9 - 10 July 2025

bestmag

The international quarterly for the battery technology industry

International Battery Exhibition & Conference

Event preview in association with

BATTERY CELLS & SYSTEMS EXPO

The Battery Cells & Systems Expo returns to the NEC Birmingham this July at a pivotal moment for the UK's battery industry. With record levels of public and private investment and growing momentum across the supply chain, the sector is stronger than ever. Backed by significant funding from the UK Government and transformative commitments from major players such as Agratas, AESC, and JLR, the UK is rapidly becoming a global hub for battery innovation and manufacturing.

This year's show brings together the full value chain — from materials and components to cell manufacturing, testing, and integration — under one roof. With world-leading companies including CATL, UKBIC, JLR, Ford, Valeo, Rolls-Royce and Williams Grand Prix Technologies participating, the event is set to showcase the cutting-edge technologies and collaborations shaping the future of energy storage and electrification.

As the battery and EV sectors continue to evolve at pace, Battery Cells & Systems Expo provides a vital platform for engineers, business leaders, and policymakers to connect, share knowledge, and drive forward the innovations needed to power a net zero future. Co-located with Vehicle Electrification Expo, The Advanced Materials Show and The Advanced Ceramics Show, these co-located events are set to attract over 5,000 attendees, 300 exhibitors and 100 speakers. It's a must-attend event for anyone serious about the next generation of transport, energy, and manufacturing solutions.

Join two days of innovation, insight, and peer-to peer discussions on how to move the European industry forward successfully at one of the most anticipated events in the battery design, manufacturing and wider vehicle electrification industry.

This highly regarded industry event brings together senior leaders from car manufacturing, battery cell producers, pack manufacturing, and tier-one integrators to shape a successful future for design, development, investment, regulations, sustainability and commercial strategies.

Three theatres will dive deeper into the key challenges and opportunities facing the sector, creating a truly comprehensive experience with dynamic content, networking opportunities and expert-led interactive sessions.

Five Reasons Why You Should Attend

1. **Explore Cutting-Edge Technologies Across Multiple Sectors**
   Stay ahead of the curve by discovering the latest breakthroughs in battery technology, energy storage systems, vehicle electrification, advanced materials, and ceramics. Explore real-world innovations that can enhance performance, reduce costs, and accelerate your development cycles.
2. **Connect with a Diverse and Influential Network**
   Take advantage of dedicated networking receptions and meet thousands of professionals from across the battery, electrification, materials, and ceramics value chains. Build strategic partnerships with manufacturers, engineers, suppliers, researchers, and policymakers, all under one roof.
3. **Gain Critical Insights from Industry Leaders**
   Attend a multi-track, expert-led conference programme covering the most pressing topics from market trends and technological advancements to evolving regulations and policy updates. Equip yourself with the insights needed to stay compliant, competitive, and forward-thinking.
4. **Collaborate on Industry-Wide Challenges**
   Engage in cross-sector conversations focused on shared challenges such as decarbonisation, circularity, and supply chain resilience. Work collaboratively with thought leaders and solution providers to find scalable strategies that move your business and the industry forward.
5. **Attend for Free and Access Ongoing Value**
   Enjoy complimentary access to all four co-located expos and six conference theatres. Plus, attend round tables and workshops with some of the industry's most influential companies. Receive post-show access to presentations and session recordings, so you can revisit key insights and extend the value long after the event ends.

Show Overview

Day 1 - Wednesday 9th July		Day 2 - Thursday 10th July	
Exhibition	09:30 – 16:30	**Exhibition**	09:30 – 16:00
Conference Theatres	09:45 – 16:30	**Conference Theatres**	09:50 – 16:00
Technology Showcase Presentations	10:00 – 15:50	**Technology Showcase Presentations**	10:00 – 15:50
The Interactive Sessions	10:00 – 15:10		
Networking Receptions	16:30 - 17:30		

Social Media

Linkedin/Facebook/Instagram - Battery Cells & Systems Expo **X -** BatteryCellExpo #BCS25

featuredspeakers

Ruth Nic Aoidh
Director of Vehicle Programmes, JLR

Andy Palmer
Chair, Inobat

Dr. Daniel Benchetrite
Battery Management Systems Director, Valeo

Professor Isobel Sheldon OBE
Global CEO, Western CAM Inc

Graeme Purdy
CEO, Ilika

Professor Martin Freer
CEO, The Faraday Institution

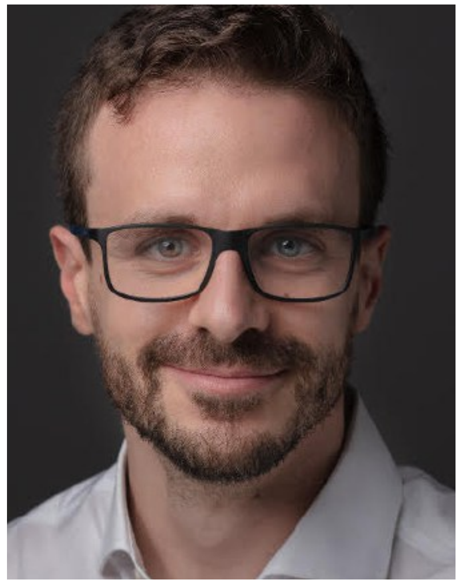
Dr. Bahareh Yazdani
Global Head of Batteries - Technical Authority, Ricardo

Dr. Allan Patterson
Head of Battery Development, Fortescue Zero

Dr. Neelam Mughal
Knowledge Transfer Manager Advanced Materials, Innovate UK Business Connect

Marco De Luna
Lead Product Manager - Battery Value Chain, Stellantis

Dr. Le Anh Ma
Business Development Manager, Battery Division, ABB



Dr. Ulderico Ulissi
Head of Overseas Tech/ Start-up Co-operation, CATL

Driving innovation in battery technology with WAB process technology solutions

Understanding how batteries work is crucial for optimising production processes. A battery operates by converting chemical energy into electrical energy, facilitated by four key components: the anode, cathode, separator, and additives. The anode (e.g., graphite) releases electrons, while the cathode (e.g., LFP: lithium iron phosphate) receives them, ensuring efficient energy transfer. The separator prevents short circuits and additives enhance battery stability and longevity.

WAB's advanced milling solutions significantly improve battery material processing. A study on grinding LFP as cathode material demonstrated the superior performance of the DYNO®-MILL UBM compared to conventional solutions, achieving fine particle sizes with greater efficiency.

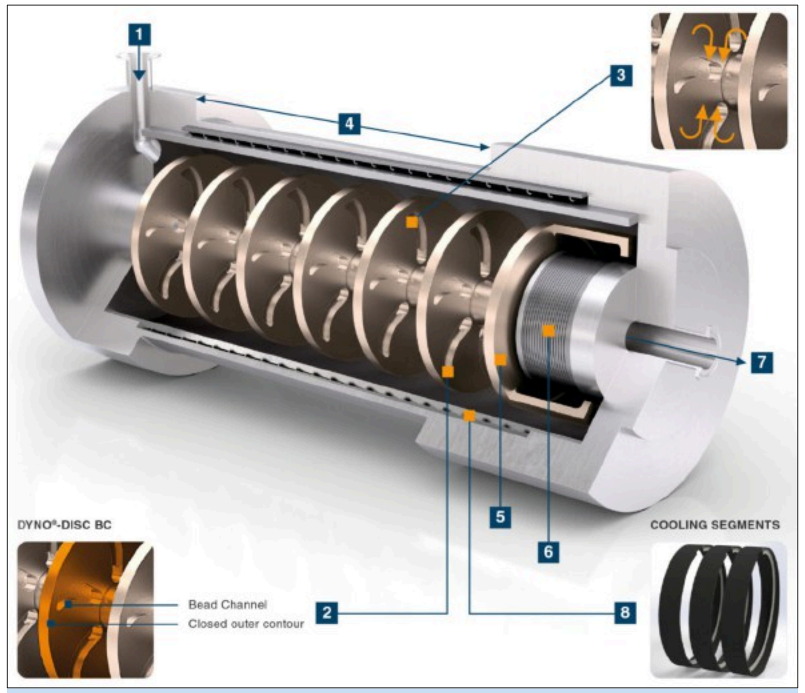
For anode materials like metal silicon, precise wet milling is essential. Trials at our Process Technology Centre (PTC) in Switzerland reduced energy consumption by more than 35% compared to previous setups. This demonstrates the DYNO®-MILL UBM's efficiency in meeting production demands.

Additionally, dispersion control of carbon nanotubes (CNTs) is crucial for improving battery performance. CNTs agglomerate easily, but optimal formulations and processing techniques can ensure uniform distribution, maximising their benefits while maintaining manageable viscosity levels.

The DYNO®-MILL UBM's compact design significantly lowers costs compared to larger mills, which consume more than twice the energy per output (kWh/t). This makes the DYNO®-MILL UBM a highly efficient, cost-effective solution.

WAB-GROUP® is a leading company in mixing, milling and flow chemistry, driving battery technology forward with four PTCs, six subsidiaries, and over 30 agents worldwide.

Visit us at Battery Cells & Systems Expo, booth 1655!



Innovative grinding chamber system

1. Product inlet
2. DYNO-DISC BC (Bead Channel)
3. Grinding circuits that operate in opposite directions
4. Even distribution of the grinding media in the active grinding chamber
5. DYNO-ROTOR BS (Bead Separation)
6. Screen for high throughputs
7. Product outlet
8. Cooling segments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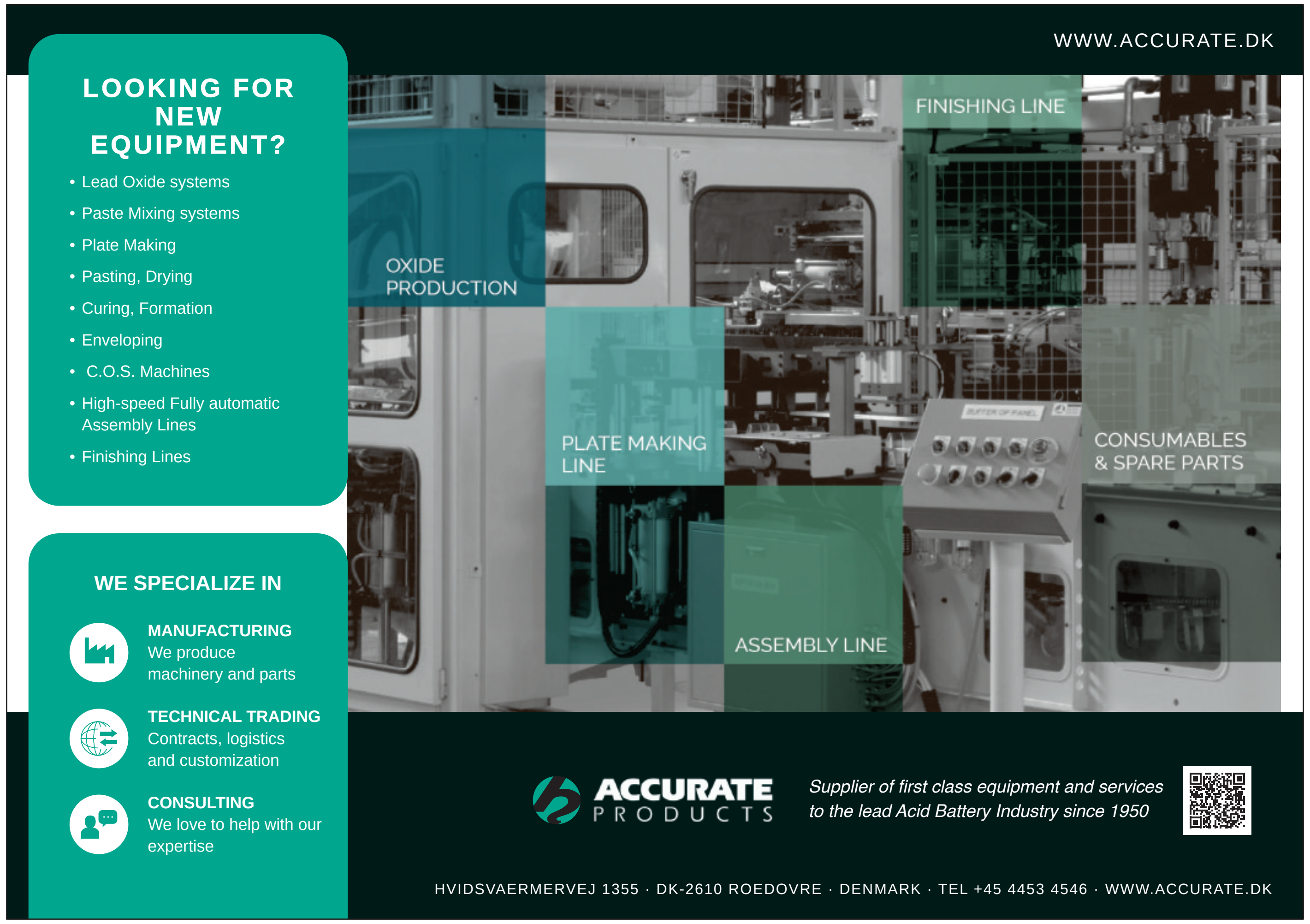
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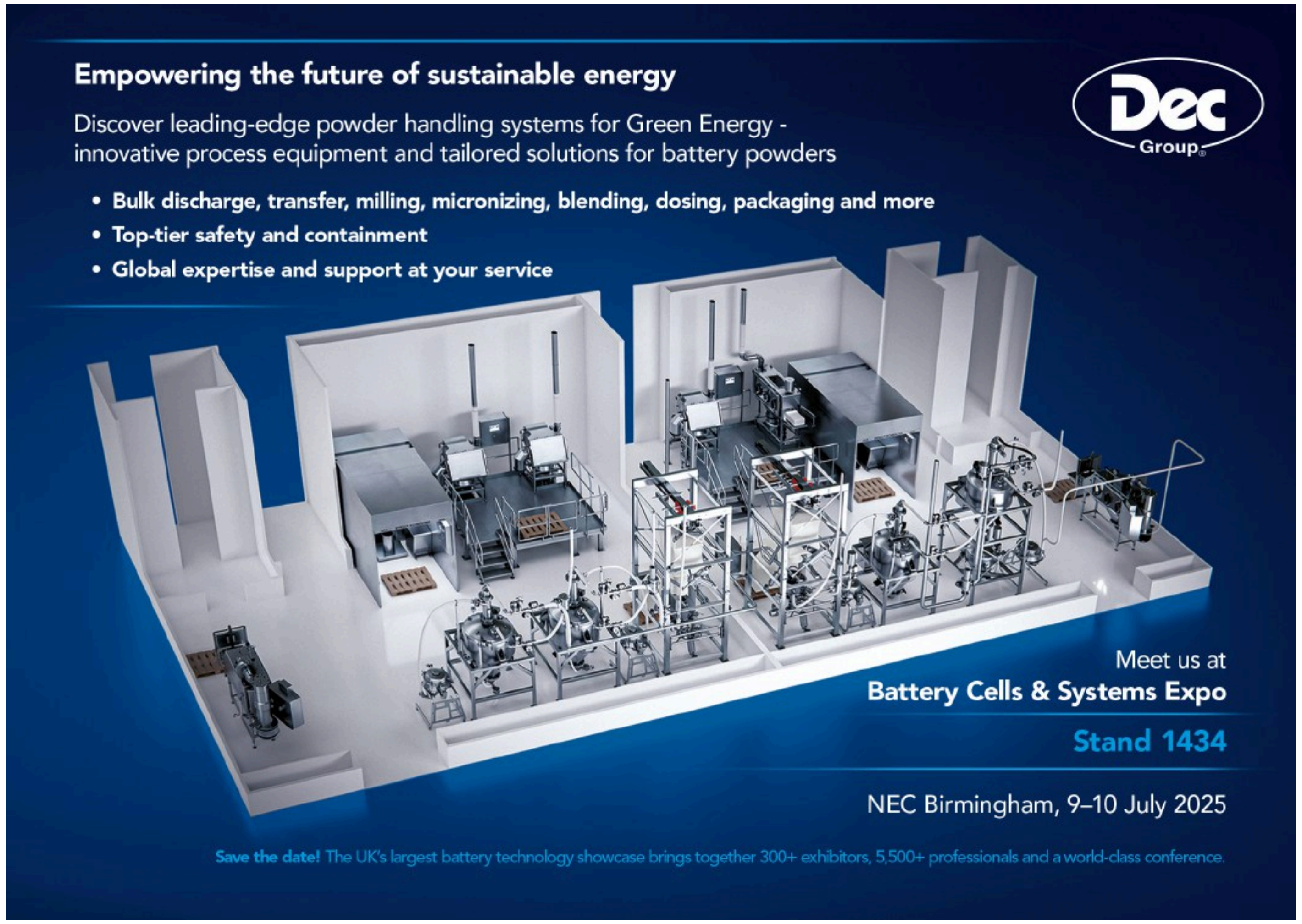
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Stand 1434
NEC Birmingham, 9–10 July 2025
Save the date! The UK's largest battery technology showcase brings together 300+ exhibitors, 5,500+ professionals and a world-class conference.

Navigating the future of energy storage safety

We recently interviewed Tom Farrell, Principal Engineer of Test and Validation Engineering at Fike Corporation about the dangers of thermal runaway, the solutions currently used to mitigate its effects, the effectiveness of Fike's solution Fike Blue, and more about the advancement of safety in the energy storage industry. **Meet us at booth #101**

Q. Why aren't energy storage systems used more often in populated areas?
Obviously, these batteries burn. We know they burn. They catch fire when they've been abused or when a defective cell begins thermal runaway inside of a module.

Early on when we had these fires, the first thought was to treat it like a fire by using Class B sizing and protective methodologies and prove the results with small-scale testing. A lot of organizations offered testing advice based on this kind of approach; however, it hasn't worked out terribly well because a number of notable events have occurred.

Specifically looking at the unfortunate event in Surprise, AZ, protective systems were in place that were supposed to stop what we considered to be a fire. Yet, these fires continued to burn and go for quite some time, releasing enormous amounts of toxic and explosive gases and thermal load to other adjacent structures, and it's extremely problematic.

The question is, did the fire protection system put out the fire? Arguably, yes. It triggered, reduced the initial heat and diffused flames that were being generated from those batteries.

"But when you look at pictures from the event in Surprise, does it look like it was suppressed? No, because it didn't address the real problem, the problem of propagating

thermal runaway. It's extremely dangerous and unpredictable, and traditional fire suppression systems simply don't solve the issue."

Because there hasn't been a reliable solution to cascading thermal runaway, AHJs are cautious to allow ESS's into their jurisdictions and are one of the primary reasons why ESS's are usually isolated to remote locations.

Q. Do ESS owners and operators generally believe they are protected from thermal runaway?
In the current state of the market, there are a lot of disclaimers that protective system manufacturers will provide in their quotes that say yes, we will absolutely deal with your fire hazard. Oftentimes, that satisfies the fears of ESS owners.

However, the fire protection manufacturers know that there is a thermal management problem in the background that they aren't going to touch.

Again, the fire can be put out with a lot of traditional means: chemical agents, water, water mist and inert gases, but that threat is still there. You still have a real thermal management problem. Because a lot of those systems discharge and deplete, the next time a cell goes off and generates more toxic gases, it pushes the protective gases out of the system, and you no longer have any protection at all within that module.

This leads to a situation where we need a solution that's not just a fire protection solution but also a thermal management solution to deal with this threat of cascading thermal runaway. Far too many owners of ESS's are unaware of this issue, as they believe they are protected.

Q. Can you tell us about Fike's current testing capabilities and any notable initial takeaways when testing these batteries?
Fike's Innovation and Testing Center located in Blue Springs, Mo., just outside of Kansas City, focuses on unit- and installation-level testing, so we aren't just dealing with cells, but we are also dealing with modules and racks of modules. We take a lot of measurements on temperatures, heat flux, thermal load and much more, and we have high-speed cameras and

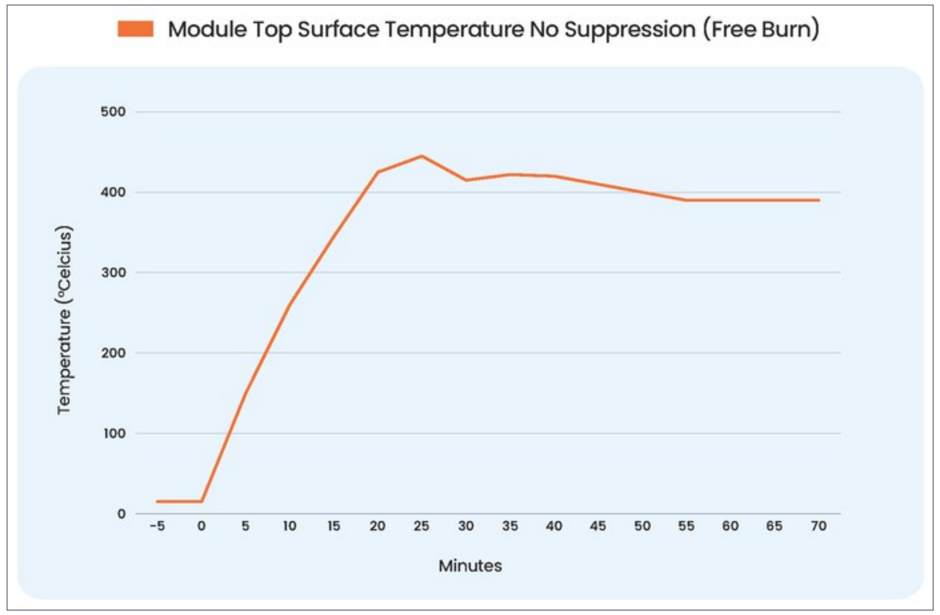


Figure 1

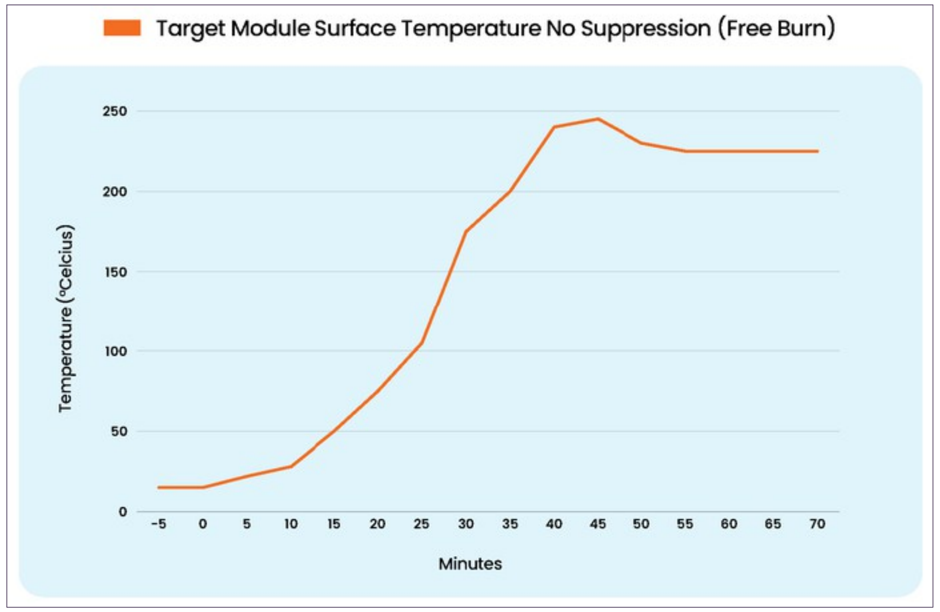
thermal imagery to visualize the data. Offgas testing is still under development but will be deployed in the coming months. It's basically a UL 9540A test without the gas sampling. We can test a variety of battery types, and this facility is where we've done the vast majority of our R&D work to date.

After several weeks of initial testing with a customer's lithium ion batteries, the end result was a lot of frustration because we were just confirming to ourselves the theory that everyone else was believing: thermal runaway cannot be stopped.

We did an initial module test and all we did was let it burn and set into thermal runaway. There was an extreme amount of smoke generated. We had a ventilator running at about 20,000 CFM to extract that, and even still our test cells were completely filled with smoke and overwhelmed with gas generation, which is another reason these ESS's can't be deployed near populated areas because that gas is toxic and there's a lot of it. ***Figure 1***

This test was also characterized with extremely high temperatures on the surface of the module itself. As you can see (Figure 1), about 450 degrees celsius of the skin, and anything nearby is also receiving that heat. There's nothing anyone can do with this until it cools down. At the conclusion of this test, it took about 18 hours for the skin to come back down below 100 degrees celsius. So it takes a long time, especially when

Figure 2



you think about. ***Figure 2***

We had a module directly above our "target module," and the temperatures were also extreme and reached about 250 degree celsius (Figure 2). If you've done any testing with these batteries, you know at 250 degree celsius your battery is already going into thermal runaway if you subject it to those temperatures. You're a long way into that, which means you've already set the next module off and it will keep going and going.

There's nothing to stop this cascading reaction, until we finally found the solution. And that would ultimately be named Fike Blue, an agent that showed promising results to not only suppress a fire like your typical fire protection system but also had the added benefit of stopping cascading thermal runaway at the module level.

Q. Did you attempt using Fike Blue in this series of testing, and if so, what were the results?
We decided to apply this new solution to those same batteries.

In the test, we only lost six of the 36 cells. The ones that were lost were two groupings of three cells: one with the heater applied and the one on the immediate other side. Everything else in the case was unharmed and it drastically reduced the thermal output and offgas that came off the system all the way down to about 60-70 degrees celsius (Figure 3), a far cry from 450 degree celsius in the "let it burn scenario" in the very beginning. ***Figure 3***

These are extremely low temperatures for these kinds of fires, low enough where immediately after an event that first responders and utility personnel can enter and extract that module that is having the issue using typical PPE. It did still generate some offgas, but it reduced the gas generated by 36 cells to six cells, assisting in the ventilation system's job to dilute and diffuse it. This means that if you've reduced those toxic emissions, you can bring these systems much closer to populated zones.

And if you look at the temperature of the module above the test module, it barely even heated to just 19 degree celsius.

Q. Can you speak more about the heat absorbed by surrounding modules?

The heat flux being generated off of these is extremely important because it goes back to the discussion of keeping first responders safe, allowing them to enter and do their jobs safely. The standards say that you can't exceed about 1.3kw/m² out to the center of your occupied space, so we went ahead and measured the heat flux at six inches.

During the free burn test, we were up to around 2.5kw/m², but with Blue applied it almost didn't register

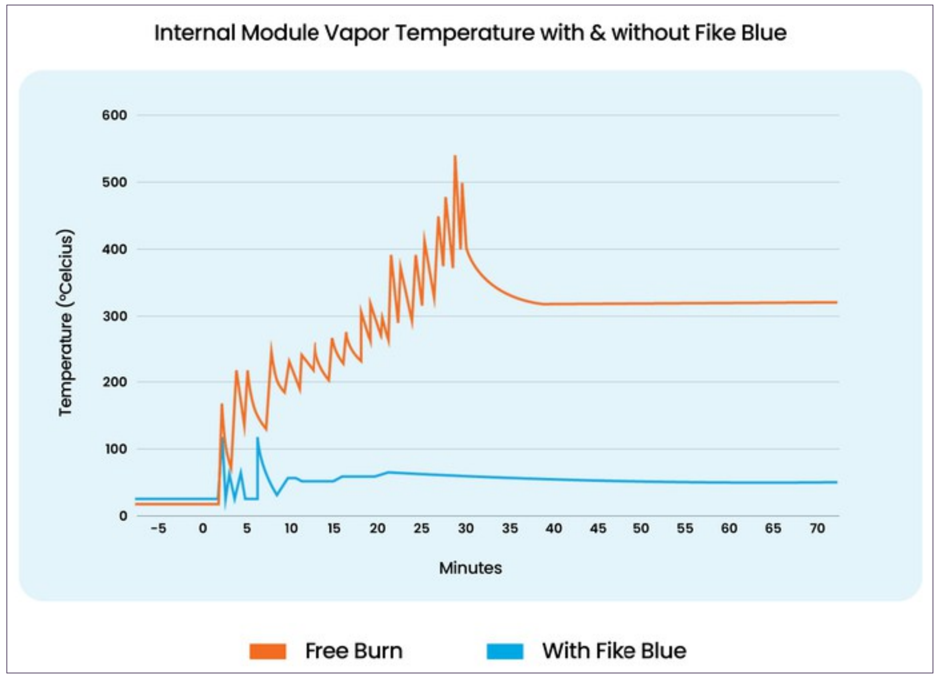


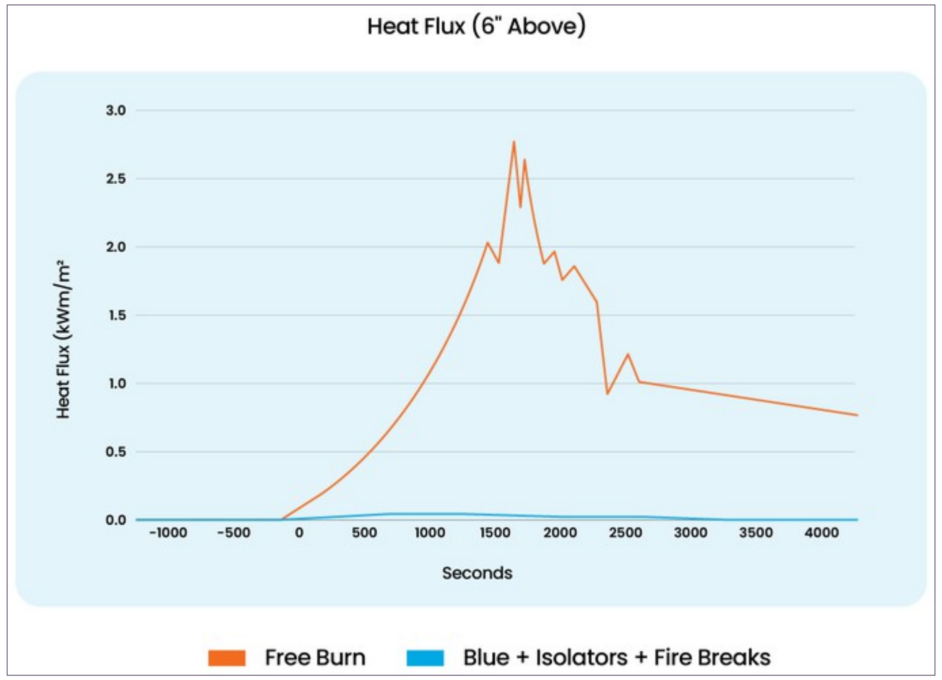
Figure 3

(Figure 4). This means a couple of things: protection for first responders, and a whole lot less heat imparted to additional modules that are above, to the sides and below inside of a rack configuration. And that means less likely for continued propagation into other models.

Q. Was this the only testing you've performed for Fike Blue?

Not at all. For example, we also performed this test at CSA, a nationally recognized test lab (NTRL)

Figure 4



with a full rack of batteries ***(Figure 5)***. We used the same setups, and the event was over in about five minutes. The experts that were there had commented they had never seen this done before, and we've done it several times now in front of those experts. They are unaware of any agent that was able to successfully stop thermal runaway inside of a module.

Q. Why does Fike Blue work so effectively to suppress the propagation of thermal runaway?

Fike Blue is a liquid, directly injected into the module and intended to manage the thermal event by absorbing the heat. It has a very high boiling point, much higher than water, which helps it stick around for a long time and keep doing its job. It doesn't dissipate like gases would in a typical fire suppression system.

In the testing we ran, only used about 26 gallons of Fike Blue as opposed to the thousands of water that would be required with traditional sprinkler systems or from a fire hose. It's not very electrically conductive, so it doesn't cause any cells to also go into thermal runaway like water has the ability to. Also, it's completely non-toxic, biodegradable, and because you use so much less of it, the concerns about contaminating groundwater or having a massive EPA issue is significantly less.

Q. Knowing what you know now, what is your opinion on the "let it burn" strategy for ESS's?

The "let it burn" philosophy is one I find to be irresponsible at best and dangerous in typical scenarios for two main reasons. One, is the incredible thermal load you subject other structures to and other batteries to, and the other being the

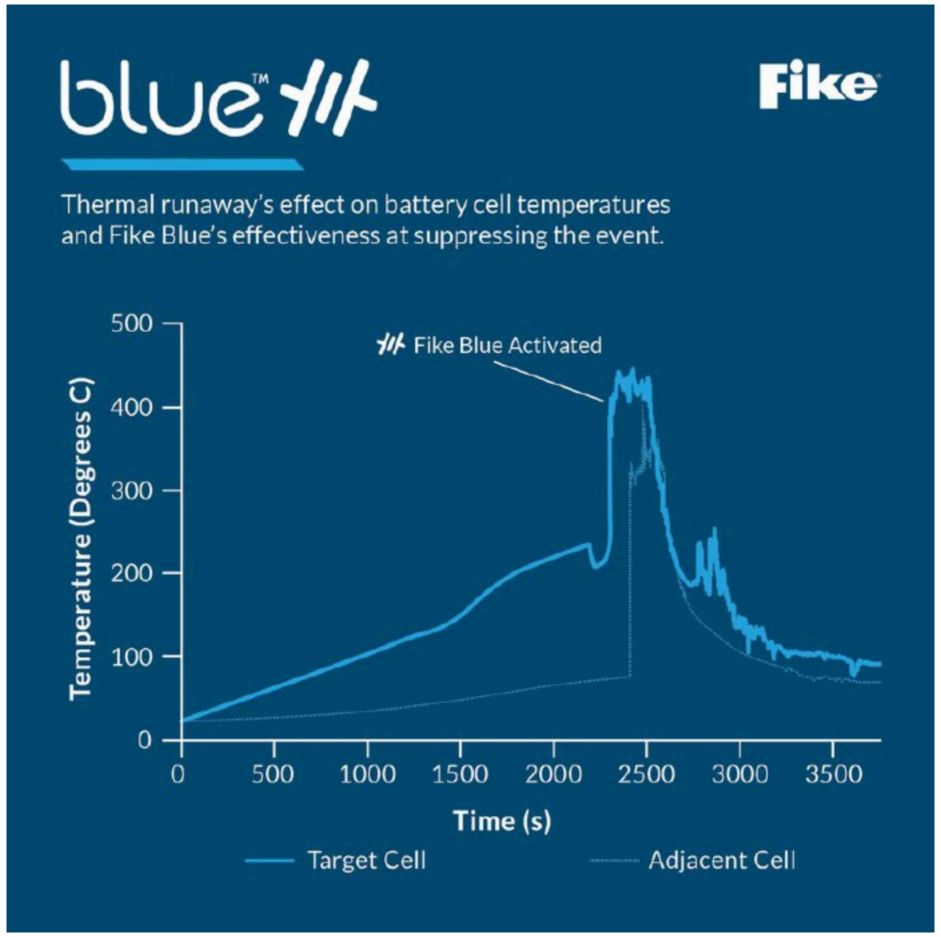


Figure 5

immediate danger to the environment and life in occupied spaces. If you let a battery burn, you generate fire obviously but also an enormous amount of toxic gases. Letting it burn takes care of the flammable gases just fine if things are on fire, but all those toxic gases have to go somewhere. If you have 1000 cells inside a battery, and you let all those burn, you generate 1000 cells worth of toxic gas that is going into occupied spaces and render them unoccupiable for some time.

If this is in an urban setting, this can have disastrous consequences. If you're able to suppress it and stop propagating thermal runaway, instead of losing 1000 cells, you may only lose 50, which means that can be dispersed and get to levels which are not quite so toxic to people in the immediate vicinity.

Fike Blue opens up a very real possibility that ESS's may be safely deployed into various urban environments. In our opinion, this makes the let it burn strategy adopted by various industry professionals and decision makers one that is non-sustainable and ultimately unsafe, particularly when a better solution like Fike Blue exists.

This offgassing will cause hazards especially for those in populated areas, so there's a vested interest in minimizing what comes off that. The agent also has other additives that will absorb things like HF, so you are reducing those other hazards, and just by cooling everything down you are generating less gas.

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Enhance battery safety and performance through thermal analysis and in-operando isothermal microcalorimetry

Hang Lau, Segment Marketing Mgr, Segment Marketing, TA Instruments

Thermal analysis techniques are extremely valuable tools for evaluating the thermal stability of battery materials. The decomposition onset temperature, reaction mechanism, and heat of reaction are essential to improving battery safety by design. At the cell level, In-operando isothermal microcalorimetry can simultaneously measure thermal and electrochemical data for a non-destructive determination of performance and stability. Evaluating the thermal properties of a battery during normal operating conditions is crucial for evaluating performance, gaining a deeper understanding of the chemistry, and studying the mechanisms of failure

Thermal analysis techniques are invaluable for evaluating the thermal stability of battery materials. Key parameters such as decomposition onset temperature, reaction mechanisms, and heat of reaction are essential for improving battery safety by design.

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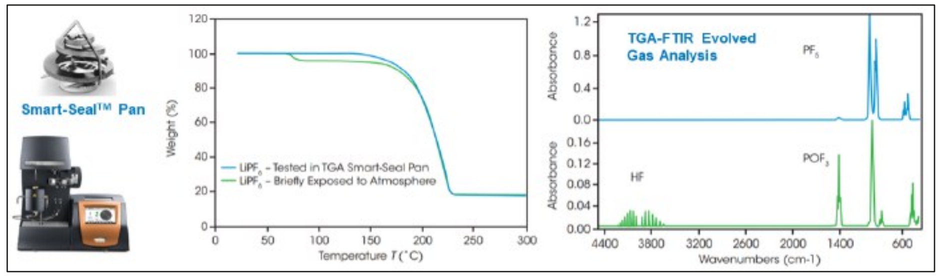
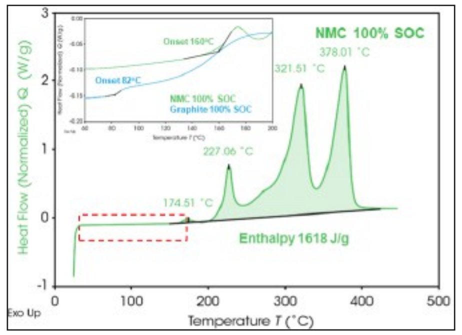
Thermal analysis improves safety

Thermal analysis techniques, including thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC), are commonly used to determine the thermal stability of battery materials. These techniques help identify the onset of exothermic reactions and measure the heat of reactions.

Commercially available lithium-ion electrolytes, which contains lithium salts (such as $LiPF_6$) and organic-based carbonate solvents, are known to be highly flammable, emitting toxic gases (such as hydrofluoric acid) during thermal degradation. TGA is used to determine the temperatures at which battery materials start to degrade, quantifying thermal stability, oxidation, and thermal degradation. By combining TGA with evolved gas analysis techniques, such as infrared spectroscopy (FTIR) or mass spectrometry, researchers can identify the gases produced during thermal degradation. This helps minimize or eliminate toxic gas release during battery thermal runaway.

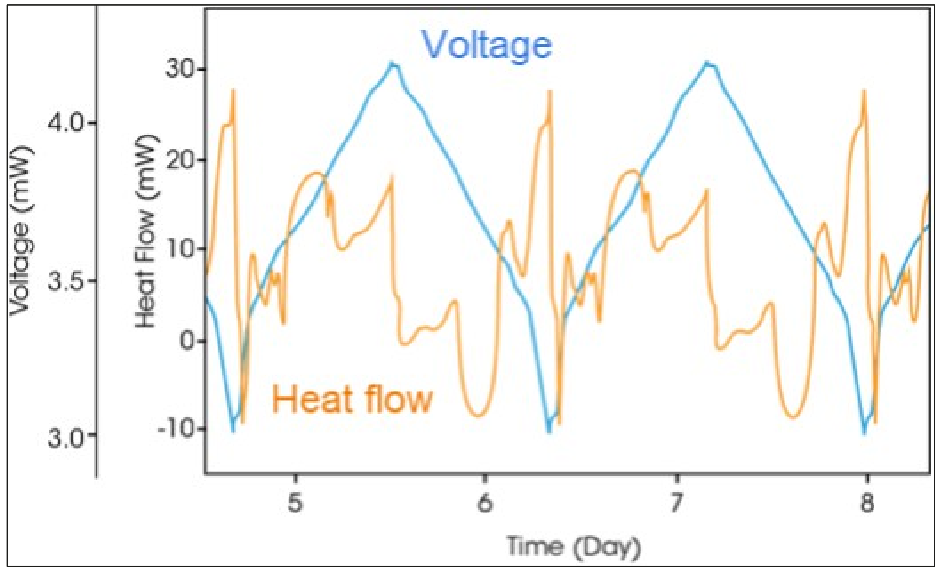
DSC measures the heat absorbed or released by a sample during heating or cooling over a range of temperatures. DSC provides insights into the heat of reactions, heat capacity and phase transitions such as melting point (T_m), heat of fusion, and glass transition (T_g), enabling researchers to evaluate thermal stability of materials used in batteries. Understanding the onset temperature and the amount of heat released during an exothermic reaction can help battery engineers design thermal management systems and perform safety evaluations of cathode and anode materials in different states of charge (SOC). This information is crucial for designing safer batteries.





Gaining insights into battery performance with in-operando microcalorimetry

Evaluating batteries during charge and discharge cycles is crucial for assessing efficiency, quality, and understanding lithium-ion battery chemistry. Batteries are highly dynamic systems, with a mixture of electrochemical reactions, chemical reactions, and structural changes occurring during each cycle, producing heat as a byproduct. Electrochemical analysis can only provide information on processes that affect electrochemical reactions, leaving other processes (chemical, phase, structural changes) uncharacterized. In-operando microcalorimetry is the leading technique for studying parasitic reactions, which are side reactions that can significantly impact the performance and longevity of lithium-ion batteries. This technique provides a comprehensive understanding of all processes occurring within the battery, helping researchers develop more efficient and durable batteries.



Measuring time-correlated voltage and heat flow signals of a battery under charge and discharge cycles (as shown in the chart below) can reveal the thermal contribution of parasitic reactions. Cycling a cell to failure can take many months but emerging in-operando tests with additional thermal insight are able to predict long-term behavior in a matter of weeks. The results help measure cell quality, aid in material formulation, assess additive impacts, study the solid electrolyte interphase (SEI), and predict cycle and calendar life. These data assist researchers in developing new materials, reducing parasitic activity, and screening cells with high parasitic activity for quality control.

Conclusion

In the race to develop safer, better-performing batteries more efficiently, advanced analytical testing provides crucial information for improving battery chemistry and manufacturing. Thermal and electrochemical analyses offer insights ranging from individual material properties to whole-cell battery performance. Embracing the latest technology helps battery developers bring more durable, safer, and cost-effective batteries to market faster.

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