

Advanced Battery Technologies for Consumer,
Automotive, Grid & Military Applications



International Battery SEMINAR & EXHIBIT

March 12-15, 2024
Loews Royal Pacific Resort
Orlando, FL



2024 CONFERENCE PROGRAMS:



R & D

- Next-Generation Battery Research
- Battery Recycling
- Lithium-ion Battery Development & Commercialization



MANUFACTURING

- High-Performance Battery Manufacturing
- Global Supply Chain for Battery Raw Materials
- Lithium-ion Battery Development & Commercialization



APPLICATIONS

- Advances in Automotive Battery Applications
- Grid-Scale Energy Storage
- Battery Power for Consumer Electronics



ENGINEERING

- Battery Safety
- Battery Management Systems
- Battery Intelligence

PLENARY KEYNOTES:



Panasonic Energy's Innovation in Battery Technology and Manufacturing for Global Demand

Shoichiro Watanabe, PhD, Chief Technology Officer, Panasonic Energy



Watching Electrolyte Move in Cylindrical Li-ion Cells and Why This Matters

Jeff Dahn, FRSC, PhD, Professor of Physics and Atmospheric Science, NSERC/Tesla Canada Industrial Research Chair, Canada Research Chair, Dalhousie University



Accelerating the World's Transition to Sustainable Energy

Steve He, PhD, Manager, Cell Development, Tesla Motors



Lithium Innovations Fueling Electrification

Job Rijssenbeek, PhD, Vice President, Energy Storage R&D, Albemarle

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PLENARY KEYNOTE PROGRAM

WEDNESDAY, MARCH 13



3:55 pm Panasonic Energy's Innovation in Battery Technology and Manufacturing for Global Demand

Shoichiro Watanabe, PhD, Chief Technology Officer, Panasonic Energy

Panasonic Energy has been leading the development of battery industry with outstanding technology and manufacturing. To meet robust demand, we will continue to increase production capacity in North America and expand global partnerships, which will also contribute to CFP reduction and realization of sustainable society. This presentation will show the evolution of our battery business from the perspective of technology and manufacturing.



4:15 pm Accelerating the World's Transition to Sustainable Energy

Steve He, PhD, Manager, Cell Development, Tesla Motors

Batteries are core to Tesla – we have been developing and integrating Li-ion batteries into our electric vehicles and energy storage products since the company's inception. In the past decade, Tesla has grown from selling 22,477 vehicles in 2013 to a target of 1.8 million in 2023 and with it have seen similar concomitant growth in the broader battery industry. I will discuss the past, present, and future of our products and cell designs from the original Roadster to the Cybertruck, and our efforts to achieve our mission to accelerate the world's transition to sustainable energy.



4:35 pm Watching Electrolyte Move in Cylindrical Li-ion Cells and Why This Matters

Jeff Dahn, FRSC, PhD, Professor of Physics and Atmospheric Science, NSERC/Tesla Canada Industrial Research Chair, Canada Research Chair, Dalhousie University

Electrode material particles expand and contract during charge and discharge of Li-ion cells. This forces some electrolyte out of the electrode winding during charge and it must then "re-wet" the electrode winding during discharge. High resolution synchrotron X-ray CT allows images to be taken every minute. Captivating "movies" showing electrolyte motion will be shown. However, access to synchrotron CT may be difficult for many battery researchers. Instead a novel torsional oscillator (you can build this), you can measure the moment of inertia of the cell perpendicular to its long axis, and hence the electrolyte distribution, as the cell operates. The impact of electrolyte motion on cell lifetime will be discussed.



5:05 pm Lithium Innovations Fueling Electrification

Job Rijssenbeek, PhD, Vice President, Energy Storage R&D, Albemarle

The soaring demand for lithium largely stems from the increase in electric vehicle (EV) production to meet consumer demand and policies that address climate change, including The Inflation Reduction Act (IRA). Advanced performance, greater energy efficiency, and decarbonization are key drivers for the electrification of transportation. To meet decarbonization targets and advance EV technology and innovation, we need to develop, scale, manufacture and commercialize products that are not sold today – sometimes into application spaces that don't yet exist. Building robust regional supply chains and local innovation ecosystems will require collaboration across multiple levels. Critical mineral and advanced materials companies, automakers, cathode manufacturers and battery cell producers must work together to mine critical minerals responsibly, innovate, and advance battery storage technology.

2024 Conference Programs:

	TUESDAY MARCH 12	WEDNESDAY MARCH 13	THURSDAY MARCH 14	FRIDAY MARCH 15
R&D STREAM MANUFACTURING STREAM APPLICATIONS STREAM ENGINEERING STREAM INVESTOR DAY	Tutorials	Next-Generation Battery Research		Lithium-ion Battery Development & Commercialization
		High-Performance Battery Manufacturing		Battery Recycling
		Global Supply Chain for Battery Raw Materials		Lithium-ion Battery Development & Commercialization
		Advances in Automotive Battery Applications		Grid-Scale Energy Storage
		Battery Safety		Battery Power for Consumer Electronics
		Battery Venture, Innovation & Partnering		Battery Management Systems
				Battery Intelligence

INTERACTIVE TUTORIALS*

TUESDAY, MARCH 12 8:30-10:00 AM

TUT1: Sodium-ion Batteries (instructor will be presenting virtually)

Instructor:

Philipp Adelhelm, PhD, Professor, Institute of Chemistry, Humboldt-University Berlin

TUT2: Battery Safety & Abuse Tolerance Validation

Instructor:

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

TUT3: Technoeconomic Analysis

Instructor:

Thomas D. Gregory, Owner and Consultant, Borealis Technology Solutions LLC

TUT4: In-Depth Analysis of the Chinese xEV Battery Industry

Instructor:

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

TUESDAY, MARCH 12 10:30 AM-12:00 PM

TUT5: Solid-State Batteries

Instructor:

Venkataraman Thangadurai, PhD, Professor, Chemistry, University of Calgary

TUT6: Technical Approaches to Li-ion Battery Recycling

Instructor:

Haixia (Haishah) Deng, PhD, Ascend Elements

TUT7: Accelerating EV Battery Design through Simulation

Instructor:

Vidyu Challa, PhD, Reliability Manager, ANSYS, Inc.

TUT8: Cell and Pack Design

Instructor:

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

TUESDAY, MARCH 12 1:30-3:00 PM

TUT9: Improving the Energy Density of Batteries with Silicon-Based Anodes

Instructor:

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

TUT10: Latest Developments on the Safe Transport and Storage of Lithium Batteries

Instructor:

George A. Kerchner, Executive Director, PRBA Rechargeable Battery Association

TUT11: Li-ion Battery Safety & Thermal Runaway

Instructor:

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

TUT12: The Rechargeable Battery Market: Value Chain & Main Trends

Instructor:

Christophe Pillot, PhD, Director, Avicenne Energy

TUESDAY, MARCH 12 3:15-4:45 PM

TUT13: Safety, Reliability & Performance for Energy Storage Projects (instructor will be presenting virtually)

Instructor:

Matthias Vetter, PhD, Department Head, Electrical Energy Storage, Fraunhofer Institute for Solar Energy Systems ISE

TUT14: Li-ion Cell Design and Manufacturing

Instructor:

James Kaschmitter, CEO, SpectraPower LLC

TUT15: Cell Passport—Designing Li-ion Rechargeable Cell Data Sheets

Instructor:

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

TUT16: Battery Sustainability

Instructor:

Stefan Debruyne, Director of External Affairs, SQM International

*All Access Registration or separate registration required for Tutorials

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TESTIMONIALS FROM LAST YEAR'S EVENT



Content-wise this was one of the best conferences I have ever attended. Thank you!

Robert Winstead, Tesla

The full representation of the battery market value chain was phenomenal. I was pleased to meet so many people in the industry that are contributing to a more sustainable future.

Anthony Liberatore, Hatch

If you are in the energy storage world, it is a must attend event.

Chris Brown, Schrodinger

Still the leading event for connecting with the academic and industrial community engaged in the battery field.

Richard Clark, Morgan Advanced Materials

This event in particular draws a serious technical audience that may be more prevalent here than at other, more marketing-oriented events. We're already looking forward to the 2024 event!

Paul Ferguson, CHASM Advanced Materials, Inc.

There were so many companies innovating at all parts of the value chain in any industry that uses batteries. Incredible talks to hear the up-and-coming tech!

Emily Dickens, Octet Scientific, Inc.

Energy storage is the subject of our time, and the International Battery Seminar is the world's most prominent battery event!

Vivian Sultan, California State University, Los Angeles

No battery conference is more relevant than this one!

Walter van Schalkwijk, Battery Sciences Inc.





R&D STREAM

Next-Generation Battery Research

Advancing Chemical, Material, and Electrochemical Engineering

MARCH 13 - 14, 2024

TUESDAY, MARCH 12

8:30 am - 4:45 pm Conference Tutorials

Choose from 16 tutorials to maximize your networking and educational opportunities

WEDNESDAY, MARCH 13

7:00 am Registration and Morning Coffee

INCREASING ENERGY DENSITY: ELECTRODES

7:55 Organizer's Remarks

Mary Ann Brown, Executive Director, Conferences, Cambridge EnerTech

8:00 Chairperson's Remarks

Kevin M. Ryan, PhD, Chair, Chemical Nanotechnology, University of Limerick

8:05 The Quest for Practical Lithium-Sulfur Batteries: Crosstalk between High-Energy Cathode and Lithium Anode

Dongping Lu, PhD, Chief Scientist, Electrochemical Materials & Systems Group, Pacific Northwest National Lab

Lithium-sulfur (Li-S) batteries, with high specific energy and low cost, are potential contenders for Li-ion batteries. However, their practical use is limited by materials, electrode structures, durable electrolytes, and stable anodes. This talk will discuss these challenges, particularly in pouch cells with lean electrolytes, cathode-anode interactions, and their effects on cycle life. Strategies for designing dense cathodes to increase energy density and extend cycle life will be presented.

8:30 3D Current Collector Architectures for High-Performance Alloying Anodes in Lithium- and Potassium-ion Batteries

Kevin M. Ryan, PhD, Chair, Chemical Nanotechnology, University of Limerick

Alloying anodes have extraordinary promise for both lithium-ion and beyond lithium-ion batteries. However, challenges arise from the large volume expansion, leading to rapid capacity fading. Here, 3D current collector substrates (including copper silicide nanowires directly grown from copper), carbon cloth, and stainless steel mesh are used as supports for alloying anode materials Si (Li-ion), and Sb and Bi (K-ion), leading to stable capacity over extended cycles.

8:55 Advanced Sodium-ion Batteries

Darren Tan, PhD, CEO, UNIGRID Battery

Advanced sodium-ion batteries can lower costs and overcome supply chain challenges of lithium-ion batteries. Through a breakthrough alloy anode innovation, the energy densities of sodium-ion batteries can be increased by a factor of 2 and eliminate battery safety hazards, offering competitive advantages in e-mobility and energy storage markets.

9:20 Metal Oxides to the Anode: Hacking the Battery Trilemma with Niobium

Maurits Houck, PhD, Technical Solutions Expert, Commercial, Echion Technologies

Current battery technology neglects hard to electrify heavy-duty applications. We will show the journey through the metal oxide phase space to find a solution, delving deep into cell thermodynamics, kinetics, & physics-based modelling. Based on abundant & cost-competitive niobium, the answer has a unique crystallographic shear structure, with open tunnels, dense distribution of active lithium-ion sites, & a rigid

superstructure, enabling faster charging than graphite & better energy density than LTO.

9:50 Grand Opening Refreshment Break in the Exhibit Hall with Poster Viewing

10:30 Navigating the Silicon Challenge

Manuel Wieser, CTO, AnteoTech Ltd.

The application of silicon is rapidly transitioning from being a secondary active material used to enhance anode capacity to being a dominant component. This talk emphasizes the growing significance of silicon-based battery technology and its associated hurdles. It highlights AnteoTech's expertise in high-silicon anode and specialized binder innovations, offering the potential to enhance lithium-ion battery performance by optimizing the inactive material fraction of the anode.

11:00 Application of Vacuum Technology to Next-Generation Lithium Battery Manufacturing

Eiichi Sasaki, Senior Manager, Global Business Management Dept., ULVAC Inc.

Worldwide transition to electric vehicles (EVs) is rapid, with rising support for net-zero emission. Batteries are regarded as most important components of EVs, and great efforts focus to develop smaller/lighter battery. ULVAC can manufacture thinner/safer material for batteries, by applying vacuum process/equipment technology, which reduces environmental impact. ULVAC presents solutions to manufacture current collector and anode material by applying technologies of thin film formation and high-volume production in a R2R format.

ULVAC

11:30 The Battery of the Future Is High Energy, Lower in Nickel, and Cobalt-Free

Matthew Bierman, PhD, Commercial Director, TexPower EV Technologies

Conventional wisdom tells us that nickel and cobalt are essential in high-energy electric vehicle batteries, but is it true? Here we introduce nickel-conscious, cobalt-free cathode materials leveraging high energies of layered oxides and excellent safety of olivine phosphates for automotive applications that cut reliance of nickel and cobalt without sacrificing major performance metrics. The future of EVs is long-range, more affordable, and cobalt-free.

12:00 pm Using Nanocoatings to Pave the Path Towards US Innovation Leadership in Li-ion Batteries

James Trevey, Chief Technology Officer, Forge Nano

Forge Nano is a materials science company that has optimized battery material performance for nearly a decade. With the company's breadth of knowledge in battery-grade materials, the company recently spun off Forge Battery to build cells for specialty EV markets at a Gigafactory in Raleigh, NC.

FORGE NANO

12:30 Networking Luncheon

EVE 亿纬锂能

1:15 Dessert Break in the Exhibit Hall with Poster Viewing

SOLID-STATE STRATEGIES: SAFETY AND STABILITY

1:45 Chairperson's Remarks

David Mitlin, PhD, David Allen Cockrell Professor in Engineering, University of Texas Austin



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Next-Generation Battery Research

1:50 Fe-Based Metal Foils for Current Collectors in Li-ion Secondary Batteries and Its Application Development

Atsushi Yashiro, Research Engineer, R&D, NIPPON STEEL Chemical & Material Co., Ltd.

Recently, all-solid-state LIBs for which electrolytes and all components are solids have been actively studied. Due to environmental changes to which battery component materials are subjected, studies to apply Fe-based metal foils having corrosion resistance and mechanical properties superior to those of conventional materials to current collectors have been actively conducted. My presentation outlines ultra-thin Fe-based metal foil for current collectors that have been studied to realize high-capacity, long-cycle-life LIBs.

2:20 Mapping and Modeling Physicochemical Fields in Solid-State Lithium Batteries

Shou-Hang Bo, PhD, Professor, Global Institute of Future Technology, Shanghai Jiao Tong University

Imaging tools are developed in our group to track the electrochemical reaction fronts, stress, and crack evolution in 3D during processing and cycling of solid-state lithium-metal batteries. We show that the crack formation and stress distribution in solid-state electrolytes are extremely sensitive to the preparation conditions, which, in turn, affect the electrochemical performance. Further, these imaging data are combined with theoretical efforts to develop electromechanical models for solid-state batteries.



2:50 FEATURED PRESENTATION: Stable Anode-Free All-Solid-State Lithium Battery through Tuned Metal Wetting on the Copper Current Collector

David Mitlin, PhD, David Allen Cockrell Professor in Engineering, University of Texas Austin

This presentation provides a series of case studies derived from the group's LMB, NMB, and KMB liquid and solid-state research on the microstructural design principles that provide for long-term cycling and fast-charge stability of metal anodes. It is demonstrated that despite appearing distinct, the efficacy of each in enabling electrochemical stability originates from three fundamental features that are directly interrelated.

3:20 Refreshment Break in the Exhibit Hall with Poster Viewing

PLENARY KEYNOTE

3:50 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech



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5:25 Reception in the Exhibit Hall with Poster Viewing

6:30 Close of Day

THURSDAY, MARCH 14

7:00 am Registration Open

7:00 Interactive Roundtable Discussions with Coffee & Pastries

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: Battery Raw Materials Supply Chain

Moderator: Robert Privette, Manager, Business Development, Rechargeable Battery Materials North America, Umicore USA, Inc.

TABLE 2: Li-ion NMC Fast Charging New Cells for E-Mobility

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

TABLE 3: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President, Battery Solutions, E Source

TABLE 4: 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 5: Innovations in Recycling Battery Materials & Second Life



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Moderator: Steven Sloop, President, OnTo Technology LLC

TABLE 6: Opportunities and Barriers to Fast Charge in Automotive and Other Applications

Moderator: Brian Barnett, PhD, President, Battery Perspectives

TABLE 7: Transformational Energy Storage Solutions for Transportation – Land, Sea and Sky

Moderator: Halle Cheesman, PhD, Program Director, Advanced Research Program Agency, U.S. Department of Energy (ARPA-E)

TABLE 8: Safe, Scalable Lithium-Metal Battery Cells for Electric Vehicles

Moderator: Alexander Kosyakov, Co Founder & CEO, R&D, Natrion

TABLE 9: Solid-State Battery Program Update

Moderator: Denis Pasero, PhD, Manager, Product Commercialization, Ilika Technologies Ltd.

TABLE 10: Project Finance in the IRA Era

Moderator: Tom Schadewald, Director, Equity Capital Markets, Baird Investment Bank

TABLE 11: Battery Management Systems

Moderator: Sheldon Williamson, PhD, Professor & Canada Research Chair, Electrical & Computer & Software Engineering, University of Ontario Institute of Technology

INCREASING ENERGY DENSITY: ELECTROLYTES

7:55 Chairperson's Remarks

Celina Mikolajczak, Chief Battery Technology Officer, Lyten

8:00 Presentation to be Announced

8:30 Harness Extreme Disorder for Designing Novel Superionic Conductors

Bin Ouyang, PhD, Assistant Professor, Chemistry & Biochemistry, Florida State University

Early theory for disordered matters usually suggests that disorder can be detrimental to ion/charge transport. More recently, several emerging works have indicated that in disordered materials, high ionic conductivity can be achieved by creating low energy barrier diffusion pathways with percolating local structures. Combined experimental and theoretical research will be demonstrated to showcase the great opportunities and design principles to turn disordered materials into superionic conductors.

8:50 Breakthroughs in All-solid-state Sulfide Ceramic Batteries: Performances, Safety and Developments

Benoit Fleutot, PhD, Lead Researcher, CEETES, Hydro Quebec Research Institute IREQ

Hydro-Quebec has decided to conduct specific research on all-solid ceramic batteries and especially sulfide-based ceramic electrolytes. The constraints of the use of Li-ion equipment, cost reduction, and safety have been considered at each level. The different improvements in positive composite electrode, in solid electrolyte ceramic film, and in lithium metal interfaces will be explained with the demonstration of cycle life under industry-relevant pressure conditions at moderate temperature under pouch-cell configuration.

9:10 Non-Fluorinated Linear Organic Carbonates as Nonflammable Electrolytes for Safe Li-ion Batteries

Minah Lee, PhD, Senior Research Scientist, Energy Storage Research Center, KIST

Fire and explosion hazards represent a major barrier to the widespread adoption of lithium-ion batteries (LIBs) in electric vehicles and energy storage systems. Although mitigating the flammability of carbonate electrolytes in LIBs is an obvious solution to the thermal safety issue, it often comes at the expense of battery performance and cost. I will present that molecular engineering of linear carbonates presents a viable route to improving LIBs' thermal stability.

8 InternationalBatterySeminar.com

9:30 Battery Cell Testing with Short Pulses of High Current

Andy Lozowski, PhD, New Product Development, New Product Development, Bitrode Corporation



In some applications batteries experience load currents containing high frequencies originating from pulses with fast risetime. It is essential to test the battery cells with current waveforms that can represent such real-life scenario. In this presentation, we will discuss the challenges in testing the cells with current pulses of high magnitude and risetimes faster than 1 millisecond. The battery cycling instrumentation needs to meet the ever-increasing demand for high bandwidth.

10:00 Armator - An Invented Technology for Battery Separator

Wei-Ting Yeh, PhD, Deputy Director, Advanced Battery Materials, BenQ Materials Corporation



Armatator is a proprietary-design separator that offers a number of advantages over conventional separators including high temperature integrity, low film impedance and it does not require modifications to existing production processes. Armatorator is easy for seamless adoption as a cost-effective solution for battery manufacturers.

10:15 Coffee Break in the Exhibit Hall with Poster Viewing

11:00 Thermodynamic and Kinetic Control of Aqueous Electrolytes for Zn-Metal Batteries

Yiming Sui, Research Scientist, David Xiulei Ji Laboratory, Chemistry Department, Oregon State University

The challenge of aqueous metal batteries is the spontaneous reaction between the metal anodes and water molecules of the electrolytes. We investigate the solvation structures of some highly concentrated solutions of metal chlorides as electrolytes to elucidate the correlations to enlarge the electrochemical stability window. Furthermore, we look into suppressing water's electrolysis by forming a solid-electrolyte interphase (SEI) to nearly shut down the parasitic reactions between Zn and water.

11:30 Lithium-Metal Battery Enabled by New Molecule-Based Liquid Electrolytes

Zhiao Yu, PhD, CTO, Feon Energy Inc.

Feon Energy is building the enablers for next-generation lithium-ion and lithium-metal batteries. Our core technology features a suite of molecular-engineered, non-flammable liquid electrolytes using brand-new solvent and/or additive molecules that never existed in the past. In the presentation, we will show two product pipelines including molecular electrolytes for high-performance 4-5Ah, 400Wh/kg lithium-metal cells, and ultra-high-voltage advanced lithium-ion batteries.

12:00 pm Pattern Coating of Li-ion Battery Electrodes by Slot-Die

Scott Zwierlein, Pattern Coating of Li-Ion Battery Electrodes by Slot-Die, Delta ModTech



Slot-die is the industry standard for coating battery electrodes. Slot-die is also well equipped for making discrete patterned coatings which are becoming integral to the manufacture of Li-ion batteries.

12:15 Challenges & Solutions for Electrode Powder Surface Area Measurements

Martin A. Thomas, PhD, Lead Scientist, Anton Paar Surface & Pores Lead Scientist, Anton Paar



Surface area helps define lithium insertion and removal from both cathode and anode, and plays a significant role in promotion/limiting SEI formation. Both electrode materials are relatively low area and can be challenging for some N₂ adsorption measurements. Latest



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generation analyzers, however, have increased sensitivity, repeatability and reproducibility. This presentation will discuss latest technology and recommendations for increased reliability and quality of surface area measurements.

12:30 PANEL DISCUSSION: Lithium Metal: Anode-Free or Foil?

Moderator: Celina Mikolajczak, Chief Battery Technology Officer, Lyten

There is debate among battery developers and manufacturers about how to implement a practical Li-metal anode. A number of battery developers are betting on an anode-free architecture where lithium is sourced from the cathode materials and plates onto the anode during the first charge. Our panel of experts will debate the issue, highlight the strategies for overcoming the challenges, and provide their feedback on the best pathway forward.

Panelists:

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

Marina Yakovleva, Director, R&D and New Business Development, Livent

Brian Sisk, PhD, CTO, Sepion Technologies

1:00 Close of Conference

**THURSDAY, MARCH 14****1:00 pm Registration Open****1:00 Networking Luncheon****2:15 Dessert Break in the Exhibit Hall with Poster Viewing****RECYCLING MARKET DEMAND****2:45 Chairperson's Remarks***Steve Sloop, PhD, President, OnTo Technology LLC***2:50 FEATURED PRESENTATION: Achieving Circularity: Adopting the Successful Lead Acid Circular Battery Economy for Lithium-ion***Craig Rigby, Vice President, Technology, Clarios***3:20 ReCell Center's Update on Lithium-ion Battery Recycling Research***Bryant Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory*

As the ReCell Center moves into its fifth year, the programs' scope covers Direct Recycling, Advanced Resource Recovery, 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 progress of the Center.

3:50 Revolutionizing Direct Recycling with Multi-Chemistry Processing*Chao Yan, Dr., Princeton NuEnergy*

Future batteries will require greater range, enhanced safety with lower cost – demanding new chemistries. NCA, NMC, LFP dominate the EV battery ecosystem today with multiple variations optimizing cost and performance. Direct Recycling (DR) expects consistent feedstock to achieve the promise of 'Half the cost with near zero waste'. PNE is constructing a unique, commercially scaled, multi-chemistry recycling and cathode rejuvenation facility with flexibility to address the single feedstock challenge.

**4:20 Refreshment Break in the Exhibit Hall with Poster Viewing****RECYCLING METHODS****5:00 Engineering Strategy for Design and Scale-Up of a Recycling Process***Bary A. Perlmutter, President, Perlmutter & Idea Development (P&ID) LLC*

One of the most important topics for battery recycling is to de-risk the scale-up to commercial operations. To correctly scale up, the industry needs to "act like recyclers" but "think like a chemical plant." This presentation provides a five-step procedure beginning with questions to ask for a detailed specification, to preliminary design and final design package for construction. The engineering strategy includes HAZOP risk analysis for safe plant operation.

5:30 Powering Progress: The Evolving Landscape of Safe Battery Management*Eric Frederickson, Managing Director of Operations, Call2Recycle*

The proliferation of battery-powered devices and electric transportation has ushered in a new era of convenience and efficiency. As we embrace this dynamic shift, we must also confront the challenges of the

interdependencies among innovation, safety, and sustainability. This presentation will cover overcoming barriers to maximize end-of-life battery management, underscoring the importance of safety at all stages of the battery lifecycle.

6:00 How RecycLiCo Goes beyond Recycling to Bridge the Gap in Battery Materials*Shaheem Ali, CFO, RecycLiCo Battery Materials*

This presentation aims to highlight the pivotal role that RecycLiCo Battery Materials Inc. plays in driving sustainable advancements in energy storage. Our journey not only embodies the spirit of innovation but also underscores our commitment to shaping a greener and more sustainable future.

6:30 Close of Day**FRIDAY, MARCH 15****8:00 am Registration and Morning Coffee****RECYCLING METHODS****8:20 Organizer's Remarks***Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech***8:25 Chairperson's Remarks***Eric Frederickson, Managing Director of Operations, Call2Recycle***8:30 Engineering the Future of Critical Minerals***David Klanecky, CEO & President, Cirba Solutions*

Cirba Solutions is the most comprehensive and trusted service provider in the battery management industry, with 7 strategic locations taking batteries at end-of-life, processing them to extract critical materials and supplying these materials back into the supply chain. Collaborating with both private and public sectors, David is focused on expanding operational and technology capabilities to support the growing needs of the circular battery supply chain.

9:00 Advancing Sustainability: A Comprehensive Solution of Closed-Loop Battery Material Recycling, Encompassing Hydro-to-Cathode and Hydro-to-Anode Processes*Tomasz Poznar, PhD, Vice President, Strategy, Ascend Elements*

The terms "sustainability" and "closed loop" are often used to describe battery recycling processes like pyrometallurgy and hydrometallurgy, but these traditional recycling processes are just the first steps in any round-trip journey of battery materials. This presentation puts recycled battery materials under the microscope and explores the steps needed to engineer new, battery-ready cathode and anode active materials.

9:30 Extremely Powerful: Evonik's Fumed Metal Oxides as Performance and Safety Booster in Li-ion Batteries*Victor Lifton, PhD, Technical Director, Evonik Corporation*

AEROXIDE fumed metal oxides from Evonik are used as dry coating additives for cathode active materials (CAM) to increase the lifetime of the battery and to stabilize new types of Ni-rich CAM systems with a very high energy density. The significant improvement of cathode cycling performance using only a low amount of the fumed metal oxide additives makes AEROXIDE ideal for application in next-generation cathode materials.



9:45 Monitoring material characteristics from R&D and production to the circular economy of recycling LIBs

Jeff DeNigris, Business Development Manager, Advanced Materials, Malvern Panalytical

Material processing, from precursor elements to recycled black mass, employs analytical methods ensuring the highest quality. These techniques focus on particle size, shape, structure, and elemental composition, essential in the lifecycle of LIB production. Beyond basic QC lab measurements, these techniques are available online, in-situ, and in-operando, offering insights for production optimization to control systems and engineers.

9:00 -10:45 am Battery Booth Crawl with Bagels in the Exhibit Hall with Poster Viewing

10:45 Characterization of Materials and Processing Residues from Li-ion Recycling Shredding Processes

Sascha Nowak, PhD, Head of Analytics & Environmental, Electrochemical Energy Technology, University of Münster

One current state-of-the-art LIB recycling procedure can start with deactivation and shredding of the spent battery modules. After discharge and dismantling, modules are shredded under inert or wet conditions to avoid thermal runaways, and volatile electrolyte residues are removed. The composition of residues and remaining material is important for further processing. Furthermore, under wet conditions, the composition of the water after processing is one crucial aspect.

11:15 Direct Recycle Cathode-Healing and Battery Deactivation to Improve Cost and Safety of the Value Chain

Steve Sloop, PhD, President, OnTo Technology LLC

Dr. Sloop will discuss deactivation and cathode-healing of lithium-ion batteries. How does inertization of batteries find a way to improve the value chain? When will industry employ a service? What is the value to the industry? Where will deactivation and direct recycle find their uses in the industry?

11:45 The Full Cycle of Battery: from Battery Production to Recycling

Jo Huang, VP, International BU, ONGOAL TECHNOLOGY CO., LTD.

Sharing experience in closed-loop production line equipment solutions, ranging from the production of cathode/anode materials and battery production (slurry mixing) to battery recycling, ONGOAL TECH aims to maximize efficiency, minimize waste, and ensure the availability of recycled materials for future production.

Key Words: Cathode/Anode Material Processing, Slurry Mixing, EV Battery Recycling

12:15 pm Enjoy Lunch on Your Own

RECYCLING METHODS

1:10 Chairperson's Remarks

Tomasz Poznar, PhD, Vice President, Strategy, Ascend Elements

1:15 Graphite Anode Recycling—An Environmentally Friendly Approach to Supply Chain Localization

Rakan Ashour, PhD, Senior Process Development Engineer, Koura

In this talk, we will present data showing that the physio-chemical



attributes and electrochemical performance of recycled graphite are on-par with pristine commercial graphite anode active materials. We will highlight the environmental, supply chain, and economic benefits for recycling graphite from lithium-ion batteries. Finally, we will discuss how recycled graphite can be a viable anode active material for Li-ion batteries.

1:45 Ion Chromatography Analysis of Battery Materials

Linx Waclaski, Product Manager, Ion Chromatography, Metrohm USA

From R&D to production to recycling, sensitive and selective analytical techniques are needed for testing battery materials. Ion chromatography (IC) is an ideal technique for looking at ionic species, ranging from trace-level ionic impurities in raw materials to quantifying various lithium salts used in electrolytes. An overview of the applicability of IC for battery materials analysis will be presented, along with specific application example.

2:15 Presentation to be Announced

TRANSPORTATION SAFETY

2:45 Transporting Recycled Batteries: The Safety and Risk Concerns

Andrew Leyder, Program Analyst, Research, Development & Technology, U.S. Department of Transportation

Given the increase of lithium-ion batteries heading to recycling centers, there are several safety concerns with transporting large quantities of batteries to recycling centers. This talk will highlight the safety concerns, how to safely transport recycled end-of-life batteries to recycling centers, and risk mitigation research and development projects that address these concerns.

3:15 Transition to Closing Plenary Panel

CLOSING PLENARY PANEL DISCUSSION

3:30 PANEL DISCUSSION: Overcoming the Barriers to Sustainability



Moderator: Craig Rigby, Vice President, Technology, Clarios
Navigating the hurdles toward achieving sustainability in our journey to electrify all facets of life is pivotal for a carbon-neutral future. Join our international panel of experts as they delve into vital strategies within areas such as R&D, manufacturing, recycling, and supply-chain optimization. Explore groundbreaking solutions and glean invaluable insights into the sustainable transformation of the energy storage industry.

Panelists:

Steven Christensen, Executive Director, Responsible Battery Coalition
Bryant Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory
Steve Sloop, PhD, President, OnTo Technology LLC
Stefan Debryune, Director of External Affairs, SQM International

4:30 Close of Conference



Lithium-ion Battery Development & Commercialization

Delivering Higher Performance and Increased Productivity

THURSDAY, MARCH 14

1:00 pm Registration Open

1:00 Networking Luncheon

2:15 Dessert Break in the Exhibit Hall with Poster Viewing

MANUFACTURING PROCESS & PRODUCT INNOVATIONS

2:45 Chairperson's Remarks

Virginia Irwin Klausmeier, President & CEO, Sylvatex

2:50 Providing a Direct Pathway to Lithium-ion Battery Commercialization at the Battery Innovation Center

Dennis Kountz, PhD, Technical Fellow, Battery Innovation Center Indiana

The BIC offers cell fabrication, testing, and evaluation at the cell and pack level. The facility is IP secure and flexible, providing companies a rapid innovation path to commercialization. The BIC offers training opportunities for all levels of energy storage students and workers. The capabilities offered at the BIC and the need for these capabilities to the battery ecosystem for adoption of advanced energy storage technologies will be described.

3:10 New Chemistry and the High Performance Cells Development in Saft

Jian Dong, PhD, Senior Engineer Cell Development, R&D Aerospace Defense & Performance ADP, SAFT America

LVPF (LiVPO₄F) and LNMO (Li_{1-x}Ni_{0.5}Mn_{1.5}O₄) are being explored for next-generation cells. Both have high operating voltage, high energy density. LVPF is similar in safety to LFP. Prototype cells have been built utilizing Saft's production equipment to evaluate power and cycling capabilities with emphasis on high-power applications. In addition, other new cells developed for specialty markets with unique power, energy density, or high temperature stability requirements will also be introduced.

3:30 Novel, Dry Manufacturing Process for Low-Cost, Low-Carbon, High-Energy-Density, Mixed-Metal-Oxide Cathode Active Materials

Virginia Irwin Klausmeier, President & CEO, Sylvatex

A lower-cost, more sustainably manufactured EV is achievable in the near-term by employing a future-proofed dry cathode manufacturing process. The cathode is the battery's most costly and carbon-intensive part. Thus, it creates a critical supply chain bottleneck in realizing the decarbonization impact industry targets. This presentation will show how we can create a sustainable battery value-chain, including tailwinds from the BIL/IRA, while highlighting an advanced manufacturing process.

3:50 NOVONIX's all-dry, zero-waste cathode materials: Revolutionizing sustainability in critical minerals processing

NOVONIX

Mark McArthur, PhD, Director, R&D, NOVONIX

NOVONIX has developed a patent-pending, sustainable, low-cost processing technology for high-performance, single-crystal NMC cathode materials for the domestic LiB market. Our team has established a tonnage-scale pilot line to demonstrate the flexibility of our transformative process technology to produce various NMC chemistries. This presentation covers the process, materials developed, and highlight the economic and environmental advantages all-dry processing brings to NMC manufacturing.

4:20 Refreshment Break in the Exhibit Hall with Poster Viewing

5:00 Surface Modification and Protection of Current Collectors for Batteries and Supercapacitors

Dongfang Yang, PhD, Senior Research Officer, Automotive & Surface Transportation Research Center, National Research Council of Canada

This presentation will summarize surface-engineered aluminum current collectors that were developed through laser-based surface-modification methods. Their performances as current collectors in batteries and supercapacitors clearly outperformed state-of-the-art carbon-coated commercial foils, and were close to ideal gold foils, thanks to the enhanced interfaces provided by their engineered surfaces. Surface modifications included roughening by laser ablation in vacuum and coating with a carbon-metal composite thin film deposited using pulsed laser deposition.

5:30 First Commercially-Ready Metallurgical Grade, Mechanically-Milled Si-Dominant Anode for EV Batteries

Coreshell

Roger Basu, CTO & Co-Founder, Coreshell

Coreshell's metallurgical Silicon enabling technology delivers high capacity, fast-charging, and superior safety. Our low-cost liquid-phase nano-coating addresses critical electrode surface degradation issues and enables batteries with a Silicon-dominant anode that have 25% higher energy density, superior intrinsic thermal safety, and significantly lower cost/kWh compared to current LIBs. Our Si anode material is 50% the cost of graphite and 100% domestically sourced.



6:00 FEATURED PRESENTATION: Battery Technology Bridging from R&D to Manufacturing at BEACONS Center

Kyeongjae Cho, PhD, Professor, Material Science & Engineering, University of Texas, Dallas

University of Texas, Dallas has established the BEACONS Center to strengthen the US energy storage systems industry through an improved domestic supply chain, new battery innovations, and a qualified workforce. We will discuss the four pillars of the Center's activities, based on AI material design, robotic synthesis, and pilot-line battery production. We will highlight the advanced manufacturing scale-up of battery materials based on AI/ML methods.

6:30 Close of Day

FRIDAY, MARCH 15

8:00 am Registration and Morning Coffee

CHEMISTRIES AND MANUFACTURING CONSIDERATIONS

8:25 Chairperson's Remarks

Eric Rountree, PhD, CEO, EC Power Group, Inc.

8:30 Optimizing Electrode Manufacturing through Rheological Measurements

Waters |

Kimberly Dennis, Applications Chemistry Analyst, TA Instruments

During electrode manufacturing, slurry formulations need to be stable during storage, dispersed easily, and flowable to produce a uniform coating. Slurries undergo different shear environments during processing. Slurry flow properties – viscosity, yield stress, thixotropy, and viscoelasticity – are key to the success of the coating process. The conductive network structure is equally important to the final electrode

Lithium-ion Battery Development & Commercialization



performance. A unique Friction-Free rheo-IS technique will be discussed in the presentation.

9:00 Charging Ahead/All Charged Up: Extreme Fast-Charging (XFC) of Li-ion Batteries over 1500 Cycles

Zhijia Du, PhD, R&D Staff Scientist, Electrification & Energy Infrastructures, Oak Ridge National Laboratory

Realizing extreme fast-charging (XFC) in lithium-ion batteries for electric vehicles is still challenging due to the insufficient lithium-ion transport kinetics. A novel high-performance electrolyte is proposed and tested in pilot-scale, 2-Ah pouch cells. The high-performance electrolyte delivers improved capacity and long-term cyclability up to 1500 cycles under XFC conditions, which is superior to the conventional state-of-the-art baseline electrolyte.

9:30 Our UV and IR Solutions for Battery Production

Larisa von Riewel, PhD, Senior Scientist, Innovation & Research, Excelitas Noblelight America

Bertram Raabe, Global Director of Process Development, Sales, Excelitas Noblelight America LLC

The drying of electrodes is an essential and limiting process step in manufacturing lithium-ion batteries. Electrode properties and process speed are significantly restricted by heat and mass transfer mechanisms in conventional convective drying. Specifically, we investigated the effects on binder migration, adhesion of active layer onto the substrate, lifetime, and the role of binders as a function of distinct slurry drying rates (low or high) for both anode and cathode.

9:00 -10:45 am Battery Booth Crawl with Bagels in the Exhibit Hall with Poster Viewing

CHEMISTRIES AND MANUFACTURING CONSIDERATIONS FOR FAST CHARGING

10:45 Charging in 60 Seconds—Energy Storage for High-Utilization Use Cases

Linda Marie Ormus, Business Development Manager, Skeleton Technologies

While supercapacitors exhibit extreme power density, lithium-ion batteries offer high energy density. Both technologies leave a gap for high-power pulse applications, with charge-discharge events lasting between 15 seconds and 15 minutes. In this presentation, Skeleton Technologies showcases how it addresses this gap using its high-power Superbattery technology. The newly developed energy storage technology charges in 60 seconds, while offering competitive energy density of over 130 Wh/L.

11:05 Overcoming Charge Anxiety and Meeting Customer Expectations with Energy Dense Lithium-Metal Batteries

Brian Sisk, PhD, CTO, Sepion Technologies

State-of-the-art lithium-ion fast charge performance must serve as a baseline requirement for lithium-metal batteries. We connect pack-level fast charge performance to material-level characteristics needed to plate non-dendritic lithium on the anode, including diffusion coefficients and Sand's time as a function of temperature. In that context, we review Sepion's innovation separators and liquid electrolytes required for adoption of Li-metal anodes to unlock greater energy density, faster charging, and lower cost.

11:25 Fast-Charging Batteries in the Extreme Cold

Eric Rountree, PhD, CEO, EC Power Group, Inc.

The lower energy density of LFP necessitates fast-charging for viability in many applications. Temperature plays a critical role in the threshold current density, dividing healthy and unhealthy fast charging. In this talk, the temperature dependence of fast-charging will be explored, followed by an introduction of EC Power's "30x" technology. Finally, the ambient temperature immunity of 30x will be presented, evidenced by healthy ~10-minute fast charging at -50°C.

11:45 Lithium-ion Ferrous Phosphate Battery Development, Commercialization and Future Prospects



Safak Dogu, Head of Product Development and Research, Product Development and Research Department, Pomega U.S.A.

The growing demand for LFP batteries across various applications like stationary energy storage, and electrical mobility is driven by changing ownership patterns and infrastructure requirements. The promising cycle life, cost-effectiveness, safety and power density make LFP a competitive choice, flourished by its superior cycle-life compared to NMC. Developing novel synthesis routes that are cost-effective, easily scalable, and efficient in producing LFP will be a critical step towards market and manufacturing challenges.

12:00 pm The Development of Safe 21700s using Polymer Current Collectors and All-Ceramic Separators



Edward R. Buiel, President and CEO, Coulometrics, LLC

Learn how to manufacture a >4.6Ah 21700 that will pass nail pen testing using NMC811 and graphite.

12:15 Enjoy Lunch on Your Own

CHEMISTRY, PRODUCTION, AND SCALE-UP TECHNOLOGIES FOR SOLID-STATE

1:00 Chairperson's Remarks

Timothy Zhigang Lin, PhD, CTO, Solid Energies, Inc.

1:05 Sustainable Processing of Oxide-Based Solid-State Batteries

Ruijie Ye, PhD, Postdoctoral Researcher, Material Synthesis & Processing, Forschungszentrum Juelich GmbH

Solid-state lithium batteries (SSLBs) are considered to be one of the most promising next-generation Li batteries due to their high capacity and intrinsic safety. Their sustainable processing offers additional advantages over conventional batteries in terms of ecological and economic benefits. This talk focuses on the sustainable processing of solid electrolytes and composite cathodes for oxide-based SSLBs, aiming to reduce both manufacturing costs and environmental footprint.

1:30 From Machine Learning Prediction to Commercialized Product: A Case Study on the Lithium Thioborates

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

In this talk, we will discuss how new computational approaches enabled by high-performance computing and machine learning algorithms are accelerating the traditional materials design and commercialization

Lithium-ion Battery Development & Commercialization



process for battery materials. As a case study, we present our recent positive results on a new, record-breaking, solid Li-ion conductor material Li8B10S19, which embodies the new data-driven R&D paradigm of machine learning-based discovery and human-based synthesis and scale-up.

1:55 Opportunities, Challenges, and Enabling Paths for Development and Scaling-Up of High-Energy-Density, Low-Cost, Solid-State Battery

Timothy Zhigang Lin, PhD, CTO, Solid Energies, Inc.

All-solid-state battery (ASSB) is a potentially superior successor to state-of-the-art lithium-ion batteries. Despite offering promising opportunity, ASSB needs to address a number of technical hurdles before its commercialization can be realized. This talk will discuss challenges and potentially enabling paths for further development of ASSB toward technical maturation and scaling-up, presenting our years-long efforts in overcoming these hurdles, and latest developments into ongoing pilot-scale manufacturing for future commercial production.

2:20 Elevating Solid-State Battery Research: Bridging the Gap to Serial Production

Jan Felix Plumeyer, Research Associate, Battery Production Technology, RWTH Aachen University

This presentation offers a glimpse into the future of solid-state battery research, emphasizing our planning of an advanced laboratory dedicated to near serial production. I will shed light on the challenges we anticipate in this journey, from material adaptability in cell assembly to tackling the complexities of anode production. Additionally, I will explore automated multi-layered SSB pouch cell stacking and strategies to empower various material systems.

2:45 Realization and Future Technology of Long Life and High Heat Resistance in Ceramic Packages in All-Solid-State Batteries

Genyo Kaneko, Chief Engineer, Energy Products Division OEM Battery Group, Maxell Corporation of America

Focusing on practical applications of all-solid-state batteries expected for next-generation technologies, Maxell ensures comprehensive



performance such as high safety, high durability, and wide operating temperature range. Maxell will begin commercialization in 2023, shipping first mass production in ceramic packages.

Further promoting technological innovation, we will introduce our plans for higher cell capacity and discuss applications which Maxell envisions for advanced technology.

3:15 Transition to Closing Plenary Panel

CLOSING PLENARY PANEL DISCUSSION

3:30 PANEL DISCUSSION: Overcoming the Barriers to Sustainability



Moderator: Craig Rigby, Vice President, Technology, Clarios

Navigating the hurdles toward achieving sustainability in our journey to electrify all facets of life is pivotal for a carbon-neutral future. Join our international panel of experts as they delve into vital strategies within areas such as R&D, manufacturing, recycling, and supply-chain optimization. Explore groundbreaking solutions and glean invaluable insights into the sustainable transformation of the energy storage industry.

Panelists:

Steven Christensen, Executive Director, Responsible Battery Coalition

Bryant Polzin, Process Engineer & Deputy Director, ReCell Center,

Argonne National Laboratory

Steve Sloop, PhD, President, OnTo Technology LLC

Stefan Debruyne, Director of External Affairs, SQM International

4:30 Close of Conference



High-Performance Battery Manufacturing

Global Production of Safe, Efficient, Higher-Energy Density Batteries

TUESDAY, MARCH 12

8:30 am - 4:45 pm Conference Tutorials

Choose from 16 tutorials to maximize your networking and educational opportunities

WEDNESDAY, MARCH 13

7:00 am Registration and Morning Coffee

ADVANCES IN CELL MANUFACTURING

8:00 Organizer's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

8:10 Chairperson's Remarks

Michael Fetcenko



8:15 Ultrasound Precision: Advancing Gigawatt-Scale Battery Grading, Defect Detection, and State-of-Health Analysis

Shawn Murphy, Founder and CEO/CTO, Titan Advanced Energy Solutions

Titan Advanced Energy Solutions will demonstrate how ultrasound technology can dramatically advance battery inspection and grading at gigawatt-scale. Leveraging machine learning algorithms, Titan's in-line, high-speed scanning system is the first to scan every cell in production at high-resolution, measuring SoH with 99.5% accuracy and inspecting for sub-250-micron manufacturing anomalies such as gas pockets, lithium-plating, inactive zones, underwetted regions, and non-uniformities from flawed formation or materials defects.

TITAN

8:30 Redefining Energy Efficient Dehumidification for Giga Plants

Vijay Chaudhry, PhD, President, Bry-Air (Asia) Pvt. Ltd.

Bry-Air is your partner in humidity control from Rotor manufacturing to Dehumidifier Selection, Design & Manufacturing. As we stand on the cusp of the next Era, Bry-Air continues to push boundaries, exploring new frontiers in humidity control. At the core of our advantage is the single rotor configuration, paired with novel materials. It is a revolution that propels us to be the most advanced low dew point dehumidifier in the world



8:45 Talk Title to be Announced

Simi Yu, Sales Director, Sales Dept., Zhuhai CosMX Power Battery Co., Ltd



9:05 Preparation for the Near-Future: Market & Technical Planning of the Asian xEV LIB Manufacturers

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

This presentation will provide an overview of the above cell-makers' planning, especially covering both the technical comparison, market, and product segmentation to show the future development in Asian xEV LIB manufacturers.

9:25 Sustainable Cathode Production Technologies for the TWh Era

Yuan Gao, Independent Board Director, Nano One

In this presentation we will illustrate how Nano One's technologies can help reduce these inefficiencies in cathode production which will make it

more sustainable for the TWh era that is around the corner.

9:45 Grand Opening Refreshment Break in the Exhibit Hall with Poster Viewing

10:30 Plasma-Printed Silicon Anodes

Gerrit Bockey, Research Associate, Battery Production Technology, RWTH Aachen University

Nanoloy's proprietary plasma printing process achieves a carbon/metal/oxide-on-metal fusion. This process creates an extremely stable battery active material framework that is more corrosive resistant, more electrically conductive. Plasma printing will substantially delay battery degradation, resulting in longer lasting, faster charging, higher-capacity batteries with improved performance at higher voltage and temperatures. This is all achieved at a reduced cost compared to existing battery manufacturing processes.

11:00 Redefining ESS with Next Generation Mr. Big & Mr. Giant

Wendy Yip, Marketing Director, Marketing Department, EVE ESS Ltd Co.

With the characteristics of "Efficient, Simple and Safe", Mr. flagship series products can break the limitations of traditional energy storage technology, redefine ESS, and solve the problems of economy, complexity of operation and maintenance management, and safety of large-scale energy storage power plants.



11:30 Laser Ablation of Battery Electrodes for Improved Performance: Key Considerations for Advanced Manufacturing

Bertrand J. Tremolet de Villers, PhD, Research Scientist, Materials, Chemical, and Computational Science, National Renewable Energy Laboratory (NREL)

Ultrafast laser can be used to create micro-structures in battery electrodes that greatly improve wetting and high-rate charging. Our cost-analysis simulations using the "BatPac" model indicate adoption of ultrafast-laser electrode processing adding minimal cell costs, approximately \$1.50/kWh. We present a detailed characterization of experimental laser ablation for common battery electrodes, enabling informed choices of laser parameters and accurate prediction of processing throughput.

12:00 pm Roll-to-Roll ALD Coatings for Battery Cell Interfaces

Andrew Cook, PhD, Application Manager, Beneq Oy

ALD is an enabling technology used to modify interface surfaces, which has been shown to improve battery performance.



12:15 Laser Welding Monitoring (LWM) Applied to Mass Production of Battery Modules

Marco Liberati, PhD, Technical Director, Mobility & Battery Solutions, Manz USA, Inc.

Monitoring the laser welding (LWM) process of cells in battery module manufacturing is critical to ensure the performance/cost savings/overall quality of mass production automation lines. We will show how this is achieved at Manz on our battery laser system, the BLS500. We will also present how the LWM data monitoring/analysis and representation through our smartPRODUCTIONKIT (sPK) provides the end customer with insights on how to keep the welding process in control.



12:30 Networking Luncheon





High-Performance Battery Manufacturing

1:15 Dessert Break in the Exhibit Hall with Poster Viewing

GLOBAL MARKET OPPORTUNITIES IN BATTERY MANUFACTURING

1:45 Chairperson's Remarks

Bertrand J. Tremolet de Villers, PhD, Research Scientist, Materials, Chemical, and Computational Science, National Renewable Energy Laboratory (NREL)

1:50 Review of Project Execution Models for Battery Materials and Cells Projects **HATCH**

Mark Bellino, Global Director, Battery Materials and Cells Manufacturing, Hatch

Current battery projects are facing many challenges with cost and schedule overruns, as well as quality/ramp up issues, and it is likely that much of these challenges may stem from the EPC approach, which is most popularly utilized at the moment. The challenges faced using the EPC model are unpacked and compared to alternative execution/project delivery models such as EPCM and CMAR.

2:20 Building a (Li-)Bridge: Revolutionizing the U.S. Battery Supply Chain

Christina Lampe-Onnerud, PhD, Founder and CEO, Cadenza Innovation

Li-Bridge, a public-private alliance convened by the U.S. DOE and managed by Argonne National Laboratory, outlined steps for the U.S. to double annual lithium battery revenues to \$33 billion and provide 100,000 jobs by 2030. An industry-first battery collaboration, Li-Bridge delivered its action plan in the report, "Building a Robust and Resilient U.S. Lithium Battery Supply Chain," which includes 26 recommended actions to bolster the domestic lithium battery industry.

2:50 Overcoming the Hurdles to Building Your Manufacturing Operation

Benton Blaine, Managing Director, Total Workplace - Site Selection, Cushman & Wakefield

Scott Watkins, Senior Vice President, Market Leader - Advanced Manufacturing, Clayco

This presentation will focus on which qualitative factors you should consider to ensure an ideal long-term location. Topics include weighing long-term locating decisions vs. high economic development incentives, realistic timelines for design/construction, assessment of sub-contractor networks, and integrated teaming to increase project efficiency. In addition, flexible supply chains that mitigate risk, reduce cost, and decrease installation time will be discussed.

3:20 Refreshment Break in the Exhibit Hall with Poster Viewing

PLENARY KEYNOTE

3:50 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech



3:55 Panasonic Energy's Innovation in Battery Technology and Manufacturing for Global Demand

Shoichiro Watanabe, PhD, CTO, Panasonic Energy

Panasonic Energy has been leading the development of battery industry with outstanding technology and manufacturing. To meet robust demand, we will continue to increase production capacity in North America and expand global partnerships, which will also contribute to CFP reduction and realization of sustainable society. This presentation will show the evolution of our battery business from the perspective of technology and manufacturing.



4:15 Accelerating the World's Transition to Sustainable Energy

Steve He, PhD, Manager, Cell Development, Tesla Motors

Batteries are core to Tesla – we have been developing and integrating Li-ion batteries into our electric vehicles and energy storage products since the company's inception. I will discuss the past, present, and future of our products and cell designs from the original Roadster to the Cybertruck, and our efforts to achieve our mission to accelerate the world's transition to sustainable energy.



4:35 Watching Electrolyte Move in Cylindrical Li-ion Cells and Why This Matters

Jeff Dahn, FRSC, PhD, Professor of Physics and Atmospheric Science, NSERC/Tesla Canada Industrial Research Chair, Canada Research Chair, Dalhousie University

Electrode material particles expand and contract during charge and discharge of Li-ion cells. This forces some electrolyte out of the electrode winding during charge and it must then "re-wet" the electrode winding during discharge. High resolution synchrotron X-ray CT allows images to be taken every minute. Captivating "movies" showing electrolyte motion will be shown. The impact of electrolyte motion on cell lifetime will be discussed.



5:05 Lithium Innovations Fueling Electrification

Job Rijssenbeek, PhD, Vice President of R&D, Energy Storage, Albemarle

To meet decarbonization targets and advance EV technology and innovation, we need to develop, scale, manufacture and commercialize products that are not sold today – sometimes into application spaces that don't yet exist. Critical mineral and advanced materials companies, automakers, cathode manufacturers and battery cell producers must work together to mine critical minerals responsibly, innovate, and advance battery storage technology.

5:25 Reception in the Exhibit Hall with Poster Viewing

6:30 Close of Day

THURSDAY, MARCH 14

7:00 am Registration Open

7:00 Interactive Roundtable Discussions with Coffee & Pastries

Roundtable discussions are informal, moderated discussions with brainstorming and interactive problem-solving, allowing participants from diverse backgrounds to exchange ideas and experiences and develop



High-Performance Battery Manufacturing

future collaborations around a focused topic.

TABLE 1: Battery Raw Materials Supply Chain

Moderator: Robert Privette, Manager, Business Development, Rechargeable Battery Materials North America, Umicore USA, Inc.

TABLE 2: Li-ion NMC Fast Charging New Cells for E-Mobility

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

TABLE 3: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President, Battery Solutions, E Source

TABLE 4: 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 5: Innovations in Recycling Battery Materials & Second Life

Moderator: Steven Sloop, President, OnTo Technology LLC

TABLE 6: Opportunities and Barriers to Fast Charge in Automotive and Other Applications

Moderator: Brian Barnett, PhD, President, Battery Perspectives

TABLE 7: Transformational Energy Storage Solutions for Transportation – Land, Sea and Sky

Moderator: Halle Cheesman, PhD, Program Director, Advanced Research

Program Agency, U.S. Department of Energy (ARPA-E)

TABLE 8: Safe, Scalable Lithium-Metal Battery Cells for Electric Vehicles

Moderator: Alexander Kosyakov, Co Founder & CEO, R&D, Natrion

TABLE 9: Solid-State Battery Program Update

Moderator: Denis Pasero, PhD, Manager, Product Commercialization, Ilika Technologies Ltd.

TABLE 10: Project Finance in the IRA Era

Moderator: Tom Schadewald, Director, Equity Capital Markets, Baird Investment Bank

TABLE 11: Battery Management Systems

Moderator: Sheldon Williamson, PhD, Professor & Canada Research Chair, Electrical & Computer & Software Engineering, University of Ontario Institute of Technology

ADVANCES IN CELL MANUFACTURING

7:55 Chairperson's Remarks

Yuan Gao, Independent Board Director, Nano One

8:00 Gigafactory—How to Reach Faster Production Ramp-Up to Yield Target

HATCH

Yiran Zhou, Process Engineer, Battery Cell Manufacturing, Metals, Hatch

Divyank Sood, Battery Cell Specialist, Hydrometallurgy, Metals, Hatch

Yield challenges during gigafactory production ramp-up are often costly and time-consuming to resolve, which poses a huge financial risk. Excellence in factory design and a robust system to integrate ISBL from technology providers help to address and mitigate the risks early.

8:30 Metal-Free Pumps for Contamination-Free, Accurate, Pulsation-Free Flow

Tom Evans, Market Development Manager, Netzsch Pumps North America LLC

The battery cell manufacturing process has multiple pumps performing the critical step of transferring complex fluids, from electrode slurry preparation and mixing, to the anode and cathode coating systems. This session will review emerging pump technologies for battery cell manufacturing processes, to meet ever stricter standards and achieve optimum electrode quality.

8:50 How Turnkey Solutions Can Increase Productivity

Bjoern Stoll, CEO, Digatron

Overall, turnkey solutions offer a holistic approach to high-performance battery manufacturing, addressing various challenges from design to production. Their integration, optimization, and customization capabilities contribute to higher productivity, reduced costs, and improved efficiency in battery manufacturing facilities.

9:10 Solutions for Manufacturing of Thin Lithium Metal Anodes at Scale

Marina Yakovleva, Director, R&D and New Business Development, Livent

Industry needs to monetize on and scale up innovative and sustainable solutions that can improve battery performance, safety and manufacturing efficiency of the lithium metal anode. The core of Livent technology is LIOVIX®®, proprietary printable lithium formulation. The ability to print lithium metal anodes opens the pathway for the diverse ranges of anode's width and thickness and allows cell manufacturers to easier change cell format to meet application requirements.

9:30 Technical Challenges in Battery Pack Assembly Automation

Cybernetik

Daniel Britton, National Sales Head – US Office, Sales, Cybernetik Inc

Battery pack assembly is a complex task requiring use of technologies such as precision automation, adhesive dispensing, clean-room and more, comprising of more than 50 stations handling more than 5 million data points every hour. Through our experience across multiple projects, we are sharing some of the technical challenges we faced, and how we can solve them.

10:00 Molicel's X Series in Field & Ultra-High Power, Zero Cell-to-Cell Variance Production

MOLICEL®

Nan-Hung Lester Yeh, PhD, Research & Development Manager, Advanced Battery Technologies,, E-One Moli Energy CORP

10:15 Coffee Break in the Exhibit Hall with Poster Viewing

11:00 Uncovering CryoFIB Applications for Characterizing Battery Materials

ThermoFisher Scientific

Ken Wu, PhD, Senior Product Specialist, Materials and Structural Analysis, Thermo Fisher Scientific

Electron microscopes and ion beam systems are essential tools in today's materials science fields. The FIB-SEM harnesses the power of both electrons and ions by combining a focused ion beam (FIB) and scanning electron microscope (SEM) in a single instrument. This harmony of capabilities has many uses in materials characterization, however, ion-beam-induced heating can create difficulties in addressing sensitive compounds. Therefore, the use of cryogenic conditions (CryoFIB) can be applied. In this presentation, we will discuss CryoFIB techniques, advantages, and workflows.

11:30 Enhanced Li-ion Battery Performance through Commercially Viable High-Performance Carbon Nanotubes

CHASM™

Michael Fetcenko, Chairman, CHASM Advanced Materials

The potential technical advantages of carbon nanotubes for many applications have been recognized, including for battery applications. Commercial application has been hindered by the practical obstacles of manufacturing process scaling at viable cost. CHASM Advanced Materials has developed a scalable, low cost manufacturing process



High-Performance Battery Manufacturing

which produces tunable and high purity CNT materials applicable for employment in Li-Ion batteries. CHASM's unique approach to producing CNT materials will be presented, along with performance results and production status.

12:00 pm **Electrode Manufacturing: High-Performance Coater for High OEE**

Hee-Yeon Ryu, PhD, Senior Vice President, Strategy, Hanwha Corp

We will describe the importance of manufacturing electrodes and the coater that provides high OEE to customers.

12:30 **Unlocking Silicon's Potential: Embracing Polymers beyond Carbon**



Jeff Norris, CEO, Paraclete Energy, Inc.

Silicon anodes with elastomeric polymer matrices enhance lithium-ion battery performance, overcoming carbon matrix limits. The adaptable polymer matrix enables diverse electrochemical properties, supporting various applications. This approach allows cost-effective, flexible manufacturing with lower capital expenses than hazardous silane gas-based Si production. Polymer matrices unlock silicon's superior electrochemical potential, surpassing carbon, offering sustainability and efficiency.

12:45 **Improving Battery Quality Management in Cell Manufacturing with Ultrasound Inspection and Machine Learning**



Clara Nyby, Sr Applied ML Scientist, Technology, Liminal Insights, Inc.

In this talk, we highlight the need for advanced inspection methods in cell manufacturing that deliver comprehensive

1:00 **Close of Conference**



Global Supply Chain for Battery Raw Materials

Balancing Supply, Demand, and Costs for Battery Materials

TUESDAY, MARCH 12

8:30 am - 4:45 pm Conference Tutorials

Choose from 16 tutorials to maximize your networking and educational opportunities

WEDNESDAY, MARCH 13

7:00 am Registration and Morning Coffee

GLOBAL PERSPECTIVES ON BATTERY RAW MATERIALS SUPPLY

8:00 Organizer's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

8:10 Chairperson's Remarks

Kimberly Berman, Senior Consultant, SFA Oxford

8:15 Circular Economy and Effects on the Supply Chain of Li-ion Batteries

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

The large-scale deployments of Li-ion batteries in the last decade have put pressure on governments and policymakers around the world to find sustainable ways to deal with these installed batteries upon retiring from service. This presentation discusses the economics of recycling and expected effects on the stability of the Li-ion batteries supply chain, and its impact on the battery industry in the next two decades.

8:45 IRA vs. CRMA—How North America and Europe Are Tackling the Build-Up of Upstream Battery Value Chains

Ines Miller, Team Lead Battery Cells, E Mobility, P3 Automotive GmbH

Embark on a comparative exploration of the strategic initiatives driving the United States' Inflation Reduction Act (IRA) and Europe's Critical Raw Materials Act (CRMA) as they address the establishment of resilient upstream battery value chains. Analyze divergent approaches taken by each region to incentivize domestic battery production, enhance supply chain security, and navigate the intricate landscapes of sustainable energy transition and economic growth.

9:15 Australia as an Energy Storage Powerhouse

Adam Best, Principal Research Scientist, CSIRO Manufacturing

We will describe the increasing challenge of discovering and processing primary mineral supply, and the importance of secondary resources. And lastly, we can demonstrate Australia's capability to operate the world's longest (transmission) network with 100% renewable energy as a proposed renewable energy powerhouse.

9:45 Grand Opening Refreshment Break in the Exhibit Hall with Poster Viewing

10:30 Lithium Ecosystem Evolution: Data-Driven Insights from Mine to Market

Apurba Sakti, PhD, Advisor, Data Science, Albemarle

We will present our data-driven methodology for tracking these accelerating demand dynamics across existing—and emerging—battery technologies and the corresponding response from the lithium market. As the lithium ecosystem continues to evolve over the next decade, our agile analyses provide insight into lithium's present and future.

11:00 North America's Role in the Lithium-ion Economy

Andrew Miller, COO, Benchmark Mineral Intelligence

This presentation will address lithium-ion battery supply chain dynamics: challenges & opportunities as well as raw material bottlenecks; lithium, cobalt, graphite, nickel, and financing the EV supply chain; and capital requirements to meet the EV demand of the coming decade.

11:30 Battery Raw Material Supply Response after Shortages

William Adams, Head of Battery Research, Cobalt & Lithium & Battery Materials Research, Fastmarkets

What should the market expect in terms of a supply response from battery raw material producers? What is the outlook for supply, demand, and prices in these complicated and fast-moving markets? The talk will look at recent developments in battery raw materials, the impact they've had on the supply chain, and the underlying trends in lithium, cobalt, and nickel.

12:00 pm Are There Limits to Thermal Processing of Graphite Powders at Commercial-Scale?



Speaker to be Announced, Harper International

12:30 Networking Luncheon



1:15 Dessert Break in the Exhibit Hall with Poster Viewing

GLOBAL PERSPECTIVES ON BATTERY RAW MATERIALS SUPPLY

1:45 Chairperson's Remarks

Ines Miller, Team Lead Battery Cells, E Mobility, P3 Automotive GmbH

1:50 Synergy Through Collaboration

Astrid Karamira, Sustainability and Governance Manager, International Lithium Association

Roland Chavasse will share a review of key multistakeholder projects in the lithium industry. He will look at various key developments in the global lithium value chain which support lithium producers, processors and end users.

2:10 Lack of Domestic Exploration and Production Leading to High Geopolitical Supply-Chain Risk

Kimberly Berman, Senior Consultant, SFA Oxford

Recent legislation, such as the Inflation Reduction Act (IRA), has certainly kickstarted long-overdue industry development in North America, with over \$2.8 billion allocated so far. Yet, there is little to no domestic mine production, let alone battery-grade material processing for the EV industry to grow as planned. Therefore, the US is on track to become more and more reliant on geo-politically sensitive countries to meet growth expectations.

2:30 Production Supply, Chemistry, and Sustainability of North American Cathode Active Material

Robert Privette, Manager, Business Development, Umicore Battery Materials USA Inc

Cathode material has a dominant influence on battery performance, cost, and CO₂ footprint. Supply of this key ingredient will rise sharply by mid-decade, led by high-nickel NMC and precursor at Umicore's Loyalist, Ontario plant. NMC will be complemented by the plant's provision for Mn-rich cathode, providing \$/kWh cost advantages without LFP energy density sacrifices. Umicore's use of 100% green energy for cathode production will improve EV CO₂ footprint and sustainability.



Global Supply Chain for Battery Raw Materials

2:50 Trends and Outlook on the American Li-ion Battery Market

Andrew Saucer, Market Reporter, Metal Commodities, Argus Media, Inc.

This presentation will provide a summary of outlook and trends based on Argus pricing, data, and sources on the North American battery market going into the month of the conference. In addition, updates on how nascent battery markets are developing based on market discussions will be provided.

3:20 Refreshment Break in the Exhibit Hall with Poster Viewing

PLENARY KEYNOTE

3:50 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech



3:55 Panasonic Energy's Innovation in Battery Technology and Manufacturing for Global Demand

Shoichiro Watanabe, PhD, CTO, Panasonic Energy
Panasonic Energy has been leading the development of battery industry with outstanding technology and manufacturing. To meet robust demand, we will continue to increase production capacity in North America and expand global partnerships, which will also contribute to CFP reduction and realization of sustainable society. This presentation will show the evolution of our battery business from the perspective of technology and manufacturing.



4:15 Accelerating the World's Transition to Sustainable Energy

Steve He, PhD, Manager, Cell Development, Tesla Motors
Batteries are core to Tesla – we have been developing and integrating Li-ion batteries into our electric vehicles and energy storage products since the company's inception. I will discuss the past, present, and future of our products and cell designs from the original Roadster to the Cybertruck, and our efforts to achieve our mission to accelerate the world's transition to sustainable energy.



4:35 Watching Electrolyte Move in Cylindrical Li-ion Cells and Why This Matters

Jeff Dahn, FRSC, PhD, Professor of Physics and Atmospheric Science, NSERC/Tesla Canada Industrial Research Chair, Canada Research Chair, Dalhousie University

Electrode material particles expand and contract during charge and discharge of Li-ion cells. This forces some electrolyte out of the electrode winding during charge and it must then "re-wet" the electrode winding during discharge. High resolution synchrotron X-ray CT allows images to be taken every minute. Captivating "movies" showing electrolyte motion will be shown. The impact of electrolyte motion on cell lifetime will be discussed.



5:05 Lithium Innovations Fueling Electrification

Job Rijssenbeek, PhD, Vice President of R&D, Energy Storage, Albemarle
To meet decarbonization targets and advance EV technology and innovation, we need to develop, scale, manufacture and commercialize products that are not sold today – sometimes into application spaces that don't yet exist. Critical mineral and advanced materials companies, automakers, cathode manufacturers and battery cell producers must work together to

mine critical minerals responsibly, innovate, and advance battery storage technology.

5:25 Reception in the Exhibit Hall with Poster Viewing

6:30 Close of Day

THURSDAY, MARCH 14

7:00 am Registration Open

7:00 Interactive Roundtable Discussions with Coffee & Pastries

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: Brian Barnett, PhD, President, Battery Perspectives

TABLE 7: Transformational Energy Storage Solutions for Transportation – Land, Sea and Sky

Moderator: Halle Cheesman, PhD, Program Director, Advanced Research Program Agency, U.S. Department of Energy (ARPA-E)

TABLE 8: Safe, Scalable Lithium-Metal Battery Cells for Electric Vehicles

Moderator: Alexander Kosyakov, Co Founder & CEO, R&D, Natrion

TABLE 9: Solid-State Battery Program Update

Moderator: Denis Pasero, PhD, Manager, Product Commercialization, Ilika Technologies Ltd.

TABLE 10: Project Finance in the IRA Era

Moderator: Tom Schadewald, Director, Equity Capital Markets, Baird Investment Bank

TABLE 11: Battery Management Systems

Moderator: Sheldon Williamson, PhD, Professor & Canada Research Chair, Electrical & Computer & Software Engineering, University of Ontario Institute of Technology

MARKET DEMAND FOR BATTERY RAW MATERIALS

7:55 Chairperson's Remarks

Adam Best, Principal Research Scientist, CSIRO Manufacturing

8:00 Sponsored Presentation (Opportunity Available)

8:30 Optimization of Cathode Materials for High Performance EV Batteries

Rohan Gokhale, PhD, Applied Technology Manager, Umicore Rechargeable Battery Materials

Umicore is a global leader in the battery cathode materials manufacturing space, with over 20 years of experience and expertise in development of specialized products using innovative processes, driven primarily by



Global Supply Chain for Battery Raw Materials

customer demand. This presentation will provide an overview of recent updates on localization of production in North America and toolkit used by CAM manufacturers to obtain best performance in the cathode product.

9:00 Battery Cost Review—A Deep Dive into the Key Issues Impacting the Lithium-ion Battery Market

Andrew Leyland, Co-Founder & Managing Director, SC Insights

China vs. the world: how have non-Chinese supply chains grown since the IRA? What chance for \$7,500 credits for US consumers? A look at how mining, processing, cathode, and anode capacity are evolving in the US and FTA partner countries.

9:30 Electrolytes - The Lifeblood of Any Innovative Energy Storage System



Kolja Beltrop, PhD, CTO, E-Lyte Innovations GmbH

9:45 Securing Localized, Commercial-Scale Battery Production to Leapfrog Global Supply Chain Hurdles



Rick Costantino, CTO and Co-Founder, Group14 Technologies

More global OEMs are eyeing localized battery manufacturing to ensure a resilient energy ecosystem and mitigate potentially devastating supply chain disruptions. This presentation will underscore the need for drop-in, plug-and-play silicon battery material factories that can easily be replicated anywhere in the world, pointing to Group14's Battery Active Materials (BAM) factories in North America and Asia – with Europe soon to follow – that are delivering globally to customers.

10:15 Coffee Break in the Exhibit Hall with Poster Viewing

11:00 Unlocking Vanadium: An Intercalation Cathode for Li-ion Batteries

Brian Schultz, PhD, CEO, Dimien

Dimien is commercializing the first stable high-energy lithium-ion cathode based on a new vanadium oxide called ZVO. ZVO has high energy (comparable to high-energy NMC), excellent safety with no oxygen evolution or thermal runaway up to ~300°C in the presence of commercial liquid electrolytes (comparable to safe LFP), and is produced from globally abundant and low-cost vanadium resources, including American supply.

11:30 Challenges to the Battery Raw Material Supply Chain: a Mineral Extraction Perspective

Landon Jackson, Process Consultant, Process Optimisation & Bottlenecking, Ausenco

The supply chain for battery raw materials faces constraints from a mineral extraction perspective. Limitations to world mineral reserves, current production capacity, and the ability to increase extraction rates to meet critical metal demand are explored using a critical minerals optimiser. Strategies are provided to mitigate the potential constraints in the supply chain and secure a sustainable supply of raw battery materials.

12:00 pm Sustainably Sustainable Production Processing of Cathode Active Material



Thanh Nguyen, MBA, Senior Vice President, Deployment, 6K Energy

The process for producing battery material must change to create a long-term ecosystem in the US. It must be cost-effective and environmentally friendly, thus sustainably sustainable. Requiring a process that is energy efficient, produces no waste, and can reuse virtually all byproducts by

returning them to the feedstock supply for future battery material. Learn how we are leveraging nitric acid to eliminate sodium sulfate waste and create a sustainable, circular process.

12:30 FIRESIDE CHAT: State of Battery Innovation, The Industry, and The Transition from the DOE to the Private Sector

Brian Barnett, PhD, President, Battery Perspectives

David Howell, Principal Deputy Director, Office of Manufacturing and Energy Supply Chains, United States Department of Energy; Vice President, Strategic Marketing Innovations (SMI)

For two decades Dave has led U.S. DOE activities to advance battery innovation and manufacturing. He led the development of President Biden's "100-Day Review of High-Capacity Batteries", launched critical research programs like the Battery500 Research Consortium, and was the founding Chair of the U.S. Federal Consortium for Advanced Batteries (FCAB).

1:00 Close of Conference

**TUESDAY, MARCH 12****8:30 am - 4:45 pm Conference Tutorials**

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WEDNESDAY, MARCH 13**7:00 am Registration and Morning Coffee****GLOBAL EV MARKET EXPANSION****8:00 Organizer's Remarks**

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech

8:10 Chairperson's Remarks

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

8:15 EV Sales Review for 2023, the Expectations Going Forward, and Implications for Battery Demand

Viktor Irlé, Co-Founder & Market Analyst, EV Volumes

This presentation will cover the EV Sales Review of 2023, expectations going forward, and implications for battery demand, and will share the latest insights from collecting the facts in the EV industry.

OEM APPLICATION-DRIVEN DEVELOPMENT**8:45 A Thousand Cycles—Revisiting a Long-Standing Battery Technological Goal**

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

A battery life target of one thousand cycles has often been prescribed as a suitable technology target for batteries, intended to be used in the automotive and mobility spaces. The target has regularly been altered to accommodate specific technological nuances, leading to challenges of the suitability of this target. This presentation investigates the use and practicality of the performance target as a technological goal in the ground transportation application space.

9:15 Polarization and Heat: Reducing Heat Generation in Cells by Optimizing the Recuperation Strategy

Frederik Morgenstern, Senior Battery Technology Engineer, BMW Group Johannes Wandt, PhD, Specialist, Battery Cell Technology, BMW Group

Recuperation during breaking is one of the key contributors of highly efficient EVs. While energy can be recuperated during breaking, this process inadvertently generates heat in the system, which can cause the battery to degrade faster. Here, we highlight how recuperation pulses can, instead, result in a reduction of heat-generation in cells by depolarizing them, leading to overall lower cell temperatures when compared to systems without recuperation.

9:45 Grand Opening Refreshment Break in the Exhibit Hall with Poster Viewing**10:30 Important Discoveries and Contributions toward Sustainable Batteries**

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

Discoveries are made in science and engineering every day, but usually it is difficult to see the potential impact on battery design and the industry. Commercial opportunities often arise a long time after the finding, due to

missing pieces. This talk discusses some discoveries and contributions that could be important for more sustainable batteries and are worth highlighting.

SOLID-STATE BATTERY APPLICATIONS**11:00 FEATURED PRESENTATION: New Perspective on Anode-Free All-Solid-State Batteries**

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

Storage Science, Argonne National Laboratory

Anode-free strategy is gaining more interest in recent years, due to its manufacturing simplicity and potential for high-energy-density batteries without safety compromise. However, the design constraints for anode-free batteries have been difficult to overcome. In this talk, I will give an update on our efforts to enable anode-free lithium-metal and anode-free sodium-metal batteries. We hope to discuss a few opportunities presented by such a strategy.

11:30 Status, Challenges, and Needs of Automotive Solid-State Batteries

Alvaro Masias, Supervisor, Cell Technology Research, Ford Motor Co.

Solid-state lithium-ion batteries hold great promise as a next-generation technology for automotive, but remain an unproven technology. A discussion of the status and unique challenges and needs presented by this solid-state lithium-ion battery technology will be presented and contrasted with liquid lithium-ion batteries.

SCALING PRODUCTION**12:00 pm Accelerating Scale-Up from Lab to Pilot to Full Production****VOLTAIQ**

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

Proving out your battery innovation in the lab is just the start of the journey—to have real impact, your technology needs to scale by several orders of magnitude. It's a daunting challenge that can take years, with thousands of interconnected process parameters to fine-tune. In this talk, we'll provide real examples of how companies are using Enterprise Battery Intelligence to accelerate through this transition and scale production faster.

12:30 Networking Luncheon**EVE 亿纬锂能****1:15 Dessert Break in the Exhibit Hall with Poster Viewing****OEM APPLICATION-DRIVEN DEVELOPMENT****1:45 Chairperson's Remarks**

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

1:50 Battery Electrode Manufacturing Modeling

Wayne Cai, PhD, Technical Fellow, Manufacturing Systems Research Lab, General Motors

Battery electrode manufacturing prediction models can assess manufacturing process robustness and product design sensitivity, leading to process/design optimizations and innovations. The monitoring models can detect electrode defects and process faults. This talk will discuss a research initiative on developing battery electrode manufacturing models, i.e., machine learning and multi-physics models to predict electrode and intermediate properties, and to monitor processes to detect product defects and process faults.



Advances in Automotive Battery Applications

ADVANCED BATTERY R&D FOR AUTOMOTIVE APPLICATIONS

2:20 U.S. Department of Energy R&D to Enable High-Energy-Density Lithium-Metal Anode Batteries

Simon Thompson, PhD, Battery Technology Development Manager, Vehicle Technologies Office, Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy

This presentation comprises an overview of the Vehicle Technologies Office portfolio of advanced battery R&D, with particular focus on lithium-metal battery R&D priorities and accomplishments in the context of meeting DOE targets for energy density, cycle life, and cost. It will also emphasize the importance of solid-state batteries to U.S. DOE strategy for increasing domestic lithium-based battery manufacturing and securing the U.S. position in next-generation battery innovation.

2:50 Presentation to be Announced

3:20 Refreshment Break in the Exhibit Hall with Poster Viewing

PLENARY KEYNOTE

3:50 Chairperson's Remarks

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4:15 Accelerating the World's Transition to Sustainable Energy

Steve He, PhD, Manager, Cell Development, Tesla Motors

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Jeff Dahn, FRSC, PhD, Professor of Physics and Atmospheric Science, NSERC/Tesla Canada Industrial Research Chair, Canada Research Chair, Dalhousie University

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5:25 Reception in the Exhibit Hall with Poster Viewing

6:30 Close of Day

THURSDAY, MARCH 14

7:00 am Registration Open

7:00 Interactive Roundtable Discussions with Coffee & Pastries

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Advances in Automotive Battery Applications

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ADVANCED BATTERY R&D FOR AUTOMOTIVE APPLICATIONS

7:55 Chairperson's Remarks

Jason Croy, PhD, Group Leader, Materials Research Group, Electrochemical Energy Storage, Argonne National Lab

8:00 Shaping Tomorrow's Batteries: Advancements in Conductive Electrode Coatings

Hannah Reister, Application Engineer, Surface Treatment, Cleaners & Lubricants, Henkel



This presentation will discuss conductive electrode coatings with a focus on material selection, characterization, and resulting performance. Additionally, the key principles in coating quality, conductive particles, and the adhesive component will be outlined. Finally, the session will introduce Henkel's capabilities and their latest materials for conductive electrode coatings.

8:30 Wildcat U.S. Manufacturing Plans for Advanced Cathode Materials

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

The intersection of Wildcat Discovery Technologies' materials experience with the U.S. goal of a domestic supply chain provides a unique opportunity. We will describe Wildcat's plan and progress to manufacture advanced cathode materials. Our product pipeline consists of materials that 1) provide a range of energy densities; 2) are free of cobalt and nickel; 3) show promising material safety performance; and 4) have synergies in manufacturing unit operations.

9:00 Replacing Graphite with Sila's Silicon: Shipping and Validating Today

Ernst van Nierop, PhD, Director of Strategy, Sila Nanotechnologies

As we begin the transition from fossil fuel dependency to clean and renewable-based energy, the world needs proven, dependable and tangible examples of sustainable products. 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.

9:30 Removing Restrictive Materials for a Sustainable, High Performance, and Cost-Effective Electrode Mass-Production

Nicolo Brambilla, Chief Technology Officer, Nanoramic Laboratories

Discover the impact of removing fluorinated binders and NMP solvent. Neocarbonix technology eliminates these materials from the battery, overcoming major blockers at each stage of its lifecycle, while leveraging conventional roll-to-roll coating equipment. This innovation streamlines manufacturing and recycling while enhancing the driving experience. Neocarbonix enables a 35% increase in energy density, a 27% cost reduction, and a 25% reduction in carbon footprint.

**10:00 Integrating 100% silicon anodes into EV cell architectures and roll-to-roll production at MWh scale**

Robert Anstey, CEO and Founder, GDI

Many next generation anode materials sacrifice range for fast charging, or vice versa. Silicon is the only anode chemistry that can maximize range and fast charging, however it is difficult to integrate into cells at high%. GDI has overcome this. GDI has achieved MWh scale roll-to-roll manufacturing of 100% Silicon anodes. GDI has demonstrated 3rd party integration, without high compression/pressure or prelithiation, using existing multi-amp-hour cell manufacturing to enable EV adoption.

**10:15 Coffee Break in the Exhibit Hall with Poster Viewing****11:00 Earth-Abundant Cathode-Active Materials: Research and Development Efforts at Argonne National Laboratory**

Jason Croy, PhD, Group Leader, Materials Research Group, Electrochemical Energy Storage, Argonne National Lab

The Vehicle Technologies Office (US DoE) has recently established a consortium of six national laboratories to address the challenges of enabling sustainable cathode technologies. This consortium is focusing efforts across a wide range of materials and technology readiness levels. In this presentation, we will discuss ongoing efforts within the program aimed at the design, synthesis, and characterization of Mn-rich cathodes as alternative, next-generation materials.

11:30 Increasing Battery System Performance

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

Battery systems are complex systems with the battery cell as the core technology of the system, but then integrated with multiple subsystems, including mechanical, thermal, and battery management systems (BMS). This presentation will look into the different subsystems that contribute to the overall battery system performance and opportunities for improvement in next-generation battery systems. Battery system trends in the industry will be evaluated and discussed.

11:50 Enabling High Energy Batteries: The Unveiled Function and Properties of Battery Separators

John Zhang, PhD, CTO/CSO, Polypore International LP

The battery separator innovation, production and application will be addressed. The battery separators, especially the CERAMIC coated separators, have redefined battery safety, enabled high energy density and long cycle life of lithium batteries (including claimed "Semi" Solid State Electrolyte Batteries).

12:10 pm A New Generation of Energy Storage Systems with State-of-Charge (SOC) Active Balancing for Extended Service Life of up to 30 Years

Chris Mi, PhD, Fellow, IEEE & SAE; Distinguished Professor, San Diego State University

We will discuss a novel active balancing technology developed by San Diego State University and commercialized by ReShine to deploy renewable energy storage systems. The proposed technology can extend the battery life from the current 10-year life to 30 years, significantly improve safety, and reduce maintenance. The balancing technique is based on the state-of-charge, not voltage, since LFP batteries have a flat OCV curve.



Advances in Automotive Battery Applications

12:30 Digital Twins for Battery Design and Test



Bob Zollo, Strategic Portfolio Planner / Solution Architect for Battery Testing, Automotive and Energy Solutions (AES), Keysight Technologies

When designing and validating new batteries, testing can be time-consuming, energy intensive, hazardous, and require expensive DUT and capital test assets. Using simulation and modeling, a digital twin of both the DUT and the test system provides virtual testing to shorten the time and expense of design verification. This presentation describes a software framework to achieve lower costs and faster design cycles.

12:45 Proven Reliability of TotalEnergies Immersion Cooling Technology in Application



G rard Quoirin, PhD, TotalEnergies Lubrifiants S.A.

Immersion cooling is a technology that enables ultra-fast charging of lithium batteries and provides an unprecedented level of safety. Using fluids developed by TotalEnergies, we will demonstrate the maturity of this concept through concrete examples.

1:15 Close of Conference

**THURSDAY, MARCH 14****1:00 pm Registration Open****1:00 Networking Luncheon****2:15 Dessert Break in the Exhibit Hall with Poster Viewing****TECHNO-ECONOMICS OF GRID INTEGRATION****2:45 Chairperson's Remarks***Iola Hughes, Research Manager, Rho Motion***2:50 Techno-Economics of Second-Life Grid Deployment of EV Packs***Kara Rodby, PhD, Technical Principal, Volta Energy Technologies*

To maintain range, electric vehicle batteries are typically decommissioned with 60-80% of accessible capacity remaining. It is desirable to repurpose these batteries for a "second life" before recycling, typically for stationary applications where the reduced energy density is not an issue. This talk discusses techno-economic analysis and other considerations for second-life deployment of EV packs to the grid to evaluate the market conditions for competitive feasibility.

3:20 Scaling-Up the Stationary Storage Market: Opportunities and Challenges*Iola Hughes, Research Manager, Rho Motion*

The session will cover the latest developments in the stationary storage market, looking at regional trends and how legislation is shaping this market, in particular the impact of the Inflation Reduction Act. Battery technology will be central to the session, with focus on the growing LFP market share and the emergence of alternative technologies such as sodium-ion and flow batteries, as well as our battery demand outlook for 2024.

3:50 Promoting Innovative Development with WENDING Energy Storage Battery*Yi Yao, Senior Manager, R&D, REPT BATTERO*

WENDING structure is the original design proposed by REPT to fully utilize the space inside prismatic Li-ion cells. By applying WENDING, we can achieve higher volumetric energy density while lowering the cost. With the innovation on cell structure and chemistry system, REPT will deliver 320Ah cell and 500MWh container for the Grid-Scale Energy Storage application and we believe the WENDING structure can inspire the design of Li-ion cells for the industry.

**4:20 Refreshment Break in the Exhibit Hall with Poster Viewing****POWER PARTNERSHIPS****5:00 Progress with Manufacturing and Deploying Zn-MnO₂ Batteries for Grid-Scale Applications***Gautam G. Yadav, PhD, Director, Advanced Battery Development, Urban Electric Power*

Zinc/Manganese Dioxide (Zn|MnO₂) batteries have the potential to be highly energy-dense with widely available raw materials that are low-cost and non-toxic. In this presentation, I will report on Urban Electric Power's progress in developing these batteries to meet the high energy-density with reduced cost (<\$100/kWh). I will also report on our experience manufacturing these batteries and deploying them in three use cases for the grid.

5:30 CO-PRESENTATION: Utility-Scale Battery Energy Storage Project EPC: Challenges and Opportunities*Ivan Srdjevic, Business Development Executive, Energy Storage & Solutions, Mortenson**Chris Wright, Senior Vice President, Project Technology, Spearmint Energy*

As decarbonization of the electric power system continues to take center stage, the increased integration of intermittent renewable energy on the electrical power grid is being enabled by energy storage. Battery energy storage systems not only allow excess renewable generation to be stored and released at times of higher load, but are increasingly providing reliability services to the grid throughout North America.

6:30 Close of Day**FRIDAY, MARCH 15****8:00 am Registration and Morning Coffee****EXPLORING CHEMISTRIES FOR EVOLVING AND INCREASING ENERGY STORAGE NEEDS****8:25 Chairperson's Remarks***Jocelyn Newhouse, PhD, Director, Iron Battery R&D, Form Energy***8:30 LiCAP-Activated Dry Electrode Process—A Path to Higher Electrode Performance with Significant Cost Savings***David Wojciechowski, Vice President Business Development, Business Development, LiCAP Technologies*

Energy storage is an exponentially growing industry that depends on cost competitiveness and sustainability of battery manufacturing processes. One of the most energy-consuming and environmentally problematic steps of battery manufacturing is electrode production via the "wet coating" process. LiCAP Technologies, Inc. patented the Activated Dry Electrode process, offering significant advantages over wet coating, including lower energy consumption, reduced CO₂ footprint, a smaller manufacturing footprint, and elimination of solvents.

8:45 Next generation solid-state battery: Evolutionary structure with superior performance, resource and lower cost*Dmitry Belov, PhD, Chief Scientist, ProLogium Technology***9:00 Unlocking Triple Capacity with Iron-Air Battery Advancements***Jocelyn Newhouse, PhD, Director, Iron Battery R&D, Form Energy*

Form Energy is developing a pioneering iron-air battery designed for 100-hour discharge. Our iron-air battery is uniquely suited for multi-day energy storage, and a number of advancements over the past few years have significantly enhanced performance. This presentation will give an overview of why multi-day energy storage is needed, how Form Energy's technology works, and strategies the team has employed to triple the discharge capacity of the iron electrode.

9:30 BESS Warranty & Insurance Considerations informed by Lessons Learned from Investigations*Ryan Spray, Principal Scientist, Polymer Science, Exponent.com*

Battery energy storage systems (BESS) provide numerous benefits to the grid and its users, such as backup power and improved power quality. Insurance and manufacturer warranties play a role in ensuring the economic viability and ultimate success. Exponent will discuss the



Grid-Scale Energy Storage

underlying the performance, reliability and safety considerations of BESS that feed into those products, including lessons learned from their expertise in investigating battery and energy storage failures.

9:00 -10:45 am Battery Booth Crawl with Bagels in the Exhibit Hall with Poster Viewing

10:45 Advancement of Redox Flow Battery Using Iron Coordination Compounds

Guosheng Li, PhD, Senior Scientist, Battery Chemistry & Electrochemistry Group, Pacific Northwest National Laboratory

To combat climate change and address global warming, there is a growing imperative to develop sustainable and large-scale energy storage solutions, such as redox flow battery (RFB). By far, vanadium RFBs have gained significant popularity and practicality. Nevertheless, challenges such as the high material cost of vanadium and the corrosive nature of strong acid-based electrolytes have impeded their advancements within the energy storage market.

11:15 Low Cost, Zero-Waste Electrochemical Manufacture and Cycling of High-Performance Organic Active Materials for Flow Batteries

Eugene Beh, PhD, Co-Founder & CEO, Quino Energy

Low-cost, scalable manufacturing of the quinone active material is made possible through two breakthroughs: (a) an electrochemical modification of the Marschalk reaction that uses the flow battery hardware itself, and (b) using the as-produced active material as an electrochemical shuttle to accelerate the reaction. The as-produced active material requires enjoys long lifetime and high performance and can be cycled in a flow battery without needing any workup or downstream purification.

11:45 Unlocking Atmospheric Carbon Capture Potential: The Aluminum-CO2 Battery Solution

Tom Chepucavage, CEO, Flow Aluminum

Discover how the aluminum-CO2 battery offers a breakthrough in atmospheric carbon capture. This presentation explores its electrochemical processes, electrode materials, and scalability. Learn how this innovative technology converts CO2 into valuable products while storing renewable energy, paving the way for sustainable solutions to combat climate change.

12:15 pm Enjoy Lunch on Your Own

TECHNOLOGY FOR GRID INTEGRATION

1:10 Chairperson's Remarks

Yuliya Preger, PhD, Principal Member of Technical Staff, Energy Storage Technology & Systems, Sandia National Labs

1:15 Stationary Lithium-ion Battery Storage Safety Considerations: Mitigations, Training, and Emergency Response

Stephanie L. Shaw, PhD, Technical Executive, EPRI

Stationary lithium-ion battery energy storage systems (BESS), along with other stored energy technologies, have inherent hazards that must be mitigated. This talk will provide an overview of safety considerations, including planning and design features that can be built into BESS facilities, leading practices during the construction and operation phases, safe decommissioning, planning for emergency response, impacts of failure events, and training opportunities.

1:45 Impact of Module Configuration on Battery Performance and Degradation

Yuliya Preger, PhD, Principal Member of Technical Staff, Energy Storage Technology & Systems, Sandia National Labs

Batteries are commonly connected in series and in parallel, to form modules that meet the power and energy requirements of different applications. This talk will review experimental data on the impact of different series-parallel configurations on lithium-ion module energy throughput, cell-level current balancing, and cell-level voltage divergence over the course of hundreds of cycles. These results provide a basis for assessing performance trade-offs and safety implications of different module configurations.

2:15 Multi-use Strategies for Behind-the-Meter and Front-of-the-Meter Battery Storage Applications

Matthias Vetter, PhD, Department Head, Electrical Energy Storage, Fraunhofer Institute for Solar Energy Systems ISE

For a secure and reliable power supply based on 100% renewable energy sources, decentralized and centralized battery storage systems are needed on a large scale and have to take over various tasks, such as providing grid services and storage of a surplus amount of energy to be used at a later point in time. In this context, highly-sophisticated operating control strategies are needed to enable multi-use concepts and revenue stacking.

2:45 Energy Storage Program for the Electric Grid at Oak Ridge National Laboratory

Mahalingam Balasubramanian, PhD, Distinguished Scientist & Group Leader, Electrification and Energy Infrastructures Division, Oak Ridge National Laboratory

The development and deployment of affordable, safe, large-scale energy storage is crucial for accelerating the full decarbonization of the electric grid. At Oak Ridge National Laboratory our research focuses on key topics such as the development of novel electrochemical storage concepts, ensuring the safety and reliability of battery systems, and pioneering advancements in power electronics and power conversion. This presentation showcases recent studies aimed at advancing grid-scale energy storage solutions.

3:15 Transition to Closing Plenary Panel

CLOSING PLENARY PANEL DISCUSSION

3:30 PANEL DISCUSSION: Overcoming the Barriers to Sustainability



Moderator: Craig Rigby, Vice President, Technology, Clarios
Navigating the hurdles toward achieving sustainability in our journey to electrify all facets of life is pivotal for a carbon-neutral future. Join our international panel of experts as they delve into vital strategies within areas such as R&D, manufacturing, recycling, and supply-chain optimization. Explore groundbreaking solutions and glean invaluable insights into the sustainable transformation of the energy storage industry.

Panelists:

Steven Christensen, Executive Director, Responsible Battery Coalition
Bryant Polzin, Process Engineer & Deputy Director, ReCell Center,



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Argonne National Laboratory
Steve Sloop, PhD, President, OnTo Technology LLC
Stefan Debruyne, Director of External Affairs, SQM International

4:30 Close of Conference

**THURSDAY, MARCH 14****1:00 pm Registration Open****1:00 Networking Luncheon****2:15 Dessert Break in the Exhibit Hall with Poster Viewing****ADVANCED BATTERY DEVELOPMENT****2:45 Chairperson's Remarks***John Wozniak, PhD, President, ESP Consulting***2:50 Batteries for Medical Devices***Laura McCalla, Senior Principal Scientist, Battery Research & Technology, Medtronic*

Within the medical device market, lithium-ion batteries power everything from miniature implantable products, to large hospital capital equipment. Delivering the utmost safety and reliability to our patients requires a unique focus on requirements and a clear understanding of the conditions-of-use. Here, we will examine how these aspects influence the design and use of lithium-ion cells and packs in medical devices.

3:20 The Evolution of Electrode Binders for Lithium Rechargeable Battery Applications*Gao Liu, PhD, Group Leader, Energy Storage & Distributed Resources Division, Lawrence Berkeley National Lab*

Fluorinated electrode binders are at the focal point, as the production of lithium-ion batteries has grown exponentially in the past decade for EV applications, and also, the projected growth of battery production for grid energy storage for green energy transformation. In this presentation, I will discuss the evolution of electrode binders, along with the rise of lithium-ion batteries for consumer electronics, EV, and stationary storage.

3:50 Next-Generation Lithium-ion Battery Technology Advancing Consumer Electronics*James Wilcox, PhD, Vice President, Business Development and Head of Mobility, Enovix Corporation*

Silicon has long been heralded as the next important anode material. Silicon anodes can theoretically store more than twice as much lithium than graphite anodes used in nearly all Li-ion batteries today. Dr. James Wilcox will share how Enovix' patented cell architecture solves the technical problems of silicon, producing a 100% active silicon anode battery designed to deliver high-energy density, cycle life and fast charge.

4:20 Refreshment Break in the Exhibit Hall with Poster Viewing**2023 EU REGULATORY IMPACT ON CONSUMER ELECTRONICS****5:00 The 2023 EU Battery Regulations: A Step in the Right Direction?***John Wozniak, PhD, President, ESP Consulting*

The EU Parliament adopted new battery regulations this past year. Within these regulations is a path to making all batteries easily replaceable. Although the intent is to minimize waste, there has yet to be a comprehensive study validating this path forward. Removable batteries may set back the consumer electronics clock 15 years, or more. Unintended results of this legislation will be discussed in this presentation.

ADVANCED BATTERY DEVELOPMENT & SAFETY**5:30 New Electrolyte Chemistry Unlocking Performance in Trusted Battery Technologies***Emily Dickens, Chief Commercial Officer, Octet Scientific*

Octet Scientific is revolutionizing performance in aqueous battery technologies through additive design. The electrolyte chemistry in a battery cell is critically important for performance, cost, and safety. However, current aqueous battery technologies are using off-the-shelf additives developed for other industries in their electrolyte. We will discuss how optimized additive chemistry improves energy density, lengthens battery life, and increases efficiency.

6:00 Consumer Safety: Latest Updates on UL Certification Programs for Micromobility, Portable, and Wearable Applications*Jakub Kacki, Global Business Manager, UL Solutions*

A steep rise in the use of micromobility and light EV batteries emerged across major cities in the United States and around the world. This presentation will provide an update on the 2021-2023 crisis that unfolded in New York City, and how product safety standards and third-party certification provided a solution enabling the market instead of banning it. A guide to UL battery and battery-operated product standards will be provided.

6:30 Close of Day**FRIDAY, MARCH 15****8:00 am Registration and Morning Coffee****OEM-DRIVEN DEVELOPMENT****8:25 Chairperson's Remarks***Brandon Martin, Vice President, Battery & Electric Products & Industry Affairs, Outdoor Power Equipment Institute***8:30 Flying Beyond Limits: High-Energy Solutions for Enhanced Drone Performance***Ionel Stefan, PhD, CTO, Amprius Technologies*

The presentation will focus on the application of silicon batteries for drone markets, highlighting their advantages relative to graphite cells. Amprius' silicon anode technology offers a unique combination of performance advantages, including fast charge (under 5 minutes for UAV applications), high power (10C continuous discharge rates), high energy density (over 450 Wh/kg) and long life (over 1300 cycles). These performance levels enable new applications, like electric flight and very small wearables.

9:00 Bringing Battery Technology and Features to Life in Consumer Electronics—Innovation at Dell Technologies*Rick Thompson, Distinguished Engineer, Battery Team, Dell Technologies*

Desire for battery innovation continues to grow at a remarkable pace. At Dell, we are often presented with new ideas and breakthrough technologies. This talk will introduce how we look at advancements in technology for our products, and ultimately, the experiences and features we deliver to our customers.

9:30 Unlocking Silicon's Potential: Embracing Polymers beyond Carbon*Jeff Norris, CEO, Paraclete Energy, Inc.*

Silicon anodes with elastomeric polymer matrices enhance lithium-ion



Battery Power for Consumer Electronics

battery performance, overcoming carbon matrix limits. The adaptable polymer matrix enables diverse electrochemical properties, supporting various applications. This approach allows cost-effective, flexible manufacturing, with lower capital expenses than hazardous silane gas-based Si production. Polymer matrices unlock silicon's superior electrochemical potential, surpassing carbon, offering sustainability and efficiency.

9:45 Industry Requested Cell Performance Testing and their Real-world applications.



Mrs. Chara Diaz, Program Manager, Boston and Atlanta Cell Performance Testing, Element Materials Technology

9:00 -10:45 am Battery Booth Crawl with Bagels in the Exhibit Hall with Poster Viewing

10:45 Electrification Trends in Outdoor Power Equipment

Brandon Martin, Vice President, Battery & Electric Products & Industry Affairs, Outdoor Power Equipment Institute

California has banned all new sales of fuel-powered equipment and other trends have targeted specific fuel-powered equipment. Similar to autos, a traditional ICE industry showcases battery adoption trends and hurdles within the outdoor power equipment sector. OPEI is an international trade association representing more than 100 manufacturers and their suppliers of gas and electric-powered outdoor power and transport equipment, with domestic shipments of nearly 40 million products each year.

11:15 Batteries for Outdoor Security Camera Applications

Naren Lakamraju, Senior Hardware Safety & Reliability Engineer, Amazon Ring

The global smart home security camera market size, wireless and wired combined, is increasing year over year and has reached over \$7 billion dollars in 2022. The reliability and safety performance of the battery cells in the wireless space is more demanding than ever. The talk aims to share some of the lessons learned to balance these competing priorities and to select the best cells for these adverse applications.

11:45 Characterization of Electrical Properties of Battery Slurries and Electrode Sheets or Beyond



Naomichi Miyairi, MR, Product Marketing Engineer, Hioki USA

Optimizing the performance of lithium-ion batteries (LiB) by application is a pressing matter in achieving global sustainability goals. Understanding and enhancing the performance of lithium-ion batteries is a complex process that necessitates a deep dive into the battery's design, chemistry, and performance characteristics. This presentation discusses the characterization of battery slurries and electrode sheets via electrical testing with case studies.

12:15 pm Enjoy Lunch on Your Own

OEM-DRIVEN DEVELOPMENT

1:10 Chairperson's Remarks

Naren Lakamraju, Senior Hardware Safety & Reliability Engineer, Amazon Ring

1:15 Challenges and Solutions for LFP and LMFP State-of-Charge Indication

Yevgen Barsukov, PhD, Head, Algorithm Development, Battery Power Systems, Texas Instruments, Inc.

LFP has emerged as a popular battery chemistry due to low cost and easy availability of raw materials. Energy density has been recently

improved by adding Mn, resulting in LMFP. Both chemistries have extremely flat voltage profiles, increasing accuracy requirements to the measurement system, and requiring a novel gauging algorithm. LMFP has some additional complications due to two flat portions. This presentation will discuss solutions for these problems in detail.

1:45 Adaptive Battery Usage Window: A New Smart-Charging for Next-Generation Li-ion Batteries

Naoki Matsumura, Principal Engineer, Intel

Li-ion batteries are used in many products. With the substantially increasing demand, longevity extension of the batteries is desired. Avoiding full-charging by smart-charging works for today's Li-ion batteries. However, next-generation batteries may have different degradation regions. This talk explains an example of degradation regions for the next-generation battery, and introduces an even smarter-charging algorithm, adaptive battery usage window.

2:15 Sponsored Presentation (Opportunity Available)

ADVANCED BATTERY DEVELOPMENT

2:45 Did My Battery Really Fail? Case Studies in Battery-Failure Analysis

Hernan Sanchez Casalongue, PhD, Principal, Battery and Consumer Electronics, Exponent

Now, more than ever, being able to determine if a battery was the initiator or victim of a thermal event has become critical when fielding a device containing a lithium-ion battery. In this talk, we'll highlight Exponent's experience in dealing with various types of battery fire investigations, from failure due to external heating, to user abuse, and failures due to manufacturing or design defects.

3:15 Transition to Closing Plenary Panel

CLOSING PLENARY PANEL DISCUSSION

3:30 PANEL DISCUSSION: Overcoming the Barriers to Sustainability



Moderator: Craig Rigby, Vice President, Technology, Clarios
Navigating the hurdles toward achieving sustainability in our journey to electrify all facets of life is pivotal for a carbon-neutral future. Join our international panel of experts as they delve into vital strategies within areas such as R&D, manufacturing, recycling, and supply-chain optimization. Explore groundbreaking solutions and glean invaluable insights into the sustainable transformation of the energy storage industry.

Panelists:

*Steven Christensen, Executive Director, Responsible Battery Coalition
Bryant Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory
Steve Sloop, PhD, President, OnTo Technology LLC
Stefan Debryune, Director of External Affairs, SQM International*

4:30 Close of Conference

**TUESDAY, MARCH 12****8:30 am - 4:45 pm Conference Tutorials**

Choose from 16 tutorials to maximize your networking and educational opportunities

WEDNESDAY, MARCH 13**7:00 am Registration and Morning Coffee****BATTERY SAFETY AND SHORTS****8:00 Organizer's Remarks**

Victoria Mosolgo, Conference Producer, Cambridge EnerTech

8:10 Chairperson's Remarks

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

8:15 Battery Safety at BYD

Ruidong Yang, Director, Battery Solutions Engineering of North America, BYD

8:45 Investigating the Ability of Plastic Current Collectors and Thermally Stable Separators to Isolate Internal Short

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

Cathode metallized polyester current collectors (PCC) show very consistent tolerance to nail penetration in 18650 and 21700 cell designs from one manufacturer. These designs achieve 233 Wh/kg (622 Wh/L) and 251 Wh/kg (684 Wh/L), respectively. In contrast, a 21700 achieving 272 Wh/kg and 724 Wh/L is consistently driven into TR with the same nail penetration test. Have we reached a specific energy limit for the PCCs?

9:15 Understanding of Stress-Driven Internal Short Circuit Mechanisms in Lithium-ion Batteries

Jun Xu, PhD, Associate Professor Mechanical Engineering, Spencer Lab, University of Delaware

In this study, we employ combined post-mortem characterization and multiphysics modeling to clarify the evolution of ISC modes in LIBs with high SOCs. Results discover novel phenomena for ISC and reveal the underlying mechanism.

9:45 Grand Opening Refreshment Break in the Exhibit Hall with Poster Viewing**THERMAL RUNAWAY & COMMERCIAL SAFETY****10:30 Triggering Thermal Runaway Using a Rapid Heating Approach**

Dean D. MacNeil, PhD, Senior Research Officer, National Research Council Canada

Rapidly heating a single Li-ion cell into thermal runaway (sec to <5 min) has recently been adopted as a test methodology into battery safety standards for EVs. This talk will go through the theory of the approach and show examples using different cell geometries and designs, as well as test objects (modules to full vehicles) that demonstrate this new robust and versatile abuse test methodology with minimal invasiveness.

11:00 Li-ion Cell Safety Monitoring Using Mechanical Parameters

Nicolas Guillet, PhD, Research Engineer, CEA Liten

This abstract introduces a study on ensuring lithium-ion cell safety through mechanical parameter monitoring. The research explores how monitoring mechanical aspects can enhance safety measures for Li-ion cells, offering potential advancements in battery technology and safety protocols.

11:30 Safety of Commercial Sodium-ion Cells

Judy Jeevarajan, PhD, Vice President and Executive Director, Electrochemical Safety Research Institute, UL Research Institutes

Commercial Na-ion cells were tested for performance and safety at ESRI. Performance tests included two different charge/discharge rates and three different temperatures. Safety tests included overcharge, overdischarge, external short circuits, and heating tests. The results of the research studies will be presented.

12:00 pm How Industry Collaborations Are Addressing E-Bike Battery Safety

Brian Morin, CEO, Soteria Battery Innovation Group

E-bike and e-mobility battery fires are on the rise in urban areas. Soteria and its Consortium are on a mission of using collaboration to identify best practices to eliminate the root cause of these events and use these best practices to educate the public. This presentation will highlight the results of battery pack tear downs, e-bike rider surveys, and will share a look at the best practices to improve safety.

12:30 Networking Luncheon**1:15 Dessert Break in the Exhibit Hall with Poster Viewing****PRODUCT SAFETY AND FIRST RESPONSE****1:45 Chairperson's Remarks**

Judy Jeevarajan, PhD, Vice President and Executive Director, Electrochemical Safety Research Institute, UL Research Institutes

1:50 Codes and Standards for Battery Safety

Michael O'Brian, CEO, Code Savvy Consultants and Fire Chief, Brighton Area Fire Department

This program will dive into the various changes affecting the built environment on batteries. From the proposed changes in the International Code Council Documents to the National Fire Protection Association.

2:20 Trust, but Verify

Emily Klein, Materials Scientist, Energy Assurance

Most people consider the features and quality of a product before purchasing it, but few are aware of the years of testing that happen before the product ever comes to market. Battery testing is a broad subject, but safety and reliability testing are two measures that are critical to evaluate a battery or battery pack.

2:50 How Should First Responders Handle Damaged Batteries Post-Incident?

Jimmy DeChant, HazMat Specialist, Colorado Springs Fire Department

Comprehensive review and assistance for industry and regulatory agencies in developing a standardized approach to the appropriate containment and mitigation of Li-ion batteries. First responders need to understand the risk, proper handling, and disposal of these devices. Appropriate transportation regulations and standards for damaged Li-ion devices need to be developed for large devices that do not meet special DOT permits, i.e., EV and ESS systems that have been damaged.



3:20 Refreshment Break in the Exhibit Hall with Poster Viewing

PLENARY KEYNOTE

3:50 Chairperson's Remarks

Craig Wohlers, Executive Director, Conferences, Cambridge EnerTech



3:55 Panasonic Energy's Innovation in Battery Technology and Manufacturing for Global Demand

Shoichiro Watanabe, PhD, CTO, Panasonic Energy

Panasonic Energy has been leading the development of battery industry with outstanding technology and manufacturing. To meet robust demand, we will continue to increase production capacity in North America and expand global partnerships, which will also contribute to CFP reduction and realization of sustainable society. This presentation will show the evolution of our battery business from the perspective of technology and manufacturing.



4:15 Accelerating the World's Transition to Sustainable Energy

Steve He, PhD, Manager, Cell Development, Tesla Motors

Batteries are core to Tesla – we have been developing and integrating Li-ion batteries into our electric vehicles and energy storage products since the company's inception. I will discuss the past, present, and future of our products and cell designs from the original Roadster to the Cybertruck, and our efforts to achieve our mission to accelerate the world's transition to sustainable energy.



4:35 Watching Electrolyte Move in Cylindrical Li-ion Cells and Why This Matters

Jeff Dahn, FRSC, PhD, Professor of Physics and Atmospheric Science, NSERC/Tesla Canada Industrial Research Chair, Canada Research Chair, Dalhousie

University
Electrode material particles expand and contract during charge and discharge of Li-ion cells. This forces some electrolyte out of the electrode winding during charge and it must then "re-wet" the electrode winding during discharge. High resolution synchrotron X-ray CT allows images to be taken every minute. Captivating "movies" showing electrolyte motion will be shown. The impact of electrolyte motion on cell lifetime will be discussed.



5:05 Lithium Innovations Fueling Electrification

Job Rijssenbeek, PhD, Vice President of R&D, Energy Storage, Albemarle

To meet decarbonization targets and advance EV technology and innovation, we need to develop, scale, manufacture and commercialize products that are not sold today – sometimes into application spaces that don't yet exist. Critical mineral and advanced materials companies, automakers, cathode manufacturers and battery cell producers must work together to mine critical minerals responsibly, innovate, and advance battery storage technology.

5:25 Reception in the Exhibit Hall with Poster Viewing

6:30 Close of Day

THURSDAY, MARCH 14

7:00 am Registration Open

7:00 Interactive Roundtable Discussions with Coffee & Pastries

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: Battery Raw Materials Supply Chain

Moderator: Robert Privette, Manager, Business Development, Rechargeable Battery Materials North America, Umicore USA, Inc.

TABLE 2: Li-ion NMC Fast Charging New Cells for E-Mobility

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

TABLE 3: Electrolyte Developments: New Components and Approaches

Moderator: Sam Jaffe, Vice President, Battery Solutions, E Source

TABLE 4: 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 5: Innovations in Recycling Battery Materials & Second Life

Moderator: Steven Sloop, President, OnTo Technology LLC

TABLE 6: Opportunities and Barriers to Fast Charge in Automotive and Other Applications

Moderator: Brian Barnett, PhD, President, Battery Perspectives

TABLE 7: Transformational Energy Storage Solutions for Transportation – Land, Sea and Sky

Moderator: Halle Cheesman, PhD, Program Director, Advanced Research Program Agency, U.S. Department of Energy (ARPA-E)

TABLE 8: Safe, Scalable Lithium-Metal Battery Cells for Electric Vehicles

Moderator: Alexander Kosyakov, Co Founder & CEO, R&D, Natrion

TABLE 9: Solid-State Battery Program Update

Moderator: Denis Pasero, PhD, Manager, Product Commercialization, Ilika Technologies Ltd.

TABLE 10: Project Finance in the IRA Era

Moderator: Tom Schadewald, Director, Equity Capital Markets, Baird Investment Bank

TABLE 11: Battery Management Systems

Moderator: Sheldon Williamson, PhD, Professor & Canada Research Chair, Electrical & Computer & Software Engineering, University of Ontario Institute of Technology

DATA AND SAFETY

7:55 Chairperson's Remarks

Peng Zhao, PhD, Associate Professor, Mechanical, Aerospace & Biomedical Engineering, University of Tennessee

8:00 Lithium-Ion Battery Manufacturing Safety Assessment

Honeywell

William Sudah, Industrial Fire Safety Consultant, Honeywell Fire & Safety Systems, Honeywell

Take away concrete know-how about safety risks at each stage of the Lithium-ion battery manufacturing process, required codes/standards for every production area, including various approaches AHJs have implemented to prevent/minimize fire threats. Rounding out, learn about the four stages of battery failure, how to prevent a thermal runaway with proper advanced detection, and why conventional gas detection won't prevent it. Leave equipped with best design/layout practices, and sequence of operation.



8:30 Deactivation of End-of-Life Batteries

Corey T. Love, PhD, Materials Research Engineer, Alternative Energy & Chemistry, US Naval Research Lab

This talk details the risks associated with end-of-life batteries and explores techniques for deactivating them when they reach the end of their useful life. Among these techniques, saltwater immersion shows promise, but it is hindered by slow deactivation and potential electrolyte release.

9:00 Lithium-ion Thermal Runaway—Experiments & Models for Detection and Consequences

Juliette Franqueville, PhD Candidate, The University of Texas at Austin

A summary of thermal runaway detection and consequence modeling from the UT Austin Fire Research Group. Failure detection has been performed using load cells, temperatures, gas sensors and ultrasonic systems. Multiple models have been developed to understand the thermal runaway process and its consequences. Models are presented to predict cell thermal runaway, cell-to-cell runaway propagation, gas release, fire, and explosion hazards.

9:30 Managing Battery Safety Data

Howard Alt, CEO, Micantis

Explore the critical aspects of managing battery safety data. From design and manufacturing to usage and disposal, batteries present unique safety challenges. We discuss strategies and tools for collecting, organizing, analyzing, and interpreting safety data throughout the battery lifecycle. By effectively managing battery testing data, companies can enhance product safety, minimize risks, reduce costs and ensure compliance with evolving regulations.



9:45 Enhancing Battery Cell Production with UV-Cured Coatings

Jacob Collison, Global Strategic Product Manager – Dielectric Solutions, PPG

The rapid growth of the electric vehicle (EV) industry demands innovative solutions to enhance battery performance, safety, and production efficiency. UV-cured dielectric coatings used in battery cell manufacturing provide several key advantages over the incumbent technologies. UV-cured dielectric coatings provide robust electrical insulation, enhanced lap shear strength, and ability to conform to unique geometries while enhancing overall battery safety.



10:00 Low Dew Point Solution for Lithium Battery Safety

Doug Burner, General Manager, DST AMERICA, INC.

When it comes to Li-Battery production, a temperature and humidity-controlled environment is critical. This not only ensures the safe production of the battery cells, but also ensures the machines and tooling equipment are operating at optimal levels. Desiccant dehumidification is critical for accomplishing this and DST will discuss the advantages and capabilities of these systems during this presentation.



10:15 Coffee Break in the Exhibit Hall with Poster Viewing

THERMAL RUNAWAY SOLUTIONS

11:00 Mitigating Thermal Runaway Propagation for Pouch and Prismatic Cells with Multifunctional Foams

Chuanbo Yang, PhD, Senior Engineer Energy Storage, Energy Conversion & Storage Systems Center, National Renewable Energy Laboratory

Battery pads, composed of polyurethane, silicone, or aerogel, have been reengineered to prevent thermal runaway propagation between battery

cells. We assessed the performance of these multifunctional foam pads through nail penetration testing of small battery modules, constructed with NMC cells and featuring these pads placed between the cells. This study covers not only pouch cells, but also prismatic cells, aiming to provide a comprehensive evaluation of thermal runaway mitigation requirements.

11:30 Aerosol Emission during Li-ion Battery Thermal Runaway

Peng Zhao, PhD, Associate Professor, Mechanical, Aerospace & Biomedical Engineering, University of Tennessee

We present experimental data and analysis on aerosol emission during Li-ion battery thermal runaway. Both engine exhaust particle sizer and aerodynamic particle sizer are coupled with the accelerating rate calorimeter to sample particles ranging from 5.6 nm to 560 nm, and from 0.5 to 20 microns respectively. Multimodal particle distribution has been observed to shed light on fire safety and environmental & inhalation hazards of particle emissions during thermal runaway,

12:00 pm Advancing Battery Pack Safety: Integrating Hot Particle Filters and Sensors into Venting Units

Michael Harenbrock, PhD, Principal Expert, Engineering Electric Mobility, MANN+HUMMEL GmbH

International regulations raise the bar for battery pack safety by mandating that passengers shall have at least 5 minutes for safe egress from vehicles—from first cell failure to battery fire. As hot particles play an important role in vent gas ignition, the presentation will show how effective hot particle filters can be designed and integrated into venting units, with additional early-warning gas sensors for enhanced pack safety management.

12:30 SafeCore - An internal Fuse to Help Prevent Thermal Runaway

Matthew Wang, PhD, Vice President, Technical Programs, Amionx

Amionx has successfully transferred its patented SafeCore technology to multiple manufacturers to enhance their cell safety performance. In this presentation, we will discuss the challenges and successful outcome in scaling from our pilot line to a full production environment. SafeCore acts like an internal fuse to help prevent thermal runaway. The process to include SafeCore in manufacturing requires no special equipment or processes in a battery factory.



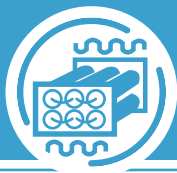
12:45 Increasing Success and Safety: Applying Lean Methodologies to Battery Testing

Robert Laudisi, Applications/Mechanical Engineer, Associated Environmental Systems

Practicing and applying concepts in lean methodologies enhance the safety and efficiency of battery testing processes. This practice involves creating specialized scenarios for managing high-density testing in smaller batches, leading to increased safety measures and a reduction in the cost per testing channel. In certain applications, larger batch testing in safer environments may be necessary. We will guide you through the steps to take for a safer, more lean approach.



1:00 Close of Conference

**THURSDAY, MARCH 14****1:00 pm Registration Open****1:00 Networking Luncheon****2:15 Dessert Break in the Exhibit Hall with Poster Viewing****BATTERY SAFETY AND BMS****2:45 Chairperson's Remarks**

Rengaswamy Srinivasan, PhD, Principal Professional Staff Scientist, Research & Exploratory Development, Johns Hopkins University Applied Physics Laboratory

2:50 Battery Management Systems & Engineering

Christina Peabody, Hardware Engineer, Google Inc.

Advanced, high-power batteries are key to datacenter power systems. Li-ion batteries are a common choice for datacenter energy storage systems, with significant power density and longevity benefits when appropriately designed to address safety concerns. This talk will discuss the technical challenges of designing Li-ion batteries and management systems for hyperscale datacenters. Specifically, I will address how to design batteries for high-reliability IT systems in a large, distributed network.

3:20 Paying it Forward: Reaping the Benefits of a Cell to Systems Approach to BMS Development

Shane Davies, Director, Vehicle Battery Systems, Nyobolt

I'll discuss Nyobolt adopting a cell to systems approach to BMS development. I'll highlight some of the advanced techniques we use to manage our ultra-fast charging cells and how the approach is reciprocated by feeding detailed application knowledge back into the cell development, which ensures we develop state of the art cells that address the critical needs of many different electrification industries.

3:50 Exciting New Possibilities for BMS Development with a State-of-the-Art Test and Emulation System

Don Wright, VP of Engineering, Unico

BMS development and validation often require high current cell cyclers as well as add-on devices for EIS, waveform capture, and more. While wide bandgap power electronics can reduce the needed footprint in the facility, these add-ons need additional space. This presentation will dive into how the advanced functionality of Unico's new Cell Test Product line can help you achieve your BMS development targets without the need to add additional external devices.

**4:20 Refreshment Break in the Exhibit Hall with Poster Viewing****BMS & TESTING****5:00 Internal Temperature and BMS Algorithms Observability**

Rengaswamy Srinivasan, PhD, Principal Professional Staff Scientist, Research & Exploratory Development, Johns Hopkins University Applied Physics Laboratory

EIS-based internal temperature monitoring has attracted increased attention for improving the safety of batteries in grid-energy storage and electric vehicles. Large-format cells have driven down cost and simplified battery pack design, inevitably reducing the number of thermal/electrochemical observables in BMS algorithms for securing battery performance and safety. In this talk, we will explore internal temperature estimation versus BMS algorithm observables, critical for the reliability and profitability of largescale battery-powered applications.

5:30 In-situ Lithium Plating Detection via Pseudo-EIS

Ian Smith, Manager R&D, Electrified Powertrain, Southwest Research Institute

Given the industry push towards extreme fast-charging, there is an increased need to detect lithium plating in real time and adjust fast-charge profiles to maximize charge rate without compromising safety or longevity. This presentation will cover an *in-situ* lithium plating detection method using pseudo-EIS, which can be incorporated into battery management systems. The detection method was demonstrated on an NMC 21700 cell and plating was verified via DPA.

6:00 Safety and Aging Behavior of Commercial Cylindrical Batteries with Different Cathode Chemistries

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

The safety of aged lithium-ion batteries beyond a state of health of 80% was investigated for cylindrical type 21700 cells with different chemistries. They have been studied in Heat-Wait-Seek tests for thermal abuse by means of Accelerating Rate Calorimetry (ARC). The presentation will cover both the degradation during aging, as well as the thermal runaway performance after aging.

6:30 Investigating Entropy Changes in Lithium-ion Batteries by Reversible Heat Characterisation Methods

Dominik Droese, Electrical Energy Storage Technology, Institute of Energy and Automation Technology, Technische Universität Berlin

The talk covers the entropic heat that occurs in lithium-ion batteries. Measurements show the significant influence of material mixes on thermal behavior, causing SOC-dependent differences in cell heating. Multiple test approaches covering a broad spectrum of different cell sizes and chemistries will be discussed. The contribution of both half-cells on the overall heat generation is shown for exemplary material combinations and the corresponding behavior of automotive-sized cell formats.

7:00 Close of Day**FRIDAY, MARCH 15****8:00 am Registration and Morning Coffee****LIFETIME PREDICTIONS****8:25 Chairperson's Remarks**

Nikolaus Keuth, PhD, Senior Group Product Manager, IODP XI Data Analytics Solutions, AVL List GmbH

8:30 Early Fault Detection in Lithium-Ion Batteries with Smart Battery Management Systems

Kanthi Latha Bhamidipati, Early Fault Detection in Lithium-Ion Batteries with Smart Battery Management Systems, High-Voltage Battery Systems, IAV Automotive inc.

Our study focuses on risk mitigation in lithium-ion batteries using various fault detection algorithms for Battery Management Systems (BMS). We sidestep resource-consuming physical tests by employing electro-physicochemical models to simulate different fault scenarios. Using readily available sensor data, we aim for simple, cost-effective detection methods. Our research offers essential insights into enhancing battery safety and efficiency, and it paves the way for leveraging AI and machine learning in future battery development.





Battery Management Systems

9:00 Battery Health Monitoring: Integrating Data Analytics, Modeling Techniques, and Anomaly Detection for Enhanced Electric Vehicle Performance

Nikolaus Keuth, PhD, Senior Group Product Manager, IODP XI Data Analytics Solutions, AVL List GmbH

In today's and future sustainable mobility, electric powertrains play a pivotal role. Among all the components of electric vehicles, the battery holds the highest value. For manufacturers and mobility providers, the competition is determined by the total cost of ownership (TCO). To balance the reduction of TCO and battery costs while ensuring optimal performance, range, efficiency, and most importantly, lifetime, the continuous monitoring of the battery during operation is inevitable.

9:30 The Threat of Thermal Runaway - How Fike Blue Makes the Deployment of an ESS into Populated Areas Possible

Thomas Farrell, MSc, Manager, Test & Validation at Fike Corporation, Fike Corporation

Fike will discuss thermal runaway dangers with energy storage systems & how this hazard has hindered ESS deployment in populated areas and renewable energy progress.

Fike Blue, the world's first tested & patented thermal runaway suppressant, will make ESS deployment in urban settings possible. This revolutionary thermal runaway suppressant will be explored and Fike's battery testing and system design capabilities to meet UL 9540A requirements will be examined.

9:00 -10:45 am Battery Booth Crawl with Bagels in the Exhibit Hall with Poster Viewing

CONTROLS

10:45 Understanding Self-Discharge by Modeling Cell Voltage Decay under Open-Circuit Conditions

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

When a battery rests in an open-circuit condition for an extended period, its voltage is observed to decay. This phenomenon has been called "self-discharge" and arises due to both reversible and irreversible mechanisms. Models that quantify these mechanisms can help a battery-management system predict capacity loss. This talk presents models of self-discharge mechanisms and shows how they accurately predict self-discharge voltage across a range of cell SOC and temperature.

11:15 A Lumped-Parameter Lithium-ion Single-Particle Model (SPM) for Estimation and Advanced Control

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

State-of-the-art battery management systems (BMS) rely on accurate battery models and well-designed algorithms to ensure reliable and safe operation. The most electrochemically informative models are physics-based, though these are inherently complex. Reduced complexity, physics-based single-particle models (SPM) are shown to be excellent candidates for next-generation BMS applications.

11:45 Sponsored Presentation (Opportunity Available)

12:15 pm Enjoy Lunch on Your Own

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING FOR BMS

1:10 Chairperson's Remarks

Lin Liu, PhD, Associate Professor, Mechanical Engineering, University of Kansas

1:15 Data-Driven Prognosis of Lithium-ion Batteries Thermal Runaway: A Novel Machine Learning Approach

Lin Liu, PhD, Associate Professor, Mechanical Engineering, University of Kansas

Thermal runaway, recognized as one of the major obstacles in the safe performance of lithium-ion batteries, has seriously hindered their large deployment. Therefore, it is crucial to develop new approaches that can accurately predict the failure of lithium-ion batteries and prevent catastrophic incidents. For this purpose, this study focuses on analyzing the failure of lithium-ion batteries due to the occurrence of thermal runaway using a data-driven framework called data-driven prognosis.

1:45 Blending Physics and Machine Learning for Battery Optimal Control and Monitoring

Dong Zhang, PhD, Director, Energy Systems Controls Laboratory, University of Oklahoma

This talk will highlight the application of physics-informed neural network and imitation learning.

2:15 Machine Learning in Lithium-Sulfur Battery Modeling and Control: Key Challenges and Opportunities

Hosam K. Fathy, PhD, Mechanical Engineering, University of Maryland College Park

The talk explores solid-state and liquid electrolyte lithium-sulfur batteries' potential advantages over lithium-ion batteries, highlighting modeling, control, and machine learning opportunities in battery dynamics.

2:45 Next-Generation Intelligent Battery Management System with Enhanced Safety for Transportation Electrification

Chao-Yang Wang, PhD, William E. Diefenderfer Professor, Mechanical Engineering, Pennsylvania State University

Range anxiety is a key reason that consumers are reluctant to embrace electric vehicles (EVs). However, none of today's EVs allow fast charging in cold or even cool temperatures due to the risk of lithium plating, the formation of metallic lithium that drastically reduces battery life and even results in safety hazards. Here, we present an approach that enables 15-minute fast charging of Li-ion batteries at any temperature (-50 °C).

3:15 Transition to Closing Plenary Panel

CLOSING PLENARY PANEL DISCUSSION

3:30 PANEL DISCUSSION: Overcoming the Barriers to Sustainability



Moderator: Craig Rigby, Vice President, Technology, Clarios

Navigating the hurdles toward achieving sustainability in our journey to electrify all facets of life is pivotal for a carbon-neutral future. Join our international panel of experts as they delve into vital strategies within areas such as R&D, manufacturing, recycling, and supply-chain optimization. Explore groundbreaking solutions and clean



Battery Management Systems

invaluable insights into the sustainable transformation of the energy storage industry.

Panelists:

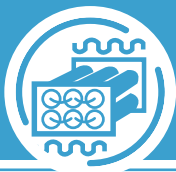
Steven Christensen, Executive Director, Responsible Battery Coalition

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

Steve Sloop, PhD, President, OnTo Technology LLC

Stefan Debryne, Director of External Affairs, SQM International

4:30 Close of Conference

**THURSDAY, MARCH 14****1:00 pm Registration Open****1:00 Networking Luncheon****2:15 Dessert Break in the Exhibit Hall with Poster Viewing****MATERIALS DISCOVERY AND DEVELOPMENT****2:45 Chairperson's Remarks***Chen Ling, PhD, Principal Scientist, Toyota Research Institute of North America***2:50 High-Throughput Computation Design for Materials***Chen Ling, PhD, Principal Scientist, Toyota Research Institute of North America*

Lethargic oxygen evolution reaction (OER) hinders proton exchange membrane water electrolyzer adoption for green hydrogen production. While iridium- and ruthenium-based catalysts are prevalent, this study proposes a high-throughput screening approach, predicting 61 potential acid OER candidates from 6912 pyrochlore compounds, including promising p-block metal dopants. These findings highlight pyrochlore compounds as versatile materials for various applications.

3:20 Machine Learning and Robotic Experimentation to Accelerate Battery Materials Innovation*Venkat Viswanathan, Assistant Professor, Mechanical Engineering, Carnegie Mellon University*

This talk discusses the integration of machine learning and robotic experimentation for rapid advancement in battery materials, offering insights into the cutting-edge developments driving innovation in energy storage.

3:50 Empowering Product OEMs with Unique Battery Performance Budgets*Daniel Higgs, PhD, Director of Business Development, Sales & Marketing, Iontra Inc*

Most people don't realize that batteries can perform way better than they usually do - if they're charged correctly. Iontra has developed a charge control technology that improves performance by maintaining a uniform current density. This talk presents electrochemical data and customer case studies showing how charging alone can double the cycle life and charge speed. Don't believe it? Contact daniel.higgs@iontra.com to set up a no-cost proof of concept project.

4:20 Refreshment Break in the Exhibit Hall with Poster Viewing**AI IN APPLICATIONS****5:00 Air Power: Lithium-ion Batteries***Jason Boyer, Head of Defense and High Performance Racing Program, Aerospace Defense Performance Division, SAFT America, Inc.*

From F35 to F1: an overview of Saft Power Capability. Saft has established a market-leading position in providing batteries with very-high power capability. Recent efforts have led to an improvement in various dimensions of Saft's very-high power-capable products, making them even more well-suited for the applications in which they are used. A summary of the work undertaken and the performance advantages that have resulted is presented.

5:30 AI for Medium- and Heavy-Duty Electric Vehicles*Rajit Gadh, PhD, Professor, Mechanical & Aerospace Engineering, University of California Los Angeles*

The talk will focus on the opportunity and challenges associated with medium- and heavy-duty electric vehicles and their impact on operations, infrastructure, and the electric grid.

6:00 Transforming Battery Data into Actionable Business Insight for the Automotive Industry*Tal Sholklipper, PhD, CEO & Co-Founder, Voltaiq, Inc.*

Optimization of lifetime performance, early identification of anomalies during production, and description of the health of the fleet are just some of the imperative insights that a battery analytics solution should provide. Enterprise Battery Intelligence leverages best-in-class battery data analytics to provide OEMs with a digital thread across their battery lifecycle. We will discuss why this digital thread is business-critical and will provide use cases from the automotive industry.

6:30 Close of Day**FRIDAY, MARCH 15****8:00 am Registration and Morning Coffee****8:25 Chairperson's Remarks***Eli Leland, PhD, CTO and Co-Founder, Voltaiq, Inc.***AI FOR BATTERY DEVELOPMENT****8:30 Electrolyte Formulation Design for Lithium Metal Batteries with AI***Ying Shi Teh, Research Scientist, NobleAI*

Electrolyte engineering is a critical strategy for improving battery performance. Learn how Science-Based AI models optimize electrolyte formulation for lithium metal batteries using literature-extracted experimental data. Discover the role of these models in suggesting promising electrolytes for the next generation battery development.

**BATTERY DATA****9:00 Accelerating battery R&D using physics-based models***Valentin Sulzer, CEO, Ionworks Technologies Inc*

Battery R&D is expensive and time-consuming due to the need to run many long experiments with expensive equipment. but physics-based modeling dramatically reduces these costs by replacing some experiments with simulations. In this presentation, we showcase PyBaMM, a popular open-source package for physics-based battery simulations. We then show how to build physics-based models from data, and demonstrate some practical examples of how to use these models to accelerate R&D.

**9:30 SEPs: How the Battery Industry Can Benefit from Standardization and Patent Cooperation***Hyun Jin (HJ) In, Principal, Fish & Richardson**Won Yoon, Principal, Fish & Richardson*

Standardization is poised to dramatically impact the battery industry. Efforts are underway to establish & promulgate global standards for various aspects of battery technology (i.e. electric vehicle charging and battery safety). Due to its ubiquity, standardization can raise fundamentally important issues with respect to IP rights. We will address





how the battery industry can benefit from standardization and patent cooperation, and how individual companies can position themselves to reap those benefits.

9:00 -10:45 am Battery Booth Crawl with Bagels in the Exhibit Hall with Poster Viewing

MANUFACTURING

10:45 Battery Lifetime Prediction with Machine Learning: From Laboratory Data to Field Data

Weihan Li, Young Research Group Leader, RWTH Aachen University

Reliable and accurate degradation prediction remains challenging due to the nonlinear nature of lithium-ion batteries that stems from internal electrochemical reactions and intrinsic parameter variability across cells. In this talk, we will introduce our current work in battery ageing trajectory prediction with machine learning with case studies of both testing data in the laboratory and large-scale field data from 60 electric vehicles.

11:15 Digital Twins for Accelerated Optimization of Battery Manufacturing Processes

Alejandro A. Franco, PhD, Professor, Reactivity & Chemistry of Solids Lab, University of Picardie Jules Verne

The manufacturing process of lithium-ion batteries is a complex procedure that encompasses multiple steps and various parameters. It is crucial to develop tools that can facilitate the preparation of future gigafactory workers for this intricate task. In this presentation, I will introduce a series of innovative virtual reality digital twins that have been developed in my research group.

11:45 Integrating AI and Quantum Simulation for Enhanced Prediction of Battery Capacity Fade and Cycle Life



Ang Xiao, Dr., Technical Lead, AI & Quantum Application, SandboxAQ

Predicting battery degradation is pivotal for advancing material research and unlocking opportunities in battery design, utilization, testing, and recovery. Traditional models and machine learning techniques often fall short in capturing these characteristics. In this talk, we will discuss the integration of artificial intelligence and quantum simulation to predict battery performance degradation on a comprehensive battery dataset provided by a commercial cell maker.

12:15 pm Enjoy Lunch on Your Own

DATA AND AGING

1:10 Chairperson's Remarks

Gerald Sammer, PhD, Principal Business Development Manager, Integrated & Open Development Platform, AVL List GmbH

1:15 Application of Physics-Guided Approach to Support Long-Term Predictions of Battery Life

Kevin L. Gering, Distinguished Staff Scientist, Energy Storage Technologies, Idaho National Laboratory

Proliferation of battery energy storage systems (BESS) carries a decision hierarchy that spans cell design, performance benchmarking, aging trends, and application matching. Ultimate disposition of used BESS considers second-use versus materials-recycle. INL tools support this hierarchy through a physics and AI platform that predicts battery aging based on arbitrary duty-cycle inputs and materials attributes. Battery aging can be tracked through first-use and into second-use options.

1:45 Cut Development Time by Virtual Testing and AI-Based Aging Prediction

Gerald Sammer, PhD, Principal Business Development Manager, Integrated & Open Development Platform, AVL List GmbH

How can the time-to-market of new batteries and electrical vehicles be shortened? Virtual testing can cut development and test time in different use cases like cell aging prediction using neural networks or battery degradation modelling using machine learning. This presentation explains AVL's approach on how to optimize battery development and testing with a comprehensive methodology supported by a dedicated software solution open for any test equipment hardware.

2:15 Health-Aware Fast-Charging Control of Lithium-ion Batteries

Chao Hu, PhD, Associate Professor, Mechanical Engineering, University of Connecticut

This talk will discuss the long-term testing and methodology development efforts for adaptive health-aware derating of charging rates led by a collaborative team of researchers at the University of Connecticut, the University of South Carolina, and the University of Delaware.

2:45 From Battery Development to Battery Passports: Electrochemical Insights at Scale

Eli Leland, PhD, CTO and Co-Founder, Voltaiq, Inc.

In this talk we'll discuss how companies can use Enterprise Battery Intelligence to leverage this compliance data to streamline supply chains, optimize quality, and maximize residual value in first- and second-life applications and recycling.

3:15 Transition to Closing Plenary Panel

CLOSING PLENARY PANEL DISCUSSION

3:30 PANEL DISCUSSION: Overcoming the Barriers to Sustainability



Moderator: Craig Rigby, Vice President, Technology, Clarios
Navigating the hurdles toward achieving sustainability in our journey to electrify all facets of life is pivotal for a carbon-neutral future. Join our international panel of experts as they delve into vital strategies within areas such as R&D, manufacturing, recycling, and supply-chain optimization. Explore groundbreaking solutions and glean invaluable insights into the sustainable transformation of the energy storage industry.

Panelists:

Steven Christensen, Executive Director, Responsible Battery Coalition
Bryant Polzin, Process Engineer & Deputy Director, ReCell Center, Argonne National Laboratory
Steve Sloop, PhD, President, OnTo Technology LLC
Stefan Debryyne, Director of External Affairs, SQM International

4:30 Close of Conference

HOTEL & TRAVEL INFORMATION

Conference Venue & Host Hotel:

Loews Royal Pacific Resort
6300 Hollywood Way
Orlando, FL 32819 USA

Discounted Room Rate: \$285 s/d
Deadline: February 12, 2024

Overflow Hotel:

Loews Sapphire Falls Resort
6601 Adventure Way
Orlando, FL 32819

Discounted Room Rate: \$259 s/d, \$298 Pool View s/d
Deadline: February 12, 2024

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2023 Sample Attendee List

 Product Developer, Corp Labs	 Dir R&D, Thoratec	 VP, E Mobility & Powertrain Systems	 Principal GCM Battery Strategy, Devices & Svcs	 Chief Engineer, Powersports Development	 Sr Mgr Battery Product Dev, Engineering Analysis & Simulations Grp	 Principal Materials Science Engineer, Applied Materials Energy Systems	 Sr Battery Technology Engineer, Research & New Technologies & Innovations	 Battery Technology Mgr	 Sr Engineer Dev, Battery Team
 Sr Dir, Global Procurement	 Global Technology Mgr Electrification, Eaton Research Lab & Energy Systems	 Member of Tech Staff	 General Engineer	 Exec Program Dir Advance Mfg, Advanced Mfg	 GM & Dir R&D, R&D Chemical & Materials Systems Lab	 Hardware Engineer	 New Business Incubation & Innovation Lead, Solutions Innovation	 Chief Scientist, Strategic Research	 Chief Scientist, Strategic Research
 Sr Mgr, FMT	 Sr Staff Engineer, Battery	 Sr Battery Design Engineer, Electric Powertrain	 Sr Research Mgr, Open Innovation	 Sr Systems Engineer	 Software Engineer Controls, MIT Driverless	 Principal Systems Engineer, HV Battery Technology & Powertrain & eDrive	 Battery Cell Engineer	 Mgr, Carbon	 Asst Dir of Energy Conversion, Power Systems
 Research Scientist Process Science & Engineering, Chemistry & Nanoscience Ctr	 Dir Resource Dev	 Sr Engineering Mgr	 VP Industrial Metrology	 Technology Planning	 Dir Energy R&D Ctr	 Dir Dev, Emerging Energy Batteries	 Head, Authorities & Tech Regulations	 Sr Research Engineer, Electrochemistry	 Strategy Leader, Energy & Utilities Industry
 Dir Engineering, Electrical Systems	 Sr VP Powertrain & Energy Engineering	 Sr Engineer, Purchasing Supplier Dev	 General Engineer, Engineering	 Electrical Engineer	 Sr Supplier Quality Engineer, Battery Electric Vehicle	 View More Attendees			

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