SYSTEMS

10:35 Chairperson's Remarks

Rohit Bhagat, PhD, Professor, Centre Director for Centre for E-Mobility and Clean Growth Research, Coventry University UK

10:40 A MATLAB Physics-Based Lithium-ion Battery Toolbox, Part I: Developing and Simulating Models of Lithium-ion Battery Cells

Gregory L. Plett, PhD, Professor, Electrical & Computer Engineering, University of Colorado, Colorado Springs

Future BMS will use physics-based models (PBMs) of Li-ion cells instead of the presently used equivalent-circuit models because PBMs can enable controlling batteries to effect a direct physically meaningful tradeoff between performance and service life. However, PBMs are mathematically complicated and difficult to formulate and use. This talk will introduce an open-source toolbox of MATLAB code that facilitates developing and simulating PBMs of Lithium-ion battery cells.

11:00 A MATLAB Physics-Based Lithium-ion Battery Toolbox, Part II: State Estimation and Control

Scott Trimboli, PhD, Associate Professor, Electrical & Computer Engineering, University of Colorado, Colorado Springs

Accurate and reliable electric vehicle battery management is crucial for safe and effective operation, especially considering today's high-performance systems. Reduced-complexity battery models and advanced estimation and control algorithms have the potential to improve battery performance and extend life. This presentation introduces an open-source MATLAB-based toolbox companion to the soon-to-be released "Battery Management Systems Volume III: Physics Based Methods" which allows the user to experiment with new techniques.

11:20 Solid State Battery Technology Breakthrough, Commercialization, and Highlights of ProLogium



Dmitry Belov, Dr., Chief Scientist, ProLogium Technology

As EV demand growing, the industry is seeking the next generation battery and solid state battery is considered the most promising one due to high safety, high energy density and low cost advantages. In this talk, ProLogium will highlight its enabling solid state battery technology progress, competitiveness with peers and the omni solution for commercializing EV application.

11:40 MODERATED Q&A: Session Wrap-Up

Moderator: Rohit Bhagat, PhD, Professor, Centre Director for Centre for E-Mobility and Clean Growth Research, Coventry University UK

Panelists:

Gregory L. Plett, PhD, Professor, Electrical & Computer Engineering, University of Colorado, Colorado Springs

Scott Trimboli, PhD, Associate Professor, Electrical & Computer Engineering, University of Colorado, Colorado Springs

11:55 Ascend Elements Luncheon Sponsor Intro

12:00 pm Networking Lunch



BATTERY MANAGEMENT SYSTEMS

12:55 Chairperson's Remarks

Chris Mi, PhD, Distinguished Professor, Electrical & Computer Engineering, San Diego State University

1:00 Model-Based BMS for Lithium-ion Batteries – From Cells to Packs and Modules

Manan Pathak, PhD, Co-Founder & CEO, BattGenie, Inc.

Using model-based control strategies, we have developed optimal charging protocols to minimize the capacity fade due to SEI-layer formation, lithium-plating, and intercalation-induced stresses, while controlling internal temperatures inside the batteries. In collaboration with NREL, we have shown increase in cycle-life by more than 100%. We will present further results for faster charging and improved battery life on 2.2kWh battery modules.

1:20 Develop a New Generation of Battery Management Systems for the Future Solid-State Lithium-ion Batteries

Chris Mi, PhD, Distinguished Professor, Electrical & Computer Engineering, San Diego State University

The life cycle of the solid-state battery may be much lower than the current battery. Hence, a new generation of the battery management system is needed to manage the future solid-state Lithium-ion batteries that can handle the high cell voltage and optimize the life cycle.

1:40 What is the Minimum Battery Management System Needed Inside an Automotive Best-in-Class EV Battery Pack?

Stefan Goede, Head of Research & Development, Co-Founder, Munich Electrification GmbH

How many BMS and E/E components are needed to make a best-in-class battery pack safe and reliable while keeping the system lean and its BOM items minimal? In our talk we'll look into actuators for switching and fusing, electronics for sensing and processing power needs as well as mechanical integration opportunities.

2:00 MODERATED Q&A: Session Wrap-Up

Moderator: Chris Mi, PhD, Distinguished Professor, Electrical & Computer Engineering, San Diego State University

Panelists:

Venkat R. Subramanian, PhD, Ernest Dashiell Cockrell Chair Engineering & Professor, Mechanical & Materials Science Engineering, University of Texas Austin

Stefan Goede, Head of Research & Development, Co-Founder, Munich Electrification GmbH

2:15 Sabic Break Sponsor Intro

2:20 Refreshment Break in the Exhibit Hall with Poster Viewing



CHARGING

2:55 Chairperson's Remarks

Chris Mi, PhD, Distinguished Professor, Electrical & Computer Engineering, San Diego State University

3:00 Extreme Fast Charging

Sangwook Kim, PhD, Staff Scientist, Energy Storage Technology, Idaho National Laboratory

Fast charging can readily lead to early cell failure and reduced performance. The ability to use cell parameters for the development of advanced charge protocols provides an opportunity to tailor both the time and energy accepted to specific needs while minimizing degradation. During this talk, advanced protocols and analysis including the use of machine learning to identify failure modes and predict performance will be discussed.

3:20 Ultra Power Dynamic Charging System for EV

Takamitsu Tajima, Chief Engineer, EV Development, Honda R&D Co. Ltd.

This presentation details a dynamic charging system, achieving an unlimited EV cruising range by charging the EV at high power during cruising. This system would help make it possible to finish battery charging in a short time by contact with the EV while cruising and enable drivers to freely cruise their intended routes after charging.

3:40 Are Solid-State Batteries Safe?

Alex Bates, PhD, Energy Storage Safety & Reliability, Sandia National Laboratories

Solid-state batteries (SSBs) offer the potential for a safer and high energy density alternative to conventional Li-ion batteries (LIBs), achieved through the replacement of flammable LE with a non-flammable solid electrolyte and enabling Li-metal as an anode. A major challenge facing SSBs is interfacial resistance. This challenge may be resolved through the use of LE. However, LE use raises concerns over safety impact. Additionally, ASSB safety is taken for granted.

4:00 MODERATED Q&A: Session Wrap-Up

Moderator: Chris Mi, PhD, Distinguished Professor, Electrical & Computer

Engineering, San Diego State University

Panelists:

Sangwook Kim, PhD, Staff Scientist, Energy Storage Technology, Idaho National Laboratory

Takamitsu Tajima, Chief Engineer, EV Development, Honda R&D Co. Ltd.

Alex Bates, PhD, Energy Storage Safety & Reliability, Sandia National Laboratories

4:20 Presentation to be Announced

4:35 Chairperson's Remarks

Benno Leuthner, General Manager, CUSTOMCELLS Group

4:40 Validation of Plastic Current Collectors

Eric C. Darcy, PhD, Battery Technical Discipline Lead, Power Systems, NASA Johnson Space Center

Tests were performed inside our fractional thermal runaway calorimeter to quantify the heat transferred and its distributions and those runs done at a synchrotron yielded fascinating very high speed X-ray videography. These show tolerance to nail penetration and activation of defect internal shorts and when thermally forced into thermal runaway, the heat output is significantly reduced.

5:00 Multifunctional Energy Storage Composite Structures for EV Applications

Fu-Kuo Chang, PhD, Professor, Aeronautics & Astronautics, Stanford University

We developed a new innovative battery assembly technique to integrate composite structures with Li-ion batteries to substantially reduce the overall system weight while maintaining the energy capacity. Ultrasonic sensors are also embedded inside the structures to monitor the health of the batteries (SOH) as well as structures (SHM) during operation remotely or in demand.

5:20 Revolutionize Battery Design with Intelligent Chip-on-Cell Battery Monitoring



Carlton Brown, Vice President Global Product Management, Dukosi

By applying intelligent chip-on-cell battery management technology with near-field wireless communication, enable a wireless cell-to-pack architecture without the space otherwise needed for line-of-sight communication, measure with the highest accuracy and data granularity, do so while electrically isolated from the high voltage domain, synchronize measurements of all cells, and utilize on-cell computing for better algorithm performance. Plus, substantially reduce the number of wires and connectors compared to a conventional BMS.

5:40 MODERATED Q&A: Session Wrap-Up

Moderator: Benno Leuthner, General Manager, CUSTOMCELLS Group

Panelists:

Eric C. Darcy, PhD, Battery Technical Discipline Lead, Power Systems, NASA Johnson Space Center

Fu-Kuo Chang, PhD, Professor, Aeronautics & Astronautics, Stanford University

Carlton Brown, Vice President Global Product Management, Dukosi

5:55 Clarios Networking Reception Sponsor Intro

6:00 Welcome Reception in the Exhibit Hall with Poster Viewing



7:00 Close of Day

WEDNESDAY, DECEMBER 7

7:45 am Registration and Morning Coffee (Power Plant)

8:00 Interactive Roundtable Discussions

Roundtable discussions are informal, moderated discussions with brainstorming and interactive problem solving, allowing participants from diverse backgrounds to exchange ideas and experiences and develop future collaborations around a focused topic.

TABLE 1: Innovations in Recycling Battery Materials & Second Life

Moderator: Steven E. Sloop, President, OnTo Technology LLC

TABLE 2: Battery Cost vs CO2 Footprint & Lifetime Warranty – What Will the

Proposed Legislation Bring?

Moderator: Wenzel Prochazka, Senior Product Manager, Battery Systems, AVL List GmbH

TABLE 3: High Percentage Silicon-Content Anodes and Cells

Moderator: Benjamin Park, PhD, Founder & CTO, Enevate

TABLE 4: Li-ion NMC Fast Charging New Cells for E-Mobility

Moderator: Shmuel De-Leon, CEO, Shmuel De-Leon Energy, Ltd. **TABLE 5: Battery Raw Materials Supply Chain** Moderator: Rob Privette, Business Development Manager, North America, Umicore

TABLE 6: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President of Battery Solutions, ESource

TABLE 7: Battery Pack System Cost and Safety – Will Future xEV Battery Packs Increase in Complexity or Simplify and How Will Cost and Safety Be Impacted?

Moderator: Kevin Konecky, Battery and Energy Storage Systems Consultant, Total Battery Consulting

TABLE 8: Cathode Materials, Technology, & Development Moderator: Carl Thoemmes, Business Development, Koura

ROOM LOCATION: Point Loma A/B BATTERY DEVELOPMENT

8:00 Interactive Roundtable Discussions

8:55 Chairperson's Remarks

Benno Leuthner, General Manager, CUSTOMCELLS Group

9:00 Creating Impact-Resistant Electrolytes

Sergiy Kalnaus, Research Scientist, Computational Engineering & Energy Sciences, Oak Ridge National Lab

Battery pack design requires substantial protective measures to keep physical separation between the electrodes of opposite polarity under external impact to avoid short circuit. We demonstrate that the addition of inert nanoparticles to a standard liquid electrolyte creates a shear thickening electrolyte which stiffens upon the application of external dynamic load. Such electrolyte prevents the electrodes from shorting and returns to the liquid state once the load is removed.

9:20 Development of High-Performance Automotive Battery Cells in Theory and Practice

Benno Leuthner, General Manager, CUSTOMCELLS Group

The transfer of theoretical approaches from research to development has a number of stumbling blocks for lithium-ion cells that can be avoided. This talk addresses core elements and lessons learned for this. These points are based on high development speed, market access to materials, technology knowledge, experience and the courage to try out new technologies and bring them into mass production.

9:40 Next-Generation Thermal Management Materials for EV Battery Packs

Anurodh Tripathi, PhD, Business Development Manager, Parker Lord

In the last decade, advancements in battery technologies of electric vehicles has improved the design and simplified manufacturing with the goal of reducing weight and enhancing battery pack energy density. During this session, I will discuss these changes in battery design and the associated market trends for thermal management solutions in EV battery packs. Insights, data and real-world testing will be presented.

10:00 MODERATED Q&A: Session Wrap-Up

Moderator: Benno Leuthner, General Manager, CUSTOMCELLS Group

Panelists:

Sergiy Kalnaus, Research Scientist, Computational Engineering & Energy Sciences, Oak Ridge National Lab

Anurodh Tripathi, PhD, Business Development Manager, Parker Lord

8:00 Presentation to be Announced

10:15 Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)

10:45 Close of Symposium & Transition to the Plenary Keynote Program

ROOM LOCATION: Ocean Ballroom PLENARY KEYNOTE

10:45 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

10:50 General Motors ULTIUM Architecture & Value Chain Overview

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

General Motors believes in an all-electric future and plans to launch 30 new EVs by 2025 leveraging the innovative Ultium Platform, GM's next-generation BEV architecture. Tim will present the Ultium Architecture, deep dive the Cadillac Lyriq embodiment, and discuss the battery value chain securing, scaling and sustaining our cell supply.

11:10 Battery Materials – Managing the Risk and Creating Opportunity

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

OEMs worldwide have committed to unprecedented investments in the transition to clean transportation and renewable energy. There is a clear realization that materials, and battery materials in particular, will be the key enabler to success in these endeavors. The scale required for a comprehensive move to electric vehicles means rethinking virtually every aspect of the battery supply chain from material mining and processing to manufacturing scrap and spent battery recycling.

11:30 The Battery Imperative – The Challenges of Building a Sustainable and Competitive Advanced Battery Industry in the U.S. and Why It Needs to Happen

Craig Rigby, Vice President, Technology, Clarios

The long-awaited growth in EV adoption is finally happening and, in parallel, the need for advanced battery technology in energy storage applications is accelerating at an unprecedented pace. This talk will focus on challenges across the value chain as well as some ways they can be addressed to position the country for long-term, sustainable manufacturing, and technology leadership.

11:50 Panasonic's LIB Technology Evolution

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

Panasonic has continuously evolved its lithium-ion battery technology over the past 30 years. This is not the history of Panasonic, but the history of accumulating technological development with various equipment manufacturers and material supply chains. Now that we have entered a new growth period for xEVs. In order to achieve their essential objective, Panasonic as a cell manufacturer needs to change the axis of direction of the technology development.

12:10 pm MODERATED Q&A: Session Wrap-Up

Moderator: Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

Panelists:

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

Craig Rigby, Vice President, Technology, Clarios

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

12:25 USABC & National Instruments Luncheon Sponsor Intro

12:30 Networking Lunch (Southpointe Lawn)

1:15 Dessert Break in the Exhibit Hall with Poster Viewing (Southpointe Center)





EV Technology for Heavy-Duty Applications

Commercializing Advanced High-Energy Batteries and Infrastructure for HEVs

MONDAY, DECEMBER 5

8:00 am - 4:30 pm Conference Tutorials

Choose from 15 tutorials to maximize your networking and educational opportunities

TUESDAY, DECEMBER 6

7:30 am Registration and Morning Coffee (Power Plant)

8:30 Organizer's Remarks

ROOM LOCATION: Mezzanine 1-3
OEM MARKET EXPANSION

8:35 Chairperson's Remarks

Leslie Goodbody, Engineer, California Air Resources Board

8:40 Revisiting the Safety of Lithium-ion Batteries

Maher El-Kady, Dr., CTO and Co-Founder, Nanotech Energy

Lithium-ion batteries have transformed the way society uses energy, but they are extremely sensitive to high temperatures and are inherently flammable. Nanotech Energy is producing improved batteries featuring new electrode materials and electrolytes that are competitive in both available energy density and safety. With their excellent performance, Nanotech batteries can be used in a variety of applications without the need for complex and expensive active and passive safety systems.



9:00 Battery Technologies for Electrified Class-8 Heavy Duty Trucks

Roger Gerson, Director, Engineering & Battery Line Architect, Battery Systems, Cummins Battery Systems North America

The likelihood that all vocations of class-8 heavy duty truck converge on a single model for electrification remains uncertain as multiple technologies compete for market position. Considering the rapid rate of advance in low-carbon combustion fuels, fuel cells, and batteries, the possibility of a fragmented market space taking hold short-term appears the likely outcome as these technologies continue to mature. All three technologies will include battery as critical component.

9:20 Battery Development at Volta for Heavy Duty Truck Applications

Joshua Goldman, Head of U.S. Product Strategy, Volta Trucks

The Volta Zero is a purpose-built full-electric 16-tonne/Class 7 vehicle designed for urban logistics, reducing the environmental impact of freight deliveries in city centres. Designed from the ground up with an operating pure-electric range of 150 – 200 kms (95 – 125 miles). The Volta Zero was designed for electric from the outset, using Proterra batteries and Meritor eAxle, which facilitates improvements in vehicle, driver, and pedestrian safety.

9:40 MODERATED Q&A: Session Wrap-Up

Moderator: Leslie Goodbody, Engineer, California Air Resources Board

Panelists:

Roger Gerson, Director, Engineering & Battery Line Architect, Battery Systems, Cummins Battery Systems North America

Joshua Goldman, Head of U.S. Product Strategy, Volta Trucks

9:55 One D Battery Break Sponsor Intro

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



10:35 Chairperson's Remarks

Leslie Goodbody, Engineer, California Air Resources Board

10:40 Is the Future of Construction Machines Electric?

David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

The days of operating large diesel engine-powered construction vehicles are numbered. OEMs are seeing this demand, and a growing number of electric commercial construction machines are becoming available. Alongside exhaust

CO2 emission reductions, electrification offers other co-benefits which include local air quality improvement and reduced noise, that could transform the worksite environment.

MANAGING HEAVY DUTY FLEETS

11:00 Future-Proof Technology To Meet Demands of Heavy Duty Vehicles

Andre Gronke, Head of Overseas Engineering, Farasis Energy Europe

Offering high energy density combined with fast charging, a long life cycle and in-time delivery will be prerequisites to success for traction batteries. Dr. Stefan Bergold, General Manager, Farasis Energy Europe, will explain how the organization tackles these challenges based on high performance lithium-ion batteries and will give an insight into latest battery developments. He will also present, the company latest localization strategy.

11:20 Heavy-Duty Batteries with Grain Boundary Enriched Cathode Materials

Kenan Sahin, PhD, President & Founder, CAMX Power

11:40 MODERATED Q&A: Session Wrap-Up

Moderator: Leslie Goodbody, Engineer, California Air Resources Board

Panelists:

David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

Kenan Sahin, PhD, President & Founder, CAMX Power

Andre Gronke, Head of Overseas Engineering, Farasis Energy Europe

11:55 Ascend Elements Luncheon Sponsor Intro

12:00 pm Networking Lunch

MANAGING HEAVY DUTY FLEETS, CONT.



12:55 Chairperson's Remarks

David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

1:00 Battery Cost of Ownership for Heavy Duty Applications

Rajshakar DasGupta, PhD, CEO, Electrovaya

Evaluation criteria for heavy duty applications will ultimately be derived by overall cost of ownership. My talk will focus on analysis of these factors (safety, cycle life, end-of-life) and how technology developments at Electrovaya and others are changing the equation.

1:20 Tackling the Complex Issue of Zero-Emission Heavy Duty Port Trucking

Matt LeDucq, CEO, Forum Mobility

Forum Mobility provides the charging infrastructure, zero-emission trucks, and technology needed to decarbonize the movement of goods in and around ports. While the environmental benefits of our business are immense, the social justice component of converting heavy duty trucking to zero-emissions is just as complex to solve. Policy, capital, technology, and scale all need to work hand-in-hand to solve this ambitious transformation.

INNOVATIONS IN BATTERY SYSTEMS FOR HEAVY-DUTY APPLICATIONS

1:40 Ultra-High Power Battery for Heavy Duty Trucks

Fengliu Lou, PhD, Director of Research & Development, Beyonder

Beyonder has developed an ultra-high battery cell up to 5 kW/kg and 30 C charging rate for heavy duty truck application. Additionally, Beyonder cells also present a cycle life over 20 000 cycles.

2:00 MODERATED Q&A: Session Wrap-Up

Moderator: David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

Panelists:

Rajshakar DasGupta, PhD, CEO, Electrovaya

Matt LeDucq, CEO, Forum Mobility

Fengliu Lou, PhD, Director of Research & Development, Beyonder

2:15 Sabic Break Sponsor Intro

2:20 Refreshment Break in the Exhibit Hall with Poster Viewing



2:55 Chairperson's Remarks

David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

3:00 Commercial Vehicle Battery Sourcing Assessment

Kevin Beaty, President, YUNEV LLC

This presentation will provide an overview of the strategic battery sourcing challenges facing the long tail of the North American commercial vehicle E-Mobility market versus the dramatically larger scale of the global EV pass car, SUV, and light truck market. These challenges will be translated into real-world battery pricing (\$/kWh) for commercial vehicle OEMs along with up-to-date battery supply chain mapping data for the North American commercial vehicle market.

3:20 MegaWatt Wireless Charging Systems Drive the Need for Compatible Battery Chemistries in Heavy Duty Vehicle Applications

Michael P. Masquelier, CEO & CTO, WAVE Wireless Advanced Vehicle Electrification

Breakthroughs in high-power wireless charging offer the opportunity to keep EV fleets powered during normal operation, matching the duty cycle of diesels. Free of heavy cables and moving parts, there is nothing to run over, break, freeze, or forget. Transit and port applications requiring 250kW up to 1MW are a reality today. These successes raise new questions about the impact of battery lifetime and the need for compatible battery chemistries.

3:40 Two-Phase Immersion Cooling; Revolutionizing Thermal Management for Outstanding Battery Performance



Moritz Lipperheide, Director, Research, Innovation, Kautex Textron

Two-phase battery cooling systems are expected to boost battery performance during fast charging and/or demanding drive cycles. However, implementation of such systems is complex due to system integration of thermal/mechanical and electrical subsystems. Kautex presents a fully functional 2-phase battery cooling system tailored to a Textron Off Road vehicle as a technology demonstrator.

4:00 MODERATED Q&A: Session Wrap-Up

Moderator: David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

Panelists:

Kevin Beaty, President, YUNEV LLC

Michael P. Masquelier, CEO & CTO, WAVE Wireless Advanced Vehicle Electrification

4:15 Chairperson's Remarks

David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

4:20 Vehicle-to-Everything (V2X): Key Technical and Market Difference for Islanding Systems versus Grid Export

Russell Vare, Director, Flex Power

The US market is seeing increased interest in V2X from Vehicle-to-Grid (V2G) school buses to Vehicle-to-Home (V2H) passenger cars. This presentation reviews the key technical differences required for EVSE and EV manufacturers to meet different energy applications from emergency backup power that requires islanding to frequency regulation for grid export. Key market drivers and trends for the various applications will be covered.

4:40 TRIP Database: Lithium Battery Fires in Aviation

David Wroth, Director, Data Science, Underwriters Laboratories

This presentation will describe the Thermal Runaway Incident Program (TRIP), a stakeholder-led voluntary reporting system for lithium-battery thermal runaway

incidents in aviation. The presentation will include an overview of the reporting process and the data collected.

5:00 How to Charge in under 60 Seconds – Superbattery Technology for Fast Charging

Sebastian Pohlmann, PhD, Vice President, Automotive, Skeleton Technologies GmbH

Skeleton Technologies has developed Superbattery technology which is able to charge >60 Wh/kg in under 60 seconds while being inherently safe. This is extremely useful for fast charging in high-utilization use cases such as mining, work, and construction machinery. This presentation aims to explore the benefits of the technology and discusses several applications, some of which are developed together in different project consortiums.

5:20 Safety and Robustness in Battery Management Applications

Scott Winder, Lead Principal AE – Battery Management, Automotive, Infineon Technologies

- Redundancy and diversity: ensuring safe operation of a critical automotive system
- Robustness at the design and process level: making devices that can withstand the harsh electrical environment inside a high-voltage vehicle battery

5:40 MODERATED Q&A: Session Wrap-Up

Moderator: David Wyatt, PhD, Technology Analyst, Electric Vehicles Team, IDTechEx

Panelists:

Russell Vare, Director, Flex Power

David Wroth, Director, Data Science, Underwriters Laboratories

Sebastian Pohlmann, PhD, Vice President, Automotive, Skeleton Technologies GmbH

Scott Winder, Lead Principal AE – Battery Management, Automotive, Infineon Technologies

5:55 Clarios Networking Reception Sponsor Intro

6:00 Welcome Reception in the Exhibit Hall with Poster Viewing



7:00 Close of Day

WEDNESDAY, DECEMBER 7

7:45 am Registration and Morning Coffee (Power Plant)

8:00 Interactive Roundtable Discussions

Roundtable discussions are informal, moderated discussions with brainstorming and interactive problem solving, allowing participants from diverse backgrounds to exchange ideas and experiences and develop future collaborations around a focused topic.

TABLE 1: Innovations in Recycling Battery Materials & Second Life

Moderator: Steven E. Sloop, President, OnTo Technology LLC

TABLE 2: Battery Cost vs CO2 Footprint & Lifetime Warranty – What Will the Proposed Legislation Bring?

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Moderator: Kevin Konecky, Battery and Energy Storage Systems Consultant, Total Battery Consulting

TABLE 8: Cathode Materials, Technology, & Development Moderator: Carl Thoemmes, Business Development, Koura

8:00 Presentation to be Announced

ROOM LOCATION: Mezzanine 1-3

REGULATORY INITIATIVES ENABLING COMMERCIALIZATION

8:55 Chairperson's Remarks

Rajshekar DasGupta, PhD, CEO, Electrovaya

9:00 Leading California Initiatives for the Heavy Duty Vehicle Transition to Zero-Emissions

Leslie Goodbody, Engineer, California Air Resources Board

After helping to launch and grow the zero-emission transit, school, and shuttle bus market, California is now focusing on zero-emission on-road trucks. This talk will include policy and regulatory drivers that are pushing the transition of California's trucking fleets zero, the incentive programs available to support this transition, the role that OEMs play in ensuring successful truck deployments, and the fueling infrastructure nexus essential to this transition.

MANAGING THE TALENT GAP

9:20 How to Address the Battery Talent Gap

Matt Anders, Manager, Energy & Battery Storage, Piper Maddox

Samantha Keay, Vice President, Cleantech, Piper Maddox

We will discuss what the challenges and limitations are with talent and recruitment in the battery space (EVs and otherwise). We will then go into what companies and individuals can do to help.

9:40 LMFP: The Future of Lithium-Ion Batteries

Hsin-Da Huang, PhD, Senior Manager, Research & Development, HCM CO., LTD.



With increasing demand of high energy density batteries for electric vehicles, Ni-rich NMC batteries become the trend. However, safety and costs of Ni-rich NMC cells have been a great concern in the EV industry. In contrast, Lithium manganese iron phosphate (LMFP) with olivine structure has attracted much attention due to its high voltage, long cycle life, low cost and high safety. In this talk, I will introduce the novel NMC/LMFP composite technologies that can provide the best solution to Li batteries for EVs and ESS.

10:00 MODERATED Q&A: Session Wrap-Up

Moderator: *Rajshekar DasGupta, PhD, CEO, Electrovaya*

Panelists:

Leslie Goodbody, Engineer, California Air Resources Board

Matt Anders, Manager, Energy & Battery Storage, Piper Maddox

Samantha Keay, Vice President, Cleantech, Piper Maddox

10:15 Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)

10:45 Close of Symposium & Transition to the Plenary Keynote Program

ROOM LOCATION: Ocean Ballroom

PLENARY KEYNOTE

10:45 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

10:50 General Motors ULTIUM Architecture & Value Chain Overview

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

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11:10 Battery Materials – Managing the Risk and Creating Opportunity

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

OEMs worldwide have committed to unprecedented investments in the transition to clean transportation and renewable energy. There is a clear realization that materials, and battery materials in particular, will be the key enabler to success in these endeavors. The scale required for a comprehensive move to electric vehicles means rethinking virtually every aspect of the battery supply chain from material mining and processing to manufacturing scrap and spent battery recycling.

11:30 The Battery Imperative – The Challenges of Building a Sustainable and Competitive Advanced Battery Industry in the U.S. and Why It Needs to Happen

Craig Rigby, Vice President, Technology, Clarios

The long-awaited growth in EV adoption is finally happening and, in parallel, the need for advanced battery technology in energy storage applications is accelerating at an unprecedented pace. This talk will focus on challenges across the value chain as well as some ways they can be addressed to position the country for long-term, sustainable manufacturing, and technology leadership.

11:50 Panasonic's LIB Technology Evolution

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

Panasonic has continuously evolved its lithium-ion battery technology over the past 30 years. This is not the history of Panasonic, but the history of accumulating technological development with various equipment manufacturers and material supply chains. Now that we have entered a new growth period for xEVs. In order to achieve their essential objective, Panasonic as a cell manufacturer needs to change the axis of direction of the technology development.

12:10 pm MODERATED Q&A: Session Wrap-Up

Moderator: *Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech*

Panelists:

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

Craig Rigby, Vice President, Technology, Clarios

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

12:25 USABC & National Instruments Luncheon Sponsor Intro

12:30 Networking Lunch (Southpointe Lawn)

1:15 Dessert Break in the Exhibit Hall with Poster Viewing (Southpointe Center)





Battery Intelligence for Automotive Applications

How Smart Analysis of Your Battery Data Can Drive On-Time New Vehicle Launches, Optimal Performance, and Increased Margins

MONDAY, DECEMBER 5

8:00 am - 4:30 pm Conference Tutorials

Choose from 15 tutorials to maximize your networking and educational opportunities

TUESDAY, DECEMBER 6

7:30 am Registration and Morning Coffee (Power Plant)

8:30 Organizer's Remarks

ROOM LOCATION: Cabana A/B Ballroom
LIFETIME PREDICTIONS

8:35 Chairperson's Remarks

Stephan Rohr, Founder & Co-CEO, TWAICE

8:40 Techniques in Li-ion Life Prediction

Susan Babinec, Program Lead, Stationary Storage, Argonne Collaborative Center for Energy Storage Science (ACCESS), Argonne National Laboratory

AI/ML cycle life prediction is emerging as the broadly transformational capability; initial focus has been on urgent transportation needs. Argonne's expanded scope includes diverse stationary markets, where useful life extends beyond 80% capacity and use-protocols are complex and changeable (e.g., stacking or role changes during asset life) and requires alternative research strategies. This talk compares results with various ML approaches and with the use of both experimental and synthetic data.

9:00 Medicine to Materials: Adapting the Drug Discovery Model to the Battery Industry

Austin Sendek, PhD, Founder/CEO, Aionics, Inc.; Adjunct Professor, Stanford University

Over the last decade, pharmaceutical co-innovation partnerships have gotten new life-saving products to market faster. Given the decreasing time-to-market for battery innovations, we discuss how the playbook for accelerated drug discovery is being adapted to the battery industry. We compare and contrast these two industries from both business and technical perspectives, discuss how co-innovation partnerships are being successfully structured for battery R&D, and showcase several case studies from Aionics partners.

9:20 Every Battery-Powered Company is a Data Company: What It Takes to Win

Tal Sholklipper, CEO & Co-Founder, Voltaiq, Inc.

As the automotive industry enters a second phase of electrification with clearly defined leaders, OEMs are using Enterprise Battery Intelligence™ (EBI) platforms to get products to market faster to create sustainable competitive advantage. With EBI, OEMs are delivering on their roadmaps by moving away from black box technologies, improving traditional performance indicators to lower consumer barriers to entry, and leveraging efficiencies across the supply chain to ensure best-in-class results.

9:40 MODERATED Q&A: Session Wrap-Up

Moderator: Austin Sendek, PhD, Founder/CEO, Aionics, Inc.; Adjunct Professor, Stanford University

Panelists:

Susan Babinec, Program Lead, Stationary Storage, Argonne Collaborative Center for Energy Storage Science (ACCESS), Argonne National Laboratory

Tal Sholklipper, CEO & Co-Founder, Voltaiq, Inc.

9:55 One D Battery Break Sponsor Intro

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



CHARGING

10:35 Chairperson's Remarks

Stephan Rohr, Founder & Co-CEO, TWAICE

10:40 Charging Algorithms – Powered by Machine Learning

Kostyantyn Khomutov, Co-Founder and CEO, GBatteries

GBatteries will present an innovative and compelling way to charge unaltered Li-ion batteries, powered by machine learning. One which reduces irreversible chemical reactions and allows for ultra-fast charging.

11:00 Energy Efficient Charging for Smart Battery Using Impedance Minimization

Abhijit Kulkarni, PhD, Assistant Professor, Electrical Engineering, Aalborg University

Pulse charging (PC) of Li-ion batteries is known to improve their lifetime. In this work, an experimental setup is developed to identify an optimal PC frequency for energy efficient operation for large (50Ah) Li-ion cells. The Smart Battery (SB) architecture is introduced and its use for the implementation of optimal PC is described. SB can generate current pulses of any frequency, so energy efficient PC is possible without external hardware.

11:20 How to Double Cycle Life and Fast Charge Speed at the Same Time, without Changing the Battery

Daniel Higgs, PhD, Director of Revenue, Iontra, LLC

This presentation will provide conclusive electrochemical data showing how we achieve double the charge speed and double the cycle life on today's commercial cells with our proprietary, scalable charging technology. Iontra has spent the past few years in stealth mode understanding how batteries want to be charged, then providing them with a charging environment that results in minimal degradation, maximum cell health, faster charging, longer life, and lower temperature charging.

11:40 MODERATED Q&A: Session Wrap-Up

Moderator: Stephan Rohr, Founder & Co-CEO, TWAICE

Panelists:

Abhijit Kulkarni, PhD, Assistant Professor, Electrical Engineering, Aalborg University

Kostyantyn Khomutov, Co-Founder and CEO, GBatteries

11:55 Ascend Elements Luncheon Sponsor Intro

12:00 pm Networking Lunch

DEGRADATION



12:55 Chairperson's Remarks

Yatish Patel, PhD, Research Associate Mechanics of Materials, Mechanical Engineering, Imperial College, London

1:00 Lithium-ion Battery Degradation: What You Need to Know and How to Model and Diagnose It

Yatish Patel, PhD, Research Associate Mechanics of Materials, Mechanical Engineering, Imperial College, London

This presentation will focus on developing novel diagnostic and state estimation techniques which uniquely take advantage of the temperature of the cell and not just voltage and current. The latest work uses knowledge of the entropic behavior of the individual electrodes to extract loss of lithium inventory (LLI), loss of active material (LAM), or stoichiometric drift, under realistic real-world operating conditions.

1:20 Online Degradation Mode Diagnosis for Lithium-ion Batteries with Artificial Intelligence

Weihan Li, Independent Junior Research Group Leader, RWTH Aachen University

Here, we present a degradation diagnosis framework for lithium-ion batteries by integrating field data, impedance-based modeling, and artificial intelligence, revolutionizing the degradation identification with accurate and robust estimation of both capacity and power fade together with degradation mode analysis.

1:40 Maximize the Value of Data: Ensure the Safety and



Performance of Batteries in Buses, Trucks, and Passenger Vehicles

Kai-Philipp Kairies, PhD, CEO and Co-Founder, ACCURE Battery Intelligence

Many companies underutilize the data volumes produced by batteries in operation. At the same time, new analytics methods are available to provide valuable insights that reduce risks, increase performance, and extend battery lifetimes. Dr. Kai-Philipp Kairies, CEO of ACCURE Battery Intelligence, will share perspective and case studies involving battery electric buses, last-mile trucks, and passenger vehicles.

2:00 MODERATED Q&A: Session Wrap-Up

Moderator: Yatish Patel, PhD, Research Associate Mechanics of Materials, Mechanical Engineering, Imperial College, London

Panelists:

Weihan Li, Independent Junior Research Group Leader, RWTH Aachen University
Kai-Philipp Kairies, PhD, CEO and Co-Founder, ACCURE Battery Intelligence

2:15 Sabic Break Sponsor Intro

2:20 Refreshment Break in the Exhibit Hall with Poster Viewing



BATTERY DEGRADATION

2:55 Chairperson's Remarks

Yatish Patel, PhD, Research Associate Mechanics of Materials, Mechanical Engineering, Imperial College, London

3:00 Safety Risk Classification of Lithium-ion Batteries Based on Machine Learning Methodology

Jun Xu, PhD, Associate Professor, Mechanical Engineering & Engineering Science, University of North Carolina, Charlotte

How to establish a fast and accurate model with physics implications still remains an unsolved headache for the community. Herein, we establish a battery safety risk classification modeling framework based on a machine learning algorithm that can accurately and rapidly classify the potential safety risk level.

3:20 Early Warning Software Solution for Prognostics and Prevention of Thermal Runaway and Other Lithium Battery Hazards

Niles Fleischer, CEO, ALGOLION Ltd.

ALGOLION has developed quantitative algorithms that extend the early warning period of thermal runaway from seconds to days. The software can be embedded in the BMS, on cloud platforms, and as programs for diagnostic instruments and OBD applications. The method monitors battery current and voltage and catches changes in their behavior caused by precursor defects prior to failure. The advance warning is sufficient for initiating appropriate preventive action.

3:40 Eliminating Risk and Enabling Opportunities in Development & In-Life of Batteries with Hybrid Simulation Models



Stephan Rohr, PhD, Co-Founder & Co-CEO, TWAICE

While virtual development and the use of simulations are increasingly adopted, combining the development phase with actual performance in the field remains difficult. Hybrid models are a unique technology that enables accurate development and in-life insights. As a result, the risks such as warranty cases can be mitigated and opportunities such as improved spare part management can be capitalized on. A current case from the automotive industry will be presented.

4:00 MODERATED Q&A: Session Wrap-Up

Moderator: Yatish Patel, PhD, Research Associate Mechanics of Materials, Mechanical Engineering, Imperial College, London

Panelists:

Niles Fleischer, CEO, ALGOLION Ltd.

Stephan Rohr, PhD, Co-Founder & Co-CEO, TWAICE

4:15 Chairperson's Remarks

Barbara Hughes, Director of Energy Storage, Forge Nano

4:20 Machine Learning for Materials

Shijing Sun, PhD, Research Scientist, Energy & Materials, Toyota Research Institute

This talk will focus on autonomous materials research. We will discuss the recent progress and future challenges in machine learning for materials.

4:40 A Holistic Systems Approach for Lithium Metal Battery Development

Richard Wang, CEO & Founder, Cuberg

Successful commercial innovation in battery technology is uniquely difficult because of interrelated and coupled challenges stemming from atomic-scale all the way through GWh-level manufacturing. Cuberg, as part of Northvolt, has pioneered a vertically-integrated approach toward battery innovation that combines excellence in simulation, data science, high-throughput testing, cell design, process development, supply chain, and customer distribution to deliver the world's first lithium metal battery at commercial scale.

5:00 Energy-Based Deep Operator Learning for Solving Battery Physics Equations

Juner Zhu, PhD, Assistant Professor, Northeastern University; Co-Director, MIT Industrial Battery Consortium

We demonstrated the use of the powerful machine learning tool to develop the "safety envelope" of lithium-ion batteries for electric vehicles that provides the range of mechanical loading conditions ensuring safe operation. The daunting challenge of obtaining a large databank of battery tests was overcome by utilizing a high-accuracy finite element model of a pouch cell to generate over 2500 numerical simulations.

5:20 Solving the 'Duck Curve' with Vehicle Energy Management

Matt Knoche, Director, Systems Engineering, AMP

With increasing reliance on wind and solar sources, a massive amount of reserve storage capacity is needed to fill the energy generation peak, affectionately known as the duck curve. Fortunately, the world is expected to have millions of EVs in the next 10 years offering a huge potential for reserve energy capacity. Let's explore how EVs can be used to unlock this stored energy resource minimizing impact on the battery lifecycle.

5:40 MODERATED Q&A: Session Wrap-Up

Moderator: Barbara Hughes, Director of Energy Storage, Forge Nano

Panelists:

Shijing Sun, PhD, Research Scientist, Energy & Materials, Toyota Research Institute

Richard Wang, CEO & Founder, Cuberg

Juner Zhu, PhD, Assistant Professor, Northeastern University; Co-Director, MIT Industrial Battery Consortium

Matt Knoche, Director, Systems Engineering, AMP

5:55 Clarios Networking Reception Sponsor Intro

6:00 Welcome Reception in the Exhibit Hall with Poster Viewing



7:00 Close of Day

WEDNESDAY, DECEMBER 7

7:45 am Registration and Morning Coffee (Power Plant)

8:00 Interactive Roundtable Discussions

Roundtable discussions are informal, moderated discussions with brainstorming and interactive problem-solving, allowing participants from diverse backgrounds to exchange ideas and experiences and develop future collaborations around a focused topic.

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Moderator: Steven E. Sloop, President, OnTo Technology LLC

TABLE 2: Battery Cost vs CO2 Footprint & Lifetime Warranty – What Will the Proposed Legislation Bring?

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TABLE 4: Li-ion NMC Fast Charging New Cells for E-Mobility

Moderator: Shmuel De-Leon, CEO, Shmuel De-Leon Energy, Ltd. TABLE 5: Battery

Raw Materials Supply Chain Moderator: Rob Privette, Business Development

Manager, North America, Umicore

TABLE 6: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President of Battery Solutions, ESource

TABLE 7: Battery Pack System Cost and Safety – Will Future xEV Battery Packs Increase in Complexity or Simplify and How Will Cost and Safety Be Impacted?

Moderator: Kevin Konecky, Battery and Energy Storage Systems Consultant, Total Battery Consulting

TABLE 8: Cathode Materials, Technology, & Development Moderator: Carl

Thoemmes, Business Development, Koura

ROOM LOCATION: Cabana A/B Ballroom

BIG DATA AND BATTERY DEVELOPMENT

8:00 Interactive Roundtable Discussions

8:55 Chairperson's Remarks

Barbara Hughes, Director of Energy Storage, Forge Nano

9:00 Big Data, Real-Time Monitoring, Physical and Digital Safety Layers

Andrew McComas, Platform Manager- New Product Development, KULR Technology

KULR is making bold strides in advancing battery safety technologies. CellCheck embodies KULR's unique approach to harnessing advanced technologies, building a path toward Big Data and Artificial Intelligence and introducing digital safety layers to complement our physical safety measures. Real-Time and historical data acquisition, coupled with low-power consumption requirements and data science are the focus of this presentation.



9:20 ALD-Optimized NMC 811: Iterating Faster to Achieve Key Performance Metrics

Barbara Hughes, Director of Energy Storage, Forge Nano

The use of ALD to become an industry leader in materials optimization in the battery space is predicated on our ability to optimize coating solutions through an iterative process between coating the materials and electrochemical testing. In this work we have employed Voltaiq analysis software as a tool to efficiently explore ALD coatings as a means of stabilizing Ni-rich NMC surfaces, enabling increased capacity retention and high voltage utilization.

9:40 Big Data in Diagnostics

Matthieu Dubarry, PhD, Assistant Researcher, Battery Testing & Evaluation & Modeling, University of Hawaii

Battery diagnosis and prognosis algorithms are critical to increase penetration of electrochemical storage systems. Current data-driven models are often limited by the non-representativeness of the training data available. This work will showcase how synthetic big data training datasets can be used for transfer learning to solve this issue. This approach offers the benefits of the broad applicability to various cell chemistries, designs, and operating modes, as well as high fidelity.

10:00 MODERATED Q&A: Session Wrap-Up

Moderator: Barbara Hughes, Director of Energy Storage, Forge Nano

Panelists:

Andrew McComas, Platform Manager- New Product Development, KULR Technology

Matthieu Dubarry, PhD, Assistant Researcher, Battery Testing & Evaluation & Modeling, University of Hawaii

8:00 Presentation to be Announced

10:15 Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)

10:45 Close of Symposium & Transition to the Plenary Keynote Program

ROOM LOCATION: Ocean Ballroom

PLENARY KEYNOTE

10:45 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

10:50 General Motors ULTIUM Architecture & Value Chain Overview

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

General Motors believes in an all-electric future and plans to launch 30 new EVs by 2025 leveraging the innovative Ultium Platform, GM's next-generation BEV architecture. Tim will present the Ultium Architecture, deep dive the Cadillac Lyriq embodiment, and discuss the battery value chain securing, scaling and sustaining our cell supply.

11:10 Battery Materials – Managing the Risk and Creating Opportunity

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

OEMs worldwide have committed to unprecedented investments in the transition to clean transportation and renewable energy. There is a clear realization that materials, and battery materials in particular, will be the key enabler to success in these endeavors. The scale required for a comprehensive move to electric vehicles means rethinking virtually every aspect of the battery supply chain from material mining and processing to manufacturing scrap and spent battery recycling.

11:30 The Battery Imperative – The Challenges of Building a Sustainable and Competitive Advanced Battery Industry in the U.S. and Why It Needs to Happen

Craig Rigby, Vice President, Technology, Clarios

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Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

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Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

12:25 USABC & National Instruments Luncheon Sponsor Intro

12:30 Networking Lunch (Southpointe Lawn)

1:15 Dessert Break in the Exhibit Hall with Poster Viewing (Southpointe Center)



**MONDAY, DECEMBER 5****8:00 am - 4:30 pm Conference Tutorials**

Choose from [15 tutorials](#) to maximize your networking and educational opportunities

TUESDAY, DECEMBER 6**7:30 am Registration and Morning Coffee (Power Plant)****8:30 Organizer's Remarks**

ROOM LOCATION: Cabana Ballroom C
RECYCLING MARKET DEMAND

8:35 Chairperson's Remarks

Steve Sloop, PhD, President, OnTo Technology LLC

8:40 ReCell Center's Update on Lithium-ion Battery Recycling Research

Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

As the ReCell Center moves into its fourth year, it has expanded its program scope to cover Direct Recycling, Intermediate Recycling Processes, Design for Sustainability, and Modeling and Analysis. The Center continues to scale up its existing technologies and develop new technologies and apply them to the processing of both manufacturing scrap and end-of-life batteries. The presentation will highlight the expansion and progress of the Center.

9:00 Battery Recycling Part of the Supply Chain

Stefan Hogg, Business Development Associate, Li Cycle Corp

As automakers scale electric vehicle (EV) production, battery recycling will become a key piece of the supply chain – and it's equally important to remember that the lithium-ion batteries within EVs will need to be properly recycled at end-of-life.

9:20 The Most Economically Compelling Ways of Returning Recycled Battery Materials Back to the Lithium-ion Battery Supply Chain

Michael O'Kronley, CEO, Ascend Elements

This presentation will compare the predominant methods of lithium-ion battery recycling and cathode manufacturing with an eye toward greater efficiency, increased value, and lower carbon emissions.

9:40 MODERATED Q&A: Session Wrap-Up

Moderator: Steve Sloop, PhD, President, OnTo Technology LLC

Panelists:

Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

Stefan Hogg, Business Development Associate, Li Cycle Corp

Michael O'Kronley, CEO, Ascend Elements

9:55 One D Battery Break Sponsor Intro**10:00 Grand Opening Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)****RECYCLING METHODS****10:35 Chairperson's Remarks**

Steve Sloop, PhD, President, OnTo Technology LLC

10:40 Combining State-of-the-Art Pyro- and Simple Hydro-Metallurgical Processes to Deliver Diversified, Flexible, and Robust Recycling Solutions

Charles Stuyck, Director, Battery Recycling Solutions, Umicore

Battery recycling provides a sustainable and secure material supply approach to addressing climate change through e-mobility. Two distinct challenges include (1) the diverse feed and significant pre-consumer scrap produced as battery plants come online, and (2) serving end-of-life vehicle disposal which will grow rapidly toward the end of the decade. Diversified, flexible, and robust recycling

technology is required to close the materials loop in the most sustainable way.

11:00 New Recycling Strategy for LiB Cells

Christian Schwarz, Technical Sales Manager, Advanced Materials, Advanced Materials Department, Riedhammer GmbH

We will present solutions for a complete plant system for a thermal recycling process for lithium-ion batteries via pyrolysis. A special feature of the system is the high resilience to aggressive media from the cells.

11:20 CV Manufacturing Battery Challenges

Brian Enis, COO Spiers New Technologies, Cox Automotive Mobility, Cox Automotive

Commercial vehicle production plants are tasked with a new challenge of storing and handling bulk international lithium-ion battery shipments and the handling/storage complexities that follow. Battery manufacturers require specific storage conditions often requiring climate control and battery tending. These overlooked and hidden complexities drive material cost increases for vehicle production.

COX AUTOMOTIVE
MOBILITY

11:40 MODERATED Q&A: Session Wrap-Up

Moderator: Steve Sloop, PhD, President, OnTo Technology LLC

Panelists:

Charles Stuyck, Director, Battery Recycling Solutions, Umicore

Dennis Bird, Process Engineer LIB Recycling, Advanced Materials Department, Riedhammer GmbH

Brian Enis, COO Spiers New Technologies, Cox Automotive Mobility, Cox Automotive

11:55 Ascend Elements Luncheon Sponsor Intro**12:00 pm Networking Lunch (Southpointe Lawn)****RECYCLING METHODS****12:55 Chairperson's Remarks**

Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

1:00 Recycling versus Primary Refining

Trent Mell, President & CEO, Electra Battery Materials Corporation

This presentation compare and contrast recycling versus primary refining and will examine cost structures and technological advances.

1:20 Battery Deactivation and Direct Recycling to Improve Cost and Safety

Steve Sloop, PhD, President, OnTo Technology LLC

Advanced battery recycling has potential for fire related to lithium and electrolytes. OnTo's deactivation eliminates flammability and residual reactivity enabling a roadmap for safe, low-cost, end-of-life battery services essential to the industry. Deactivation coupled with cathode-healing provides safety and efficiency in material recycling that can be applied all along the manufacturing value chain. Dr. Sloop will present recent developments in application and scale of these innovative technologies.

1:40 Innovative Solutions for Battery Management: From Initial Distribution Back to Cathode

Shane Thompson, Executive Vice President of Business Development and Strategy, Cirba Solutions

As the landscape of the battery supply chain continues to change, only a focus on sustainable solutions will be able to meet the changing needs required to close the loop. A commitment to assisting with logistics, collection, recycling/material recovery, 2L, and cathode production is at the forefront of a circular battery supply chain. Learn about initiatives that will provide these solutions when there is scarcity for battery raw materials.

2:00 MODERATED Q&A: Session Wrap-Up

Moderator: Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

Panelists:

Trent Mell, President & CEO, Electra Battery Materials Corporation
 Steve Sloop, PhD, President, OnTo Technology LLC
 Shane Thompson, Executive Vice President of Business Development and Strategy, Cirba Solutions

2:15 Sabic Break Sponsor Intro

2:20 Refreshment Break in the Exhibit Hall with Poster Viewing (Southpointe Center)



2:55 Chairperson's Remarks

Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

3:00 Toward Solvent-Based Direct Recycling of Lithium-ion Batteries

Ilias Belharouak, PhD, Section Head, Electrification and Energy Infrastructure Division, Oak Ridge National Laboratory

The discussion will shed light on new solvent-based separation and regeneration processes as an enabling step towards direct recycling of LIBs.

3:20 Graphite Recycling from Spent Lithium-ion Batteries

Anna Vanderbruggen, PhD, Researcher, Helmholtz Institute of Freiberg

Graphite is the state of the art for anode material and is critical raw material. However, graphite is not recycled at the moment. We developed a process using froth flotation that enables for the first time a highly selective recycling of both graphite and metals from lithium-ion batteries.

3:40 Can Production of Battery Material on US Soil Compete with China?

Richard Holman, Senior Vice President, Battery Products, 6K Energy

- Domestic battery material production is a future path to compete, but ...
- ...can it be done in a cost-effective way with lower costs that translate to lower cost in EVs?
 - ...can it be done with sustainability and low environmental impact as a key tenet?
 - ...is there a technology that can cost effectively upcycle old battery cathode material into new modern cathode material and is it a sustainable process?

4:00 MODERATED Q&A: Session Wrap-Up

Moderator: Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

Panelists:

Ilias Belharouak, PhD, Section Head, Electrification and Energy Infrastructure Division, Oak Ridge National Laboratory

Anna Vanderbruggen, PhD, Researcher, Helmholtz Institute of Freiberg

4:15 Chairperson's Remarks

Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

4:20 Reimagining the Recycling Process to Directly Recycle Cathode Materials

Albert Lipson, PhD, Principal Materials Scientist, Applied Materials Division, Argonne National Lab

In the ReCell Center, we have been working towards finding a low-cost method to directly recycle cathode materials. To accomplish this, we needed to find strategies to separate all the materials in a battery without creating contamination. We have found a method to do this separation, and this talk will focus on how this process works to separate the various battery components and make high performing cathode material.

4:40 Recycling of Electrode Materials from Lithium-ion Batteries Using Froth Flotation with Thermal Pretreatment

Ruiting Zhan, PhD, Postdoctoral Scholar, Michigan Technological University

Separation and purification of cathode and anode active materials from lithium-ion batteries have been studied using froth flotation. Impact of the particles' surface chemistry have been studied, surface impurities such as PVDF binder

and SEI layer could deteriorate flotation performance. After optimal thermal pretreatment, electrode particles have regained their original surface properties without structure and morphology change, over 99% of cathode active materials recovered with over 98% of grade.

5:00 Towards Low-Cost and Sustainable Direct Recycling of Battery Materials

Zheng Chen, PhD, Assistant Professor, NanoEngineering, University of California San Diego

This work will discuss low-cost and sustainable recycling of various battery materials, including cathodes (LiNiCoMnO2, LiMn2O4, and LiFePO4) and anode (graphite) using the direct regeneration approach.

5:20 Sponsored Presentation Re-Examining Recycling Technology Decisions to Reach Industry's LIB Goals

Chao Yan, PhD, CEO and Founder, Princeton NuEnergy

What are Industry's lithium-ion battery recycling goals? Let's re-examine recycling technology decisions essential for the industry to retain critical materials, maximize cost efficiencies, minimize environmental impact - and evolve. How to eliminate low-value processing and transportation steps, reduce energy input at each step, reduce hazardous chemicals use in traditional processes, and create new processes with zero-tolerance of waste. What's the best way forward?



5:40 MODERATED Q&A: Session Wrap-Up

Moderator: Bryant J. Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory

Panelists:

Albert Lipson, PhD, Principal Materials Scientist, Applied Materials Division, Argonne National Lab

Chao Yan, PhD, CEO and Founder, Princeton NuEnergy

Ruiting Zhan, PhD, Postdoctoral Scholar, Michigan Technological University

Zheng Chen, PhD, Assistant Professor, NanoEngineering, University of California San Diego

5:55 Clarios Networking Reception Sponsor Intro

6:00 Welcome Reception in the Exhibit Hall with Poster Viewing (Southpointe Center)



7:00 Close of Day

WEDNESDAY, DECEMBER 7

7:45 am Registration and Morning Coffee (Power Plant)

8:00 Interactive Roundtable Discussions (Southpointe Lawn)

Roundtable discussions are informal, moderated discussions with brainstorming and interactive problem solving, allowing participants from diverse backgrounds to exchange ideas and experiences and develop future collaborations around a focused topic.

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Moderator: Shmuel De-Leon, CEO, Shmuel De-Leon Energy, Ltd. **TABLE 5: Battery Raw Materials Supply Chain**

Moderator: Rob Privette, Business Development Manager, North America, Umicore

TABLE 6: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President of Battery Solutions, ESource

TABLE 7: Battery Pack System Cost and Safety - Will Future xEV Battery Packs Increase in Complexity or Simplify and How Will Cost and Safety Be

Impacted?

Moderator: Kevin Konecky, Battery and Energy Storage Systems Consultant, Total Battery Consulting

TABLE 8: Cathode Materials, Technology & Development Moderator: Carl Thoemmes, Business Development, Koura

8:00 Presentation to be Announced

ROOM LOCATON: Cabana Ballroom C

U.S. REGULATORY LANDSCAPE, TRANSPORTATION & SAFETY

8:55 Chairperson's Remarks

Anna Vanderbruggen, PhD, Researcher, Helmholtz Institute of Freiberg

9:00 The Role that Federal and State Policy Can Play in Advancing EV Battery Second-Life Use and Recycling

Vishant Kothari, Manager, Electric Mobility, World Resources Institute

Battery recycling will need a significant policy and regulatory push to enable the private sector to make it viable, particularly for medium-heavy-duty vehicles. This session will highlight the role that federal and state policy can play in advancing EV battery second-life use and recycling. I'll also touch upon important areas of collaboration with the private sector and share good case practices.

MANAGING & COMMERCIALIZING THE LIFE CYCLE OF BATTERY PACKS

9:20 Integrated Life Cycle Management of Battery Packs

Dirk Spiers, CEO, Spiers New Technologies, Inc.

When demand outstrips supply, it is essential that automotive OEM's extend the economic life of battery packs once they are in service. Reducing service overheads, and logistical costs are key. In this session, we will discuss the economics behind life cycle management and its three main parts: Remanufacturing, Repurposing / Second-Life, and Recycling. What are the best options, and where can OEM's save the most money?

EXPANDING U.S. BASED RECYCLING MARKETS

9:40 FEATURED PRESENTATION: Recycling, Refining, and Remanufacturing Battery Materials

Paul Voigt, Vice President of Engineering, Redwood Materials

Paul will discuss Redwood's mission and strategy reduce both the cost and environmental footprint of batteries by producing critical battery materials, cathode active materials and anode copper foil, in the U.S. for the first time, from an increasing percentage of recycled, end-of-life lithium-ion batteries.

10:00 MODERATED Q&A: Session Wrap-Up

Moderator: Anna Vanderbruggen, PhD, Researcher, Helmholtz Institute of Freiberg

Panelists:

Vishant Kothari, Manager, Electric Mobility, World Resources Institute

Dirk Spiers, CEO, Spiers New Technologies, Inc.

Paul Voigt, Vice President of Engineering, Redwood Materials

10:15 Coffee Break in the Exhibit Hall with Poster Viewing (Southpointe Center)**10:45 Close of Symposium & Transition to the Plenary Keynote Program**

ROOM LOCATION: Ocean Ballroom

PLENARY KEYNOTE

10:45 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

10:50 General Motors ULTIUM Architecture & Value Chain**Overview**

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

General Motors believes in an all-electric future and plans to launch 30 new EVs by 2025 leveraging the innovative Ultium Platform, GM's next-generation BEV architecture. Tim will present the Ultium Architecture, deep dive the Cadillac Lyriq embodiment, and discuss the battery value chain securing, scaling and sustaining our cell supply.

11:10 Battery Materials – Managing the Risk and Creating Opportunity

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

OEMs worldwide have committed to unprecedented investments in the transition to clean transportation and renewable energy. There is a clear realization that materials, and battery materials in particular, will be the key enabler to success in these endeavors. The scale required for a comprehensive move to electric vehicles means rethinking virtually every aspect of the battery supply chain from material mining and processing to manufacturing scrap and spent battery recycling.

11:30 The Battery Imperative – The Challenges of Building a Sustainable and Competitive Advanced Battery Industry in the U.S. and Why It Needs to Happen

Craig Rigby, Vice President, Technology, Clarios

The long-awaited growth in EV adoption is finally happening and, in parallel, the need for advanced battery technology in energy storage applications is accelerating at an unprecedented pace. This talk will focus on challenges across the value chain as well as some ways they can be addressed to position the country for long-term, sustainable manufacturing, and technology leadership.

11:50 Panasonic's LIB Technology Evolution

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

Panasonic has continuously evolved its lithium-ion battery technology over the past 30 years. This is not the history of Panasonic, but the history of accumulating technological development with various equipment manufacturers and material supply chains. Now that we have entered a new growth period for xEVs. In order to achieve their essential objective, Panasonic as a cell manufacturer needs to change the axis of direction of the technology development.

12:10 pm MODERATED Q&A: Session Wrap-Up

Moderator: Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

Panelists:

Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors

Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company

Craig Rigby, Vice President, Technology, Clarios

Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America

12:25 USABC & National Instruments Luncheon Sponsor Intro**12:30 Networking Lunch (Southpointe Lawn)****1:15 Dessert Break in the Exhibit Hall with Poster Viewing (Southpointe Center)**



xEV Battery Technology, Applications, and Market

Driving the Future Growth of Electric Vehicles Globally

WEDNESDAY, DECEMBER 7

ROOM LOCATION: Ocean Ballroom

PLENARY KEYNOTE**10:45 am Chairperson's Remarks***Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech***10:50 General Motors ULTIUM Architecture & Value Chain Overview***Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors*

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12:10 pm MODERATED Q&A: Session Wrap-Up*Moderator: Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech*

Panelists:

*Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors**Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company**Craig Rigby, Vice President, Technology, Clarios**Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America***12:25 USABC & National Instruments Luncheon Sponsor Intro****12:30 Networking Lunch (Southpointe Lawn)****1:15 Dessert Break in the Exhibit Hall with Poster Viewing (Southpointe Center)****2:00 Organizer's Remarks**

ROOM LOCATION: Ocean Ballroom

xEV MARKET EXPANSION**2:05 Chairperson's Remarks***Michael A. Fetcenko, Executive Chairman, Sion Power***2:10 Engineering for Emerging Traction Battery-Related Regulations***Oliver Gross, MASc, SME Energy Storage and Conversion, Advanced Propulsion Technology, Stellantis*

Traction batteries have recently come under considerable regulatory interest, with significant governance coming into place over the next few years. Areas of particular interest are the assurance of predictable usable battery energy over life and reporting the related states of health in a standardized way with specific accuracy requirements. This talk discusses the kinds of battery and operation dates being requested by many of the emerging regulations.

2:30 Batteries for Commercial Electric Vehicle Applications*Bob Taenaka, xEV Battery Senior Technical Leader, Ford Motor Company*

Commercial BEV applications present a unique set of usage demands on a high-voltage traction battery compared to retail/passenger BEV applications. A family of different BEVs and BEV batteries will be needed to support growing networks of different and emerging commercial applications that are expected to materialize throughout this decade. This presentation will highlight a number of key technical needs for present and near-term future commercial BEV battery systems.

2:50 Enabling Customer Choice in EVs with Ultium Platform*Andrew Oury, Engineering Technical Leader, Battery Packs, General Motors*

General Motors believes in an all-electric future and plans to launch 30 new EVs by 2025, leveraging the innovative Ultium Platform, GM's next-generation BEV architecture. Mr. Oury will discuss the advantages of a flexible, modular platform, describe how it enables customer choice within and across vehicle models, and propose a method for energy density benchmarking across disparate battery designs.

3:10 MODERATED Q&A: Session Wrap-Up*Moderator: Michael A. Fetcenko, Executive Chairman, Sion Power*

Panelists:

*Oliver Gross, MASc, SME Energy Storage and Conversion, Advanced Propulsion Technology, Stellantis**Bob Taenaka, xEV Battery Senior Technical Leader, Ford Motor Company**Andrew Oury, Engineering Technical Leader, Battery Packs, General Motors***3:25 Refreshment Break in the Exhibit Hall with Poster Viewing (Southpointe Center)****4:10 Chairperson's Remarks***Michael A. Fetcenko, Executive Chairman, Sion Power***4:15 HV Battery Integration for Class 8 Fuel Cell Trucks***Daniel McLaughlin, Principal Engineer, Powertrain Design Division, Toyota*

Developing vehicle duty cycles into battery power profiles. Adapting fuel cell power requirements to the market's cell capability.

4:35 Accelerating the Volvo Group's Electrification and Sustainability Journey.

Anna M. Axelsson, Head of Battery Industrialization and Logistics, Volvo Energy
Volvo Energy is Volvo Group's newest business area committed to driving and propelling a fundamental breakthrough of electrification, from the development of charging and infrastructure solutions to the remanufacturing, refurbishing, repurposing, and recycling of state-of-the-art batteries that power our Volvo Group products. With the creation of Volvo Energy, we aim to connect the beginning with the end, going from a linear business model to a circular one.

4:55 Accelerate New Technology Qualification with The VOLTAIQ Battery Index*Christianna Lininger, PhD, Director of Battery Science and Engineering, Voltaiq*

Qualifying new battery technologies is key to developing state-of-the-art



electrified vehicle platforms which demand cutting-edge technologies to stay competitive. In this talk, we provide a battery technology framework that OEMs can use to accelerate their new technology qualification process, enabling them to reach product launch timelines with the most competitive and highly performant new technologies on the market.

5:15 Grain Boundary Enriched Cathode Materials for Ultra Safe Batteries (GEMX & CELX Technologies)

Kenan Sahin, PhD, President & Founder, CAMX Power

5:35 MODERATED Q&A: Session Wrap-Up

Moderator: Michael A. Fetcenko, Executive Chairman, Sion Power

Panelists:

Daniel McLaughlin, Principal Engineer, Powertrain Design Division, Toyota

Anna M. Axelsson, Head of Battery Industrialization and Logistics, Volvo Energy

Tal Sholklipper, PhD, CEO and Co-Founder, Voltaiq

Kenan Sahin, PhD, President & Founder, CAMX Power

5:50 Toyota Networking Reception Sponsor Intro

5:55 Networking Reception in the Exhibit Hall with Poster Viewing

7:00 Close of Day

THURSDAY, DECEMBER 8

8:30 am Registration and Morning Coffee (Power Plant)

9:00 Organizer's Remarks

ROOM LOCATION: Ocean Ballroom

xEV MARKET EXPANSION

9:05 Chairperson's Remarks

Oliver Gross, MASC, SME Energy Storage and Conversion, Advanced Propulsion Technology, Stellantis

9:10 Materials Choice and the Role of Electric Vehicles in Society

Tobias Glossmann, Principal Systems Engineer, HV Battery Research and Test Lab, Mercedes-Benz Research and Development North America

Multiple pathways opened up and more are being added to design long-range EV battery packs. Each pathway comes with its own set of challenges and limitations in regard to density, cost, durability and recyclability. The presentation will attempt to predict if that material selection could change the place of the EV in society.

9:30 Impact of EV Cell Design on Performance vs Lifetime Trade-Offs

James McKinney, Battery Technology Engineer, BMW of North America

This presentation will describe BMW's view of the role that different cell designs and chemistries can play in designing batteries for diverse EV applications. Specifically, the impact of cell design and charging protocol optimization on battery lifetime (calendar and cycle aging) will be discussed. Key challenges will be addressed with examples from BMW research projects.

9:50 Maximize Your EV Battery Performance

Jim Duffy, EV Business Development Manager, Automotive & Energy Solutions, Keysight Technologies

Bob Zollo, Strategic Portfolio Planner / Solution Architect for Battery Testing, Automotive & Energy Solutions, Keysight Technologies

This presentation will provide solid ideas on how to build and equip a successful battery test lab. It will illustrate how a well thought out design and test strategy will lay the foundation for effective and efficient research and production of battery cells, modules, and packs.

10:10 MODERATED Q&A: Session Wrap-Up

Moderator: Oliver Gross, MASC, SME Energy Storage and Conversion, Advanced Propulsion Technology, Stellantis

Panelists:

Tobias Glossmann, Principal Systems Engineer, HV Battery Research and Test

Lab, Mercedes-Benz Research and Development North America

James McKinney, Battery Technology Engineer, BMW of North America

Jim Duffy, EV Business Development Manager, Automotive & Energy Solutions, Keysight Technologies

Bob Zollo, Strategic Portfolio Planner / Solution Architect for Battery Testing, Automotive & Energy Solutions, Keysight Technologies

10:25 Coffee Break in the Exhibit Hall - with Poster Viewing (Southpointe Center)

11:25 Chairperson's Remarks

Oliver Gross, MASC, SME Energy Storage and Conversion, Advanced Propulsion Technology, Stellantis

11:30 Overview of Research and Development of Batteries for Electric Vehicles at Nissan

Shigemasa Kuwata, PhD, Senior Manager, R&D, Nissan North America

This presentation will provide an R&D overview of Nissan's electric vehicle programs.

11:50 Electro-Thermal Modeling & Simulation of Li-ion Battery Packs

Jens Groot, PhD, Chief Engineer, Battery Systems, Polestar

This presentation will examine Polestar's approach to Electro-Thermal Modeling & Simulation.

CONNECTED MOBILITY

12:10 pm AWS for Connected Electric Mobility Ecosystem

Martin Talke, Senior Consultant, Global Automotive, Amazon Web Services

Battery Electric Vehicle Mobility is a reality and need for this decade. With growing Electric vehicles we have growing opportunities and new trends in Energy management. It is one of the means adapted worldwide to reach carbon footprint limits. Are we there yet to cater to different personas involved in the entire ecosystem.

12:30 MODERATED Q&A: Session Wrap-Up

Moderator: Oliver Gross, MASC, SME Energy Storage and Conversion, Advanced Propulsion Technology, Stellantis

Panelists:

Shigemasa Kuwata, PhD, Senior Manager, R&D, Nissan North America

Jens Groot, PhD, Chief Engineer, Battery Systems, Polestar

Martin Talke, Senior Consultant, Global Automotive, Amazon Web Services

12:45 Gotion Sponsored Networking Luncheon Intro

12:50 Networking Lunch (Southpointe Lawn)

1:45 Dessert Break in the Exhibit Hall - Last Chance for Poster Viewing (Southpointe Center)

BATTERIES FOR xEVs

2:30 Chairperson's Remarks

Jens Groot, PhD, Chief Engineer, Battery Systems, Polestar

2:35 Ultra-High Energy Licerion Metallic Lithium Anode Battery Technology for EV and Commercial Trucking Applications

Michael A. Fetcenko, Executive Chairman, Sion Power

Sion Power has developed large-format 6 and 17 Ah cells, modules, and battery packs using our proprietary metallic lithium anode battery technology for automotive and commercial truck applications. This presentation will focus on the technical approaches used allowing industry-leading energy in both Wh/kg and Wh/L, with special emphasis on cycle life advancements. Sion's independently verified performance and safety results will also be presented.

2:55 Energain: Advanced Solutions to Accelerate E-Mobility

Larry Hough, PhD, Senior R&I Manager and Solvay Research Fellow, Battery Platform, Solvay

EV manufacturers strive to increase energy density to increase range and

reduce charging times. Our significant expertise in fluorinated chemistry has enabled us to develop Energain, a range of highly stable electrolyte additives and solvents. Energain enhances the performance of current Ni-rich and Si anode lithium-ion batteries and is also ideal for high voltage batteries that use advanced cathode materials such as nickel-rich cathodes and LMNO.

3:15 Cost-Effective & Reliable Surface Mount Fuses for EV and Battery Pack



Liwu Wang, PhD, Vice President, Business Development & Marketing, BD & Marketing, AEM Components

This presentation highlights some concerns in balancing the cost, safety and reliability for EV and battery pack. A proper solution shall be not only cost effective but also safe and reliable for the system critical design. The presentation demonstrates how advanced Solidmatrix, AirMatrix fuse technologies, and CMF high power fuses could yield cost effective, consistent and reliable circuit protection for the EV and battery pack applications.

3:35 MODERATED Q&A: Session Wrap-Up

Moderator: Jens Groot, PhD, Chief Engineer, Battery Systems, Polestar

Panelists:

Michael A. Fetcenko, Executive Chairman, Sion Power

Rick Busch, CEO, AEM

Larry Hough, PhD, Senior R&I Manager and Solvay Research Fellow, Battery Platform, Solvay

3:50 Refreshment Break (Ocean Ballroom + Mezzanine 1-3)

4:10 Chairperson's Remarks

Jens Groot, PhD, Chief Engineer, Battery Systems, Polestar

4:15 Glimpses into BEV Batteries on the Market – AVL Series Battery Benchmarking

Wenzel Prochazka, PhD, Senior Product Manager, Battery Systems, AVL List GmbH

AVL's series battery benchmarking program provides a database for objective comparison in technical attributes as well as in engineering methodology

for BEV battery 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 are pointed out to support current and future development programs.

4:35 Rapid Development of High Power Lithium-ion Cells at Saft

Michael Pollina, Battery Test Engineer, SAFT America, Inc.

Saft's historical experience in producing high-power cells has led to the growth of a successful business supplying cells for racing applications. This expertise has been translated into a product for a high-performance hybrid vehicle. We discuss how Saft's R&D approach has made this possible.

4:55 High-Energy, Fast-Charging, Lithium-ion Cells Enabled by Pre-Lithiated Silicon Anode

Herman A Lopez, PhD, Chief Technology Officer, Ionblox

Zenlabs has overcome poor cycling and high swelling associated with Silicon anode-based Lithium-ion cells. Zenlabs has developed large format pouch cells using pre-lithiated silicon anode that exhibit high specific energy, fast charge, high power, and low cost. Our patented pre-lithiated silicon anode when paired with Nickel rich cathode enables Lithium-ion cells to have specific energy from 330 to 400 Wh/Kg.

5:15 MODERATED Q&A: Session Wrap-Up

Moderator: Jens Groot, PhD, Chief Engineer, Battery Systems, Polestar

Panelists:

Wenzel Prochazka, PhD, Senior Product Manager, Battery Systems, AVL List GmbH

Michael Pollina, Battery Test Engineer, SAFT America, Inc.

Herman A Lopez, PhD, Chief Technology Officer, Ionblox

5:30 Close of Conference



Global Battery Raw Materials

Balancing Supply, Demand & Costs for Battery Component Materials

WEDNESDAY, DECEMBER 7

ROOM LOCATION: Ocean Ballroom

PLENARY KEYNOTE

10:45 am Chairperson's Remarks*Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech***10:50 General Motors ULTIUM Architecture & Value Chain Overview***Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors*

General Motors believes in an all-electric future and plans to launch 30 new EVs by 2025 leveraging the innovative Ultium Platform, GM's next-generation BEV architecture. Tim will present the Ultium Architecture, deep dive the Cadillac Lyriq embodiment, and discuss the battery value chain securing, scaling and sustaining our cell supply.

11:10 Battery Materials – Managing the Risk and Creating Opportunity*Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company*

OEMs worldwide have committed to unprecedented investments in the transition to clean transportation and renewable energy. There is a clear realization that materials, and battery materials in particular, will be the key enabler to success in these endeavors. The scale required for a comprehensive move to electric vehicles means rethinking virtually every aspect of the battery supply chain from material mining and processing to manufacturing scrap and spent battery recycling.

11:30 The Battery Imperative – The Challenges of Building a Sustainable and Competitive Advanced Battery Industry in the U.S. and Why It Needs to Happen*Craig Rigby, Vice President, Technology, Clarios*

The long-awaited growth in EV adoption is finally happening and, in parallel, the need for advanced battery technology in energy storage applications is accelerating at an unprecedented pace. This talk will focus on challenges across the value chain as well as some ways they can be addressed to position the country for long-term, sustainable manufacturing, and technology leadership.

11:50 Panasonic's LIB Technology Evolution*Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America*

Panasonic has continuously evolved its lithium-ion battery technology over the past 30 years. This is not the history of Panasonic, but the history of accumulating technological development with various equipment manufacturers and material supply chains. Now that we have entered a new growth period for xEVs. In order to achieve their essential objective, Panasonic as a cell manufacturer needs to change the axis of direction of the technology development.

12:10 pm MODERATED Q&A: Session Wrap-Up*Moderator: Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech***Panelists:***Timothy Grewe, General Director Electrification Strategy and Cell Engineering, General Motors**Ted Miller, Senior Manager, Battery Cell Research & Advanced Engineering, Ford Motor Company**Craig Rigby, Vice President, Technology, Clarios**Yoshinori Kida, PhD, Deputy CTO, EV Battery Business, Panasonic Corporation of North America***12:25 USABC & National Instruments Luncheon Sponsor Intro****12:30 Networking Lunch (Southpointe Lawn)****1:15 Dessert Break in the Exhibit Hall with Poster Viewing****(Southpointe Center)****2:00 Organizer's Remarks**

ROOM LOCATION: Mezzanine 1-3

GLOBAL DEMAND FOR BATTERY RAW MATERIALS

2:05 Chairperson's Remarks*Brian Barnett, PhD, President, Battery Perspectives***2:10 The Coming Lithium Roller Coaster: Lithium Demand and Lithium Pricing is About to Get Spiky***Sam Jaffe, Vice President, Battery Solutions, E Source*

In the current inflationary environment, it should surprise nobody that lithium is priced in the stratosphere. E Source expects that the roller coaster is about to start now: with lithium expected to dip and rise in the coming years as supply matches and then is overwhelmed with demand. This talk will explore E Source's Li ion demand forecasts and corresponding supply buildout expectations.

2:30 The Battery Passport - Your Technology Tool for EV Battery Sustainability Compliance*Lauren Roman, Business Director - Metals & Minerals, Everledger*

Governments around the world are poised to launch regulations to ensure the sustainability of electric vehicle batteries. Although daunting to battery manufacturers and EV OEMs, blockchain-based technology can ease compliance from mine to manufacturing and throughout the battery life.

2:50 Global Battery Raw Material Demand for EVs*Jay Hwang, Senior Research Analyst, S&P Global*

Auto Supply Chain & Technology's Battery team in S&P Global Mobility will share its new proprietary data and insights on supply/demand dynamics of lithium, cobalt, nickel and manganese in light passenger vehicles. Also, the mid to long-term impact from raw material price hikes in battery technology evolution and electric vehicle demand will also be discussed.

3:10 MODERATED Q&A: Session Wrap-Up*Moderator: Brian Barnett, PhD, President, Battery Perspectives***Panelists:***Sam Jaffe, Vice President, Battery Solutions, E Source**Lauren Roman, Business Director - Metals & Minerals, Everledger**Jay Hwang, Senior Research Analyst, S&P Global***3:25 Refreshment Break in the Exhibit Hall with Poster Viewing (Southpointe Center)****4:10 Chairperson's Remarks***Brian Barnett, PhD, President, Battery Perspectives***4:15 Commodity Super Cycle Redux – Is It Different This Time?***Chris Berry, Founder & President, House Mountain Partners*

As demand for battery metals prices continue to be revised upwards, talk of a new commodity super cycle gets louder by the day. Is it really any different this time or are we on the cusp of something new? This presentation is a cautionary tale and an analysis of what is the same and what is different relative to cycles of the past. *Audentis fortuna adiuvat.*

4:35 Creating a Battery Value Chain in the US*Sachiya Inagaki, Vice President, Battery Material Supply Business, FREYR Battery Norway AS*

FREYR is planning to set up Giga Factory up to 50GWh by 2030. There might be still time, but we need to prepare our battery value chain in the US. In this talk, I would like to introduce how we see battery value chain in the US and how we are going to create it.

4:55 It's Not Only about Mines – Is There Enough Processed Battery Raw Materials to Satisfy the Demand?*Lukasz Bednarski, Associate Director, Battery Raw Materials, IHS Markit*

We will examine whether the US needs its own battery materials processing capacities to minimize CO2 emissions, cell costs and security of supplies and what it will take to build them – in terms of investment and time needed. We will also assess risk factors affecting the roadmap to the US battery chemicals self-sufficiency.

5:15 Upgrading Battery Active Materials via Scalable and Low-Cost Atomic Layer Deposition

Lucy Li, PhD, Field Application Engineer - Energy Storage, Sales, Forge Nano
Demand to meet high energy density and longevity goals while maintaining affordability and safety hinges on the development of next-generation battery materials. Forge Nano's nano-coating technology enables surface engineering of cathode and anode components to optimize battery performance at a lower cost than legacy techniques. As the US ramps up domestic material production, supported from the Bipartisan Infrastructure Law, Forge Nano will unlock new potential for battery active materials.

5:35 MODERATED Q&A: Session Wrap-Up

Moderator: Brian Barnett, PhD, President, Battery Perspectives

Panelists:

Chris Berry, Founder & President, House Mountain Partners

Sachiya Inagaki, Vice President, Battery Material Supply Business, FREYR Battery Norway AS

Lukasz Bednarski, Associate Director, Battery Raw Materials, IHS Markit

5:50 Toyota Networking Reception Sponsor Intro

5:55 Networking Reception in the Exhibit Hall with Poster Viewing (Southpointe Center)



7:00 Close of Day

THURSDAY, DECEMBER 8

8:30 am Registration and Morning Coffee (Power Plant)

ROOM LOCATION: Mezzanine 1-3

GLOBAL DEMAND FOR BATTERY RAW MATERIALS

8:45 Chairperson's Remarks

Lukasz Bednarski, Associate Director, Battery Raw Materials, IHS Markit

8:50 Building A Supply Chain In North America For Advanced Cathode Materials

Mark Szendro, Director, Battery Materials, North America and CEO of BASF Toda America LLC, BASF Corporation

To ensure growth of EV's in North America it is critical to develop a robust supply chain for battery materials from mine to market. In the past couple years, companies have seen the importance of a reliable local supply chain. BASF has taken this approach by building a global network with cathode active materials production in all key regions. This presentation covers battery materials supply chain, sourcing, and forecasted consumption trends.



9:10 North American Lithium-ion Battery Supply Chain Database

Ahmad A. Pesaran, PhD, Chief Energy Storage Engineer, National Renewable Energy Laboratory

NAATBatt International supported NREL to develop a database of companies supplying goods, equipment, and services that manufacture or reuse/recycle battery packs and cells in North America. The purpose was to identify strengths and gaps so private-government partnerships could formulate strategies to have a competitive LIB supply chain. NREL published the first version of this database.

GLOBAL SUPPLY FOR BATTERY RAW MATERIALS

9:30 Supply Chain Challenges in LIB Cathode Metals

Alex Laugharne, Principal Consultant, Consulting, CRU International

Consumers, producers, and governments in North America and Western Europe

are beginning to address critical vulnerabilities in their LIB supply chains, but where will gaps in the supply chain remain, and is it feasible that either region will achieve self-sufficiency? This presentation will quantify the size of gaps in the supply chain from mine to EV, and how they might be addressed, for each of nickel, cobalt, lithium and manganese.

9:50 Talk Title to be Announced

Ian McCallum, Chief Growth Officer, Marketing, Anovion

ANOVION
BATTERY MATERIALS

10:10 MODERATED Q&A: Session Wrap-Up

Moderator: Lukasz Bednarski, Associate Director, Battery Raw Materials, IHS Markit

Panelists:

Ahmad A. Pesaran, PhD, Chief Energy Storage Engineer, National Renewable Energy Laboratory

Alex Laugharne, Principal Consultant, Consulting, CRU International

Mark Szendro, Director, Battery Materials, North America and CEO of BASF Toda America LLC, BASF Corporation

9:00 Organizer's Remarks

10:25 Coffee Break in the Exhibit Hall - with Poster Viewing (Southpointe Center)

11:25 Chairperson's Remarks

Lukasz Bednarski, Associate Director, Battery Raw Materials, IHS Markit

11:30 Sustainable Response to the Challenges of Growing Nickel Demand

Andrew Brudnok, Vice President, Sales PGMs & Nickel Specialty Products, Norilsk Nickel USA

The transport electrification, wider use of renewable energy and expansion of energy storage push nickel demand higher. This presentation will focus on nickel demand projections by industry and potential additional supply sources, including an update on Indonesian projects and possible constraints with the NPI to nickel sulphate conversion plans. The nickel incentive price required to bring additional metal units to the market will be also examined.

11:50 Developing a New, Green, and European Source of Battery-Grade Manganese Products: The Chvalětice Manganese Project

Matthew James, PhD, President and CEO, Euro Manganese, Inc.

Euro Manganese is a battery materials company focused on becoming a leading, competitive, and environmentally superior producer of high-purity manganese for the electric vehicle (EV) industry. The Chvalětice Manganese Project in the Czech Republic is a unique waste-to-value recycling and remediation opportunity involving reprocessing old tailings. It is the only sizeable resource of manganese in the EU, positioning the company to provide critical raw materials to a circular, low-carbon economy.

12:10 pm Pure Lithium: Filling the Supply Chain Gap with Battery-Ready Lithium Metal Electrodes for Next-Generation EVs

Paul Burke, PhD. CTO, Pure Lithium

Pure Lithium enables the mass adoption of lithium metal rechargeable batteries (LMBs) by getting lithium from the ground into a battery as quickly, sustainably, and inexpensively as possible. It is the first company to produce a battery-ready pure lithium-metal electrode that can be made from a variety of inexpensive, readily available feedstocks – from salts to metal.

12:30 MODERATED Q&A: Session Wrap-Up

Moderator: Lukasz Bednarski, Associate Director, Battery Raw Materials, IHS Markit

Panelists:

Andrew Brudnok, Vice President, Sales PGMs & Nickel Specialty Products, Norilsk Nickel USA

Matthew James, PhD, President and CEO, Euro Manganese, Inc.

Paul Burke, PhD. CTO, Pure Lithium

12:45 Gotion Sponsored Networking Luncheon Intro

12:50 Networking Lunch (Southpointe Lawn)

1:45 Dessert Break in the Exhibit Hall - Last Chance for Poster Viewing (Southpointe Center)



GLOBAL SUPPLY FOR BATTERY RAW MATERIALS

2:30 Chairperson's Remarks

Chris Berry, Founder & President, House Mountain Partners

2:35 A Roadmap for Carbon and Water Neutral Lithium Production: SQM's Innovative Sustainable Development Plan

Stefan Debruyne, Director, Business Development, Lithium, SQM International

An update on SQM's lithium expansions globally and sustainable development plan towards carbon and water neutral lithium production at Salar de Atacama in Chile. Additionally, the footprint of Argonne's lithium LCA will be presented at cell level, as well as the latest figures on global lithium demand.

2:55 Securing Critical Raw Materials at Competitive Costs and CO2 Emissions

Wolfgang Bernhart, Senior Partner, Automotive Competence Center, Roland Berger Strategy Consultants GmbH

Outlook on demand-supply balance for Li, Ni, Co, Mn, and graphite; alternative feedstock and processing routes; comparing costs and CO2 emission; strategies to secure critically raw materials adopted by major players; framework for holistic evaluation of raw material strategies.

3:15 Gotion High-Tech: A Global Approach to the Future of EV Batteries

Steven Cai, PhD, CTO, Gotion Global, Gotion High-Tech

3:35 MODERATED Q&A: Session Wrap-Up

Moderator: Chris Berry, Founder & President, House Mountain Partners

Panelists:

Stefan Debruyne, Director, Business Development, Lithium, SQM International

Wolfgang Bernhart, Senior Partner, Automotive Competence Center, Roland Berger Strategy Consultants GmbH

3:50 Refreshment Break (Ocean Ballroom + Mezzanine 1-3)

GLOBAL SUPPLY CHAIN SUSTAINABILITY

4:10 Chairperson's Remarks

Chris Berry, Founder & President, House Mountain Partners

4:15 Tackling the Battery Raw Material Volume Challenge in a Sustainable Way

Tom Van Bellinghen, Vice President Marketing & OEM Value Chain, Rechargeable Battery Materials, Umicore

Solving the challenges of raw material demand presented by the growing global EV market will involve key considerations including sustainability and geopolitical risk. Production capability to accept a variety of raw materials (salts/metal/refining feed) provides important sourcing flexibility. This sourcing must be led by informed environmental and societal impacts that can vary widely between sources. Recycled metal sources will provide increasing value in combination with near-term reliance on primary sources.

4:35 Is Lithium Production in Chile Sustainable?

Emilio Bunel, PhD, Professor, Catholic University of Chile

The role that batteries play in the fight against climate change puts Chile in front of a great challenge: how to obtain lithium without devastating the salt flats of Atacama, the driest desert in the world, where more than half of the reserves of the mineral essential for the manufacture of batteries for the consumer electronics and electric vehicles industries is found.

4:55 Can Circular Economy and Cathode Chemistry Evolution Offset the Gap between the Demand and Supply of Li-ion Batteries

Ahmad Mayyas, PhD, Professor, Industrial & Systems Engineering, Khalifa University

This topic is important to OEMs to inform them about the dynamics of the raw materials of the Li-ion batteries and how the supply chain will look in the next 5-10 years. It can also give them an idea about the required investments needed to ensure a stable supply-demand curve.

5:15 MODERATED Q&A: Session Wrap-Up

Moderator: Chris Berry, Founder & President, House Mountain Partners

Panelists:

Tom Van Bellinghen, Vice President Marketing & OEM Value Chain, Rechargeable Battery Materials, Umicore

Emilio Bunel, PhD, Professor, Catholic University of Chile

Ahmad Mayyas, PhD, Professor, Industrial & Systems Engineering, Khalifa University

5:30 Close of Conference



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