Solid-state battery

Weekly Intelligence Report

2026-05-31 | 20 articles | 7 countries

troy-technical.jp

This Week's Keyword

Solid-State Battery Race

China's lead, EU/US commercialization & manufacturing

20	7	500	3
articles	countries	Wh/kg	min
Total Articles Analyzed	Source Countries	Highest Energy Density	Fastest 80% Charge

All 20 Articles This Week — 5-Axis Evaluation Matrix

How to read columns — Tech Novelty: degree of breakthrough Market Proximity: closeness to commercialization Market Impact: industry-wide effect Data Reliability: quantitative data & peer review US/EU Relevance: direct impact on US/European companies & supply chains

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#01	Ganfeng Pilot 500 Wh/kg	Corporate Strategy	●●●●○	●●●○○	●●●●○	●●●●○	●●●●○	Ganfeng Lithium begins pilot production of 500 Wh/kg solid-state EV batteries, targeting premium applications.
#02	China 451.5 Wh/kg, 3-Min	Research	●●●●●	●●●○○	●●●●●	●●●●●	●●●●○	Chinese researchers unveil 451.5 Wh/kg SSB with 3-minute fast charging, addressing key EV concerns.
#03	Dry Electrode Process	Analysis	●●●○○	●●●○○	●●●●○	●●●○○	●●●○○	Dry electrode process is crucial for solvent-free SSB manufacturing, reducing costs and environmental impact.
#04	Anode-Free vs. SSB	Comparison	●●○○○	●●○○○	●●●○○	●●●○○	●●●○○	Compares anode-free cells (250-300 Wh/kg) and SSBs (280-320 Wh/kg), highlighting dendrite/interface challenges.
#05	US DOE Lab Capabilities	Corporate Strategy	●○○○○	●●○○○	●●●○○	●●●●○	●●●●●	US DOE highlights national lab capabilities to accelerate solid-state battery R&D; and domestic supply chain.
#06	All-Organic Batteries	Research	●●●○○	●○○○○	●●○○○	●●●○○	●●●○○	Review highlights polymer-based electrodes for all-organic SSBs, addressing interface issues and sustainability.
#07	BYD Sulfide Patent	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●○	BYD patents composite sulfide solid electrolyte, as China targets 2027 pilot production for SSBs.
#08	US DOE Next-Gen Focus	Corporate Strategy	●○○○○	●○○○○	●●●○○	●●●●○	●●●●●	US DOE prioritizes flow and solid-state batteries for enhanced safety, performance, and reduced critical materials.
#09	ProLogium Nasdaq, France	Corporate Strategy	●●●●○	●●●●○	●●●●●	●●●●○	●●●●●	ProLogium to list on Nasdaq, plans French gigafactory for 360 Wh/kg, UL-verified safe SSBs.
#10	Bone-Inspired CaF2 Elec	Research	●●●●●	●○○○○	●●○○○	●●●●●	●●●○○	Bone-inspired CaF_2 electrolyte shows high-temp stability (100°C, 200 cycles) for Li-metal batteries.
#11	Hymson Dry Electrode Tech	New Product	●●●●○	●●●○○	●●●●●	●●●●○	●●●●○	Hymson's dry electrode tech cuts SSB manufacturing CAPEX/OPEX by 66%/81%, crucial for sulfide electrolytes.
#12	Anode-Free Li-Metal Review	Research	●●○○○	●○○○○	●●○○○	●●●○○	●●●○○	Review: Anode-free Li-metal batteries target 400-480 Wh/kg, but face interfacial stability and dendrite challenges.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	SSB Calendering Process	Analysis	●●●○○	●●●○○	●●●●○	●●●○○	●●●○○	Calendering for SSBs requires precise pressure/temp control (30-100 MPa, 60-120°C) to prevent damage and resistance.
#14	Li_3P/Fe Interface	Research	●●●●●	●○○○○	●●○○○	●●●●●	●●●○○	Novel Li_3P/Fe dual-conductive interface reduces impedance by 90% for garnet SSBs, enabling 2200+ hr stability.
#15	Basquevolt BQV400L Launch	New Product	●●●○○	●●●●●	●●●●○	●●●●○	●●●●●	Spanish firm Basquevolt launches BQV400L lithium metal battery cell with hybrid polymer electrolyte for commercial market.
#16	SSBs for Robotics	Analysis	●○○○○	●○○○○	●●○○○	●●●○○	●●●○○	Review highlights SSBs' potential for robotics due to safety, wide temp range, and geometric versatility.
#17	CIBF2026 SSB Pathways	Market Overview	●●○○○	●●●○○	●●●●○	●●●○○	●●●●○	CIBF2026 shows "mandatory" SSB adoption but fragmented tech pathways (sulfide/oxide/semi-solid) in sample stage.
#18	Solidion Revenue, Patent	Corporate Strategy	●●●○○	●●●●○	●●●○○	●●●●○	●●●●●	Solidion Technology achieves first revenue, patents Li-ion to SSB conversion, launching 380 Wh/kg Li-S cells.
#19	IPCO Mfg Capabilities	New Product	●●●○○	●●●○○	●●●●○	●●●○○	●●●●○	IPCO showcases enhanced roll-to-roll/double belt press for dry electrode and solid-state battery manufacturing.
#20	Nayuan Anode-Free Na-Ion	New Product	●●●●○	●●○○○	●●●●○	●●●○○	●●●○○	Nayuan unveils anode-free all-solid-state Na-ion battery with 320 Wh/kg, targeting 70-80% cost reduction.

●●●●○ High ●●●○○ Med-High ●●○○○ Med ●○○○○ Low | Yellow highlight = featured article

Three Questions That Demand Your Decision This Week

❶ Is your EV platform ready for 3-minute charging?

Chinese researchers achieved 451.5 Wh/kg with 3-minute (20C) fast charging to 80% for SSBs (#02). This capability could redefine EV adoption. Does your current or planned EV charging infrastructure and battery thermal management system support such aggressive rates without degradation?

❷ How exposed is your SSB strategy to dry electrode tech?

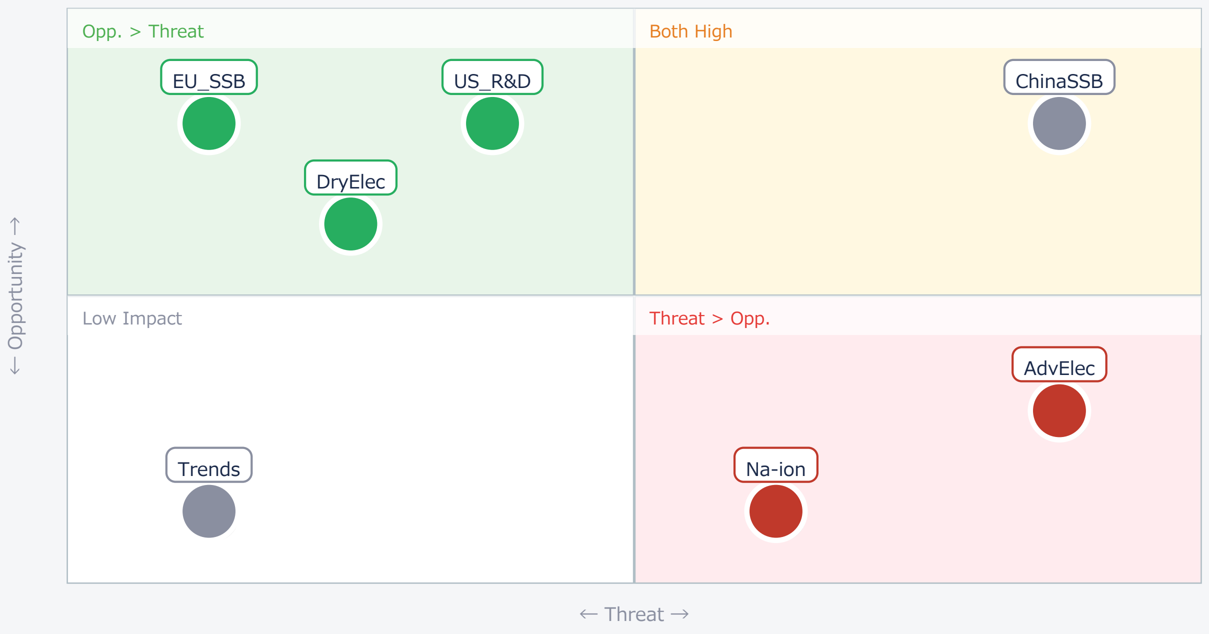
Dry electrode processes are critical for SSB cost reduction (66% CAPEX, 81% OPEX) and enabling moisture-sensitive sulfide electrolytes (#11, #03). Are your manufacturing partners adopting this, or will you face a significant cost disadvantage against Asian competitors?

❸ Can US/EU scale SSB production to compete with Asia?

While ProLogium plans a French gigafactory (#09) and Basquevolt commercializes a hybrid cell (#15), Chinese firms like Ganfeng (#01) and BYD (#07) are rapidly advancing pilot production and IP. What specific investments are needed to prevent a widening production gap?

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● ChinaSSB	Critical	Partnerships, IP access	Market share loss
● EU_SSB	Opp.	Local supply, innovation	Limited scale
● DryElec	Opp.	Cost cut, efficiency	Lag in adoption
● US_R&D;	Opp.	Leverage labs, funding	Slow commercial
● AdvElec	Threat	Future tech	IP gap
● Na-ion	Threat	Diversify	Catch-up
● Trends	Ref.	Market insight	—

Deep Dive ① — China's 3-Minute Fast-Charging SSB

#02 | 2026/05/21 | Car News China | Tech Novelty●●●●● Proximity●●●○○ Market Impact●●●●● Data Reliability●●●●● US/EU Relevance●●●●○

Chinese Academy of Sciences researchers developed an all-solid-state lithium metal battery with 451.5 Wh/kg energy density, capable of ultra-fast charging to 80% in ~3 minutes (20C rate) and maintaining over 700 cycles.

This breakthrough uses polymer-modulated solvation chemistry to suppress side reactions and form a stable, LiF-rich interphase, crucial for high-rate capability and longevity in ASSBs.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: The 451.5 Wh/kg and 3-minute charging claims are highly ambitious. While achievable at lab scale, scaling to large EV cells while maintaining 700+ cycles and managing thermal stress remains a significant technical barrier. The polymer-modulated interface is novel, but its manufacturability and long-term stability in real-world conditions need rigorous validation. [Opportunity] for US/EU companies lies in licensing this core IP or accelerating internal R&D; into similar interfacial engineering and fast-charging chemistries. [Threat] is China establishing a decisive lead in high-performance, fast-charging EV batteries, potentially making current US/EU EV platforms and battery supply chains less competitive. [R&D;] Initiate immediate research into polymer-modulated interphases. [Strategy] Conduct a competitive analysis of fast-charging SSB roadmaps by Q3 2026.

Deep Dive ② — ProLogium's EU Gigafactory & Nasdaq IPO

#09 | 2026/05/27 | electrek | Tech Novelty●●●●○ Proximity●●●●○ Market Impact●●●●● Data Reliability●●●●○ US/EU Relevance●●●●●

Taiwanese SSB pioneer ProLogium is going public on Nasdaq via SPAC ($3.8B valuation) to fund its 4th-gen "super-fluidic" inorganic SSBs and a new gigafactory in Dunkirk, France, with €1.4B French government subsidies.

The company's latest cells achieve 360 Wh/kg and are UL Solutions ARC verified as free from thermal runaway risks, with mass production in France targeted for Q2 2029.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: ProLogium's 360 Wh/kg and UL safety verification are credible, positioning them as a strong contender in the SSB market. The French gigafactory, backed by substantial government subsidies, signals serious intent and a significant step towards commercialization in Europe. Technical barriers include scaling production efficiently and achieving cost parity with traditional Li-ion. [Opportunity] for European OEMs to secure a local, advanced SSB supplier, reducing supply chain risks. US investors gain access to a leading SSB player. [Threat] for existing US/EU battery manufacturers who may be outpaced in SSB deployment, and for Asian competitors facing a strong EU-backed entrant. [Business Dev] Engage ProLogium for potential supply agreements or technology partnerships by Q4 2026. [Executive] Assess implications for domestic battery manufacturing strategy.

Deep Dive ③ — Basquevolt Commercializes Hybrid Li-Metal

#15 | 2026/05/22 | electrive.com | Tech Novelty●●●○○ Proximity●●●●● Market Impact●●●●○ Data Reliability●●●●○ US/EU Relevance●●●●●

Spanish firm Basquevolt has launched its BQV400L lithium metal battery cell, featuring an NMC cathode, lithium metal anode, and a proprietary hybrid polymer electrolyte, available commercially now.

This fourth-generation cell is positioned as a precursor to all-solid-state technology, aiming for high energy density with enhanced safety, marking a significant step towards next-gen battery commercialization.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: Basquevolt's commercial launch of a hybrid Li-metal cell is a tangible step towards solid-state, offering immediate evaluation opportunities. While specific energy density and cycle life data are not detailed, commercial availability implies a level of product maturity. The hybrid polymer electrolyte approach is a pragmatic way to address full SSB challenges. Technical barriers include demonstrating long-term performance and scalability beyond initial market entry. [Opportunity] for US/EU OEMs and device manufacturers to procure and evaluate this near-market technology, potentially integrating it into premium products. [Threat] for US/EU battery developers who are still in earlier R&D; stages, as Basquevolt gains first-mover advantage in a critical intermediate technology. [Procurement] Initiate evaluation of BQV400L samples immediately. [R&D;] Benchmark hybrid electrolyte performance against internal targets by Q3 2026.

Other Notable Articles

Ganfeng Lithium Initiates Pilot Production of 500 Wh/kg Solid-State EV Batteries (Electrek)
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●○

China's Ganfeng Lithium is a major player, their 500 Wh/kg pilot production signals aggressive commercialization.

Hymson's Dry Electrode Technology Revolutionizes Solid-State Battery Manufacturing (electrive.com)
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●●

Hymson's dry electrode tech offers massive CAPEX/OPEX savings, critical for cost-competitive SSB mass production.

Solidion Technology Achieves First Quarterly Revenue and Secures Patent (Solidion Technology (via PRNewswire))
Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●○○

US-based Solidion's revenue and patent for Li-ion to SSB conversion show a viable path for domestic SSB manufacturing.

BYD Files Patent for Composite Sulfide Solid Electrolyte Membrane (Car News China)
Tech Novelty●●●○○ Proximity●●●○○ Market Impact●●●●○

BYD's patent for composite sulfide electrolyte underscores China's strategic focus on advanced SSB materials.

Constructing Li3P/Fe Dual-Conductive Interface for High-Performance Garnet Solid-State (ACS Publications)
Tech Novelty●●●●● Proximity●○○○○ Market Impact●●○○○

This academic breakthrough significantly reduces interfacial resistance, a key hurdle for high-performance garnet SSBs.

Recommended Actions This Week

Action recommendations based on article evaluation matrix and opportunity/threat analysis.

Immediate (this week)

- [Strategy] Assess competitive threat from Chinese SSB advancements (500 Wh/kg, 3-min charging) on existing product roadmaps.
- [Procurement] Initiate contact with Basquevolt to evaluate BQV400L samples for potential integration into niche applications.
- [R&D;] Task materials science teams to review polymer-modulated solvation chemistry and LiF-rich interphase research from China.

Short-term (1 month)

- [R&D;] Evaluate dry electrode manufacturing technologies (e.g., Hymson, IPCO) for potential CAPEX/OPEX savings and SSB compatibility.
- [Business Dev] Explore partnership or licensing opportunities with US-based Solidion Technology for their Li-ion to SSB conversion patent.
- [Executive] Mandate a cross-functional team to develop a strategic response to China's accelerating SSB commercialization efforts.

Medium-long term (quarter+)

- [Strategy] Develop a comprehensive IP strategy to protect and leverage next-generation battery technologies, including advanced electrolytes and manufacturing processes.
- [R&D;] Increase investment in domestic SSB R&D;, leveraging US DOE national lab capabilities, focusing on high-temperature stability and interfacial engineering.
- [Procurement] Diversify supply chain for critical battery materials, exploring alternatives like sodium-ion technology to mitigate lithium dependency.

troy-technical.jp/en | Original curation. Article copyrights belong to respective authors. | Gemini API + Claude | 2026-05-31

SolidStateBattery — Selected Articles

Date: 2026-05-31

Articles: 20

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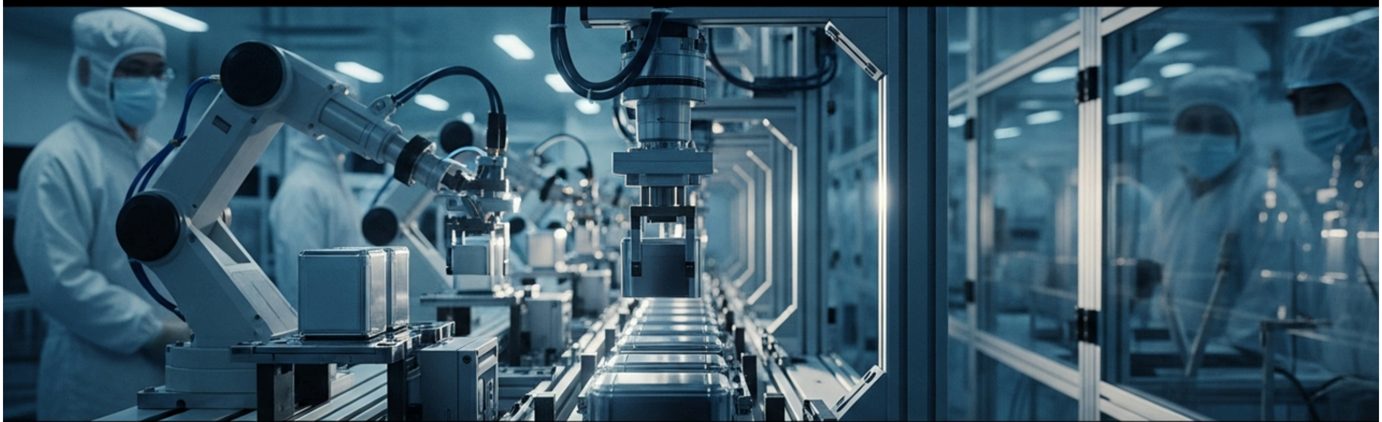
#19 IPCO Showcases Enhanced Manufacturing Capabilities for Dry Electrode and Solid-State Batteries

#20 Nayuan New Materials Unveils Anode-Free All-Solid-State Sodium-Ion Battery with 320 Wh/kg Energy Density

Ganfeng Lithium Initiates Pilot Production of 500 Wh/kg Solid-State EV Batteries

Published May 21, 2026 Electrek China



OVERVIEW

Chinese lithium giant Ganfeng Lithium has commenced small-scale production of its 10 Ah solid-state battery, achieving an impressive energy density of 500 Wh/kg. The company is simultaneously advancing both silicon-based (400 Wh/kg, over 1,100 cycles) and lithium metal anode approaches. These high-performance cells are targeting premium EVs, low-altitude aircraft, robotics, and consumer electronics, signaling a significant step towards commercializing next-generation battery technology.

IN DEPTH

Background and Development Momentum

Ganfeng Lithium, a prominent Chinese lithium metal producer, has announced a pivotal advancement in solid-state battery (SSB) technology. The company has initiated small-scale production of its 10 Ah solid-state battery, which boasts a remarkable energy density of 500 Wh/kg. This milestone positions Ganfeng Lithium at the forefront of the race to commercialize SSBs, aiming to overcome the limitations in safety and energy density inherent in conventional lithium-ion batteries. The strategic emphasis on high-performance batteries aligns with global efforts to transition towards more sustainable and efficient energy storage solutions, particularly for the rapidly expanding electric vehicle market and other demanding applications.

Key Technical Achievements and Approaches

Ganfeng Lithium is pursuing a dual-path development strategy for its SSBs. One approach utilizes a silicon-based anode, which has already demonstrated a robust energy density of 400 Wh/kg and impressive cycle stability exceeding 1,100 cycles. The second, and more energy-dense, approach involves a lithium metal anode, achieving the newly announced 500 Wh/kg. This high energy density is crucial for extending the range of electric vehicles, enhancing the endurance of drones, and powering advanced robotic systems. The successful scaling to a 10 Ah cell capacity for the 500 Wh/kg variant indicates a significant progression from laboratory-scale prototypes to practical, production-ready designs, underscoring the company's commitment to industrialization.

Market Implications and Future Outlook

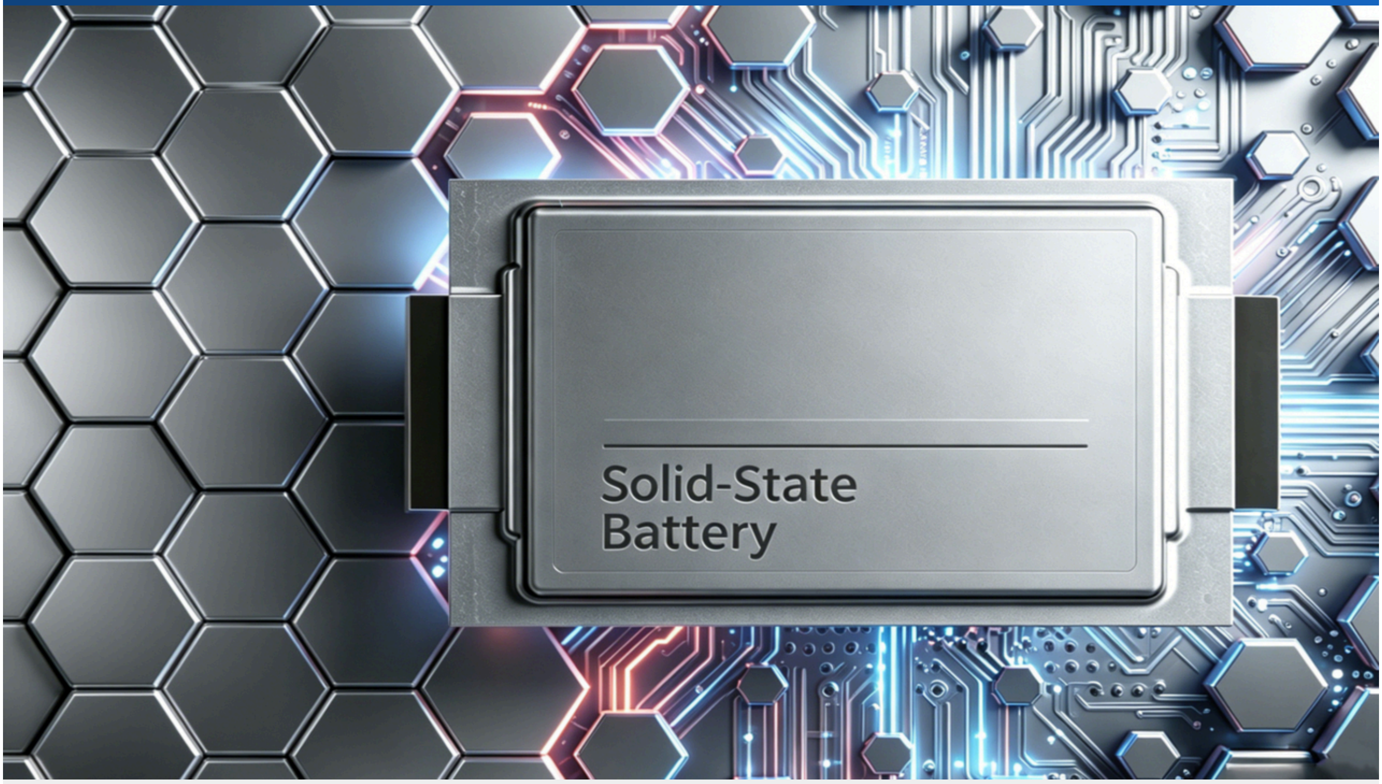
The targeted applications for these advanced solid-state batteries are diverse and high-value, including high-end electric vehicles, low-altitude economic sectors (such as drones and urban air mobility), sophisticated robotics, and premium consumer electronics. The commencement of small-scale production is a critical precursor to full-scale mass manufacturing, establishing Ganfeng Lithium as a potential leader in the nascent solid-state battery market. China's national strategic focus on advanced battery technologies further supports this development, promising accelerated innovation and market adoption. The successful integration of enhanced safety, superior energy density, and broad operational capabilities offered by these solid-state batteries is set to redefine the future of mobility and energy storage across multiple industries.

Source: https://electrek.co/2026/05/21/solid-state-ev-batteries-hit-another-major-milestone-china/

Collected: May 29, 2026 | Automated Research System (Gemini API)

Chinese Researchers Unveil 451.5 Wh/kg Solid-State Battery with 3-Minute Fast Charging

Published May 21, 2026 Car News China China



OVERVIEW

Researchers at the Chinese Academy of Sciences have developed an all-solid-state lithium metal battery boasting an energy density of 451.5 Wh/kg and capable of ultra-fast charging to 80% in approximately three minutes (20C rate). This innovative cell maintains stable performance for over 700 cycles. The breakthrough hinges on a polymer-modulated solvation chemistry that suppresses detrimental side reactions at the electrode interface, fostering the formation of a stable, lithium fluoride-rich interphase crucial for high-rate capability and longevity.

IN DEPTH

Revolutionizing EV Charging and Energy Density

The rapid expansion of the electric vehicle (EV) market demands significant advancements in battery technology, particularly in terms of energy density and charging speed. All-solid-state batteries (ASSBs) are widely regarded as a critical next-generation solution, offering enhanced safety and higher energy density compared to conventional lithium-ion counterparts. A team of researchers from the Chinese Academy of Sciences has achieved a groundbreaking development, unveiling an ASSB that pushes the boundaries of both performance metrics, bringing practical solid-state solutions closer to reality.

Breakthrough in Interfacial Stability and Fast Charging

The newly developed all-solid-state lithium metal battery exhibits an impressive energy density of 451.5 Wh/kg. More strikingly, it supports ultra-fast charging at a 20C rate, meaning it can achieve significant charge in approximately three minutes, while maintaining stable performance for more than 700 cycles. This remarkable capability is attributed to a novel approach utilizing polymer-modulated solvation chemistry. This technique effectively suppresses unwanted side reactions at the interface between the lithium metal anode and the solid-state electrolyte. Crucially, it facilitates the formation of a stable, lithium fluoride (LiF)-rich interphase layer. This engineered interface is pivotal in preventing lithium dendrite growth and ensuring efficient lithium ion transport, thereby enabling high-rate charging and extending the battery's operational lifespan.

Implications for the EV Market and Global Landscape

This technological leap holds transformative potential for the EV industry, directly addressing the common consumer concern of long charging times. By enabling a "refueling" experience comparable to gasoline vehicles, such fast-charging ASSBs could accelerate EV adoption globally. Beyond this research, major Chinese battery manufacturers like CATL are actively pursuing commercialization of ASSBs, with targets set for around 2026-2027. CATL itself is reportedly engaged in pilot production of 500 Wh/kg class solid-state cells. This ongoing innovation underscores China's burgeoning leadership in advanced battery technology, positioning it to significantly influence the future trajectory of the global EV market.

Source: https://carnewschina.com/2026/05/21/chinese-researchers-unveil-451-5-wh-kg-solid-state-battery-with-3-minute-charging-capability/

Dry Electrode Process: A Pivotal Innovation for Solvent-Free Battery Manufacturing

Published May 21, 2026 PatSnap Eureka USA

OVERVIEW

The dry electrode process is emerging as a critical innovation in the manufacturing of lithium-ion and solid-state batteries, significantly reducing costs and environmental impact by eliminating expensive and energy-intensive NMP solvents. This solvent-free approach, now transitioning from pilot to full-scale production, is particularly indispensable for solid-state batteries, where sensitive solid electrolytes necessitate extremely low moisture environments. Addressing challenges like crack control and uniform material distribution is key to its widespread adoption.

Transition to Solvent-Free Manufacturing and Its Advantages

The dry electrode process is recognized as a pivotal advancement in the manufacturing of both conventional lithium-ion and next-generation solid-state batteries. Traditionally, electrode production involves coating slurries, where active materials, conductive additives, and binders are dispersed in organic solvents like N-methyl-2-pyrrolidone (NMP), followed by energy-intensive drying and solvent recovery. NMP is not only costly but also environmentally hazardous. The dry electrode process fundamentally addresses these issues by completely eliminating the use of such solvents, leading to substantial reductions in manufacturing costs (CAPEX and OPEX) and environmental footprint due to the removal of drying ovens and solvent recovery systems.

Technical Hurdles and Scaling Up Efforts

While offering significant benefits, the dry electrode process presents its own set of technical challenges, including controlling crack formation in the electrodes and ensuring uniform mixing of binder and active materials. For solid-state batteries (SSBs), these challenges are amplified because the interface between the solid electrolyte and active material is more complex, and the mechanical properties of the electrode directly impact battery performance. Precise process control is paramount. Despite these hurdles, the technology is rapidly progressing from pilot-scale validation to full-scale mass production, with various companies actively developing and refining their proprietary dry processing techniques. This transition is crucial for demonstrating the scalability and economic viability of the method.

Indispensable for Solid-State Battery Production

Solid-state batteries, by their nature, replace flammable liquid electrolytes with solid counterparts, making moisture management an extremely critical factor in their manufacturing. Sulfide-based solid electrolytes, in particular, are highly sensitive to moisture and can produce hazardous gases upon contact with water. The solvent-free nature of the dry electrode process inherently minimizes the risk of moisture ingress and facilitates manufacturing in ultra-low dew point environments (e.g., -60°C), thereby drastically reducing degradation rates by over tenfold. This makes dry electrode processing an essential technology for preventing solid electrolyte degradation and ensuring the stable production of high-quality solid-state batteries, ultimately accelerating their cost competitiveness and market introduction.

Source: https://eureka.patsnap.com/blog/research-report/dry-electrode-processing-solvent-free-manufacturing-crack-control-scale-up/

Anode-Free and Solid-State Batteries: Performance, Challenges, and Outlook for Next-Gen Storage

Published May 22, 2026 PatSnap Eureka USA

OVERVIEW

Anode-free cells (AFCs) and solid-state batteries (SSBs) represent promising next-generation battery technologies aiming for higher energy density, improved safety, and enhanced performance. While AFCs theoretically offer over 400 Wh/kg, practical implementations typically yield 250-300 Wh/kg. SSBs demonstrate a more stable 280-320 Wh/kg, with sulfide electrolytes enabling superior low-temperature operation. Both technologies face critical challenges in mitigating lithium dendrite formation and reducing interfacial resistance, which are key to their commercial viability.

Emergence of Next-Generation Battery Technologies

The pursuit of higher energy density, enhanced safety, and superior performance has propelled anode-free cells (AFCs) and all-solid-state batteries (SSBs) to the forefront of next-generation battery research. These technologies aim to transcend the limitations of conventional liquid-electrolyte lithium-ion batteries, enabling advancements across a wide spectrum of applications, including electric vehicles (EVs), portable electronics, and grid-scale energy storage systems. While employing distinct architectures, both AFCs and SSBs share the overarching goal of delivering safer and more performant energy storage solutions to meet escalating global demands.

Comparative Analysis of Energy Density and Performance

Anode-free cells theoretically possess the potential to achieve exceptionally high energy densities, exceeding 400 Wh/kg, by eliminating the need for inactive anode materials like graphite and directly utilizing a lithium metal anode. However, practical implementations often encounter challenges related to initial lithium plating/stripping efficiency and dendrite formation, which typically restrict their delivered energy density to the 250-300 Wh/kg range. In contrast, solid-state batteries, by replacing flammable liquid electrolytes with solid counterparts, inherently offer superior safety and thermal stability. Current SSB technology reliably achieves energy densities between 280-320 Wh/kg. Notably, SSBs utilizing sulfide solid electrolytes exhibit excellent performance even in cold environments, maintaining functionality at temperatures as low as -20°C, a significant advantage for automotive applications in diverse climates.

Common Challenges and Future Research Directions

Both AFCs and SSBs confront critical technical hurdles that demand concerted research efforts. A primary challenge involves suppressing the formation and growth of lithium dendrites during charge-discharge cycles. Dendrites can lead to internal short circuits, severely compromising battery safety and cycle life. The second major obstacle is the reduction of interfacial resistance between the electrodes and solid electrolytes. Achieving good contact across solid-solid interfaces is inherently difficult, leading to higher resistance that impedes ion transport and diminishes the battery's power performance. Overcoming these challenges necessitates a multi-faceted approach, including the development of novel solid electrolyte materials, advanced interfacial engineering techniques, and optimized electrode architectures. Continuous innovation in these areas is crucial for accelerating the commercialization of these promising next-generation battery technologies.

Source: https://eureka.patsnap.com/report-anode-free-cells-vs-solid-state-batteries-performance-review

Collected: May 29, 2026 | Automated Research System (Gemini API)

U.S. Department of Energy Highlights National Lab Manufacturing Capabilities for Solid-State Battery R&D

Published May 22, 2026 Department of Energy USA

OVERVIEW

The U.S. Department of Energy (DOE) has revealed extensive national laboratory manufacturing capabilities to accelerate solid-state battery R&D. These include advanced extrusion systems, roll-to-roll manufacturing, slot-die coating, tape casting, and ceramic processing. The labs also possess expertise in synthesizing and scaling diverse solid electrolytes (sulfides, oxides, halides, polymers) and cathode materials, along with dry process manufacturing for solid electrolyte films and electrodes, and pouch cell prototyping.

IN DEPTH

Strategic Investment in Next-Generation Battery Technology

The U.S. Department of Energy (DOE) is strategically advancing the development of next-generation battery technologies, particularly solid-state batteries (SSBs), by publicizing the cutting-edge manufacturing capabilities available at its national laboratories. This initiative forms a core component of a broader national strategy aimed at fortifying the domestic battery supply chain and cementing U.S. leadership in advanced energy storage. The disclosed capabilities cover the entire spectrum of SSB development, from fundamental research and material synthesis to prototype fabrication and small-scale production, providing a comprehensive ecosystem for innovation.

Comprehensive Manufacturing and Material Expertise

The DOE's national labs offer a diverse array of advanced manufacturing tools and expertise. Key capabilities include sophisticated extrusion systems for forming solid electrolyte and electrode materials, efficient roll-to-roll manufacturing processes for continuous production, precision slot-die coating for uniform layer deposition, tape casting for thin-film fabrication, and advanced ceramic processing techniques. In material science, the labs possess robust synthesis and scaling capabilities for various solid electrolyte chemistries, including sulfides, oxides, halides, and polymers, alongside compatible cathode materials. Furthermore, the emphasis on dry process manufacturing for solid electrolyte films and electrodes – a technology gaining significant traction for its environmental and cost benefits – and the ability to fabricate practical pouch cell prototypes underscore the versatility and readiness to support diverse SSB technological pathways.

Accelerating Innovation and Commercialization

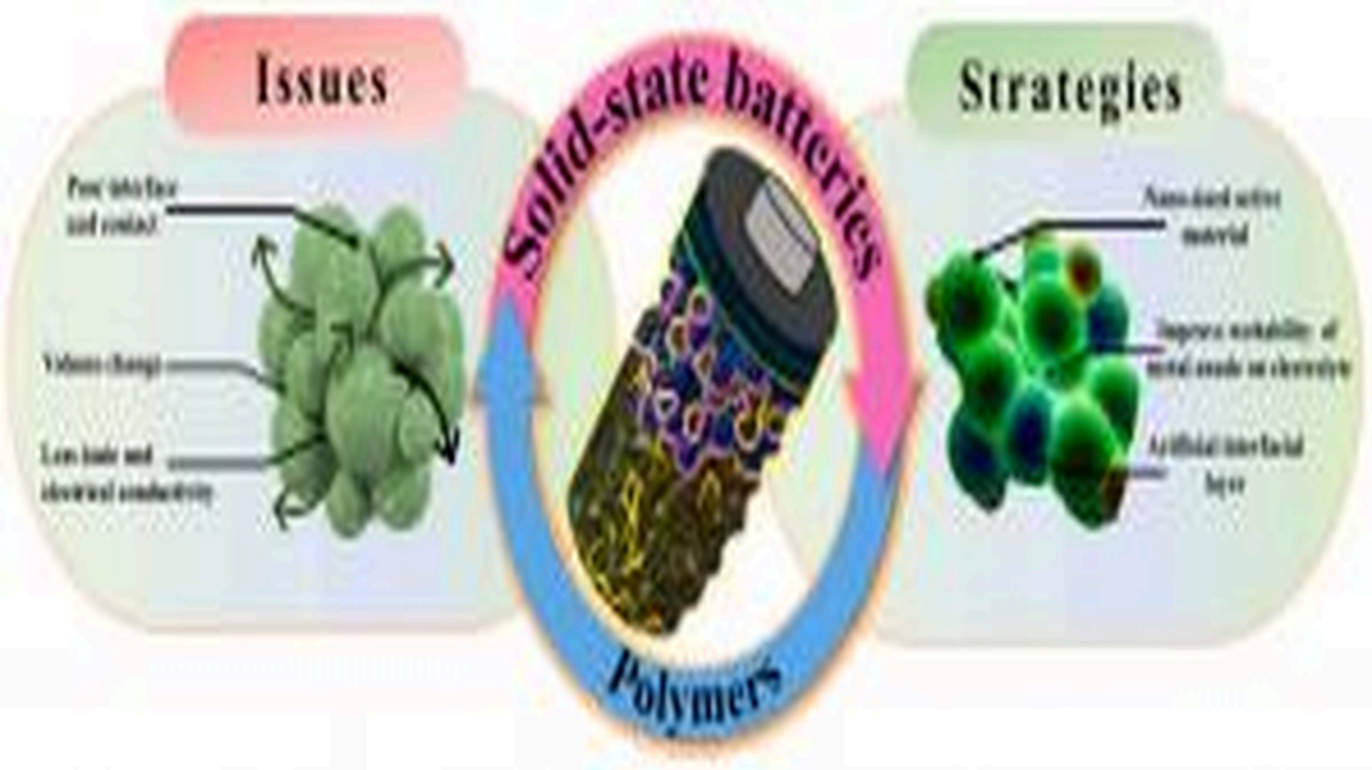
The public availability of these national laboratory resources provides an invaluable opportunity for academic institutions and industrial partners to leverage state-of-the-art facilities without incurring prohibitive capital expenditures. This collaborative approach is expected to significantly accelerate the research and development cycle, helping to overcome technical bottlenecks and expedite the journey from discovery to deployment. Through these efforts, the DOE aims to foster the commercialization of SSBs that offer superior safety, higher energy density, extended cycle life, and improved cost performance, ultimately contributing to a cleaner energy future and bolstering U.S. economic competitiveness.

Source: https://www.energy.gov/cmei/ammto/fy-2023-battery-manufacturing-lab-call-national-lab-capabilities-and-contacts

Collected: May 29, 2026 | Automated Research System (Gemini API)

The Rise of All-Organic Batteries: A Sustainable Frontier for Energy Storage

Published May 25, 2026 EINPresswire.com (via eScience Energy) USA



OVERVIEW

A new review paper highlights the potential of polymer-based electrodes to address key safety, stability, and sustainability challenges in all-solid-state metal-ion batteries. It specifically points out that polymer flexibility can mitigate issues like poor solid-solid interfacial contact, high resistance, and mechanical cracking often seen with rigid ceramic electrolytes. Integrated manufacturing approaches, including roll-to-roll printing and minimized solvent processes, are deemed crucial for the mass production of polymer-based solid-state batteries.

Addressing Sustainability and Performance in Battery Technology

With the surging demand for energy storage in modern society, the performance limitations and environmental footprint of conventional lithium-ion batteries are becoming increasingly prominent. In this context, a recent review paper presents the compelling potential of "All-Organic Batteries" as a sustainable alternative, offering enhanced safety, stability, and environmental friendliness. The paper specifically focuses on their promise within the realm of all-solid-state metal-ion batteries, where polymer-based electrodes are identified as a key solution to existing challenges.

Polymer Electrodes: A Solution for Solid-State Interface Issues

Traditional all-solid-state batteries often employ rigid ceramic electrolytes, which commonly lead to critical issues such as poor solid-solid interfacial contact with electrodes, high interfacial resistance, and mechanical cracking. These problems significantly hinder overall battery performance and long-term stability. The review paper emphasizes the inherent flexibility and superior processability of polymer-based electrode materials as a direct remedy. Polymers can substantially improve interfacial contact, reduce ion transport resistance, and enhance mechanical resilience against stress, thereby boosting the overall performance and reliability of solid-state batteries. This adaptability positions polymeric materials as a viable path to overcoming current solid-state interface limitations.

Manufacturing Approaches and Future Prospects for Mass Production

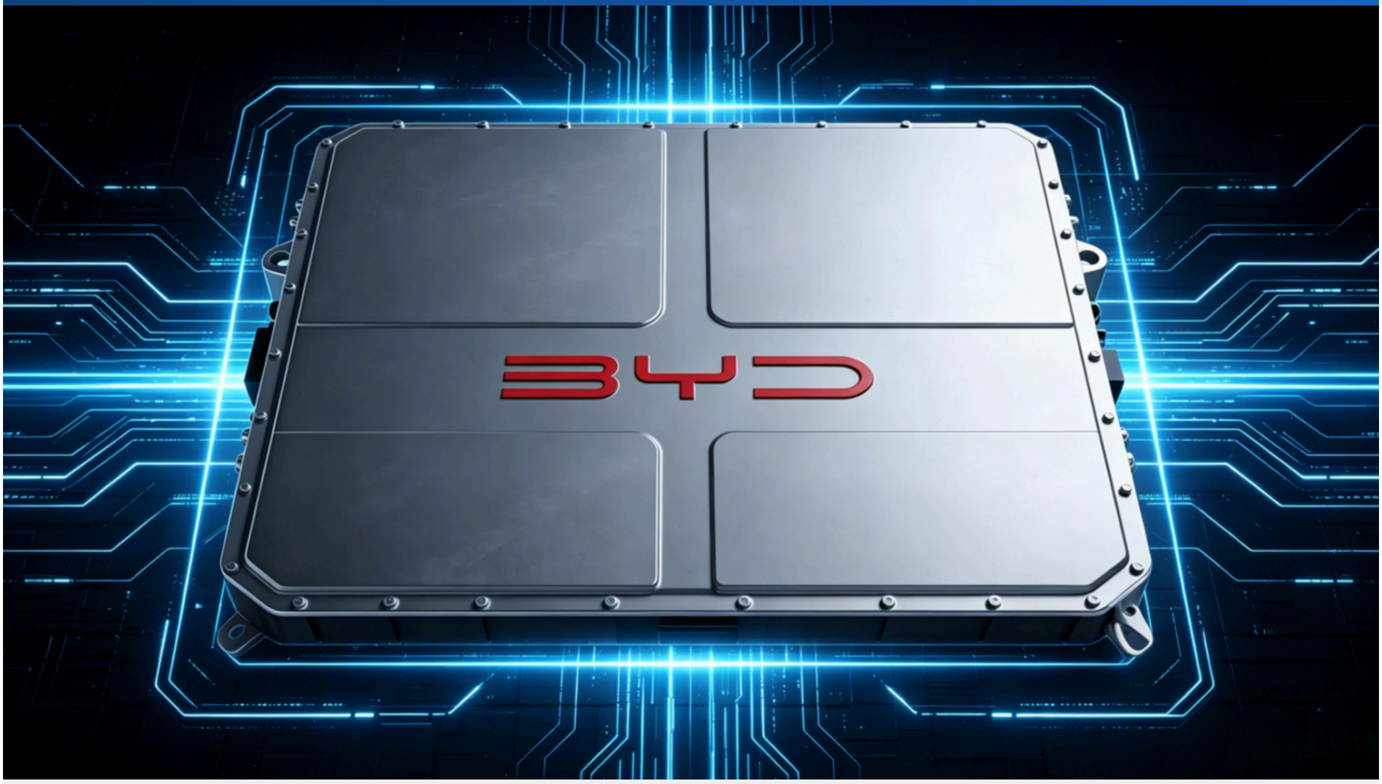
The successful commercialization of all-organic and polymer-based solid-state batteries hinges on establishing efficient and cost-effective manufacturing processes. The review concludes that integrated manufacturing approaches, such as roll-to-roll printing technologies and processes that minimize solvent usage, are indispensable for achieving mass production. These techniques offer the potential to accelerate battery cell manufacturing speeds, reduce production costs, and simultaneously lower environmental impact. Given their reduced reliance on scarce metals like lithium and cobalt, all-organic batteries also mitigate supply chain risks, paving the way for a more sustainable energy future. Continued research and industrial application of this promising technology are expected to play a crucial role in the evolving landscape of energy storage.

Source: https://natlawreview.com/press-releases/beyond-lithium-rise-all-organic-batteries-sustainable-energy-future

Collected: May 29, 2026 | Automated Research System (Gemini API)

BYD Files Patent for Composite Sulfide Solid Electrolyte Membrane, China Targets 2027 Pilot Production

Published May 25, 2026 Car News China China



OVERVIEW

Chinese EV giant BYD has filed a new patent (CN121983643A) for a composite solid electrolyte membrane designed for all-solid-state batteries. This innovation combines inorganic solid electrolyte particles with a polymer electrolyte fiber network, aiming to enhance both ion conductivity and mechanical strength. Multiple Chinese battery manufacturers, including CALB which has already unveiled a 60 Ah, >450 Wh/kg prototype, are targeting pilot production around 2027, signaling rapid advancements in the region.

Accelerating Solid-State Battery Development in China

BYD, a leading Chinese electric vehicle (EV) manufacturer, is intensifying its focus on the development of all-solid-state battery (ASSB) technology, a critical next-generation power solution. As part of this effort, the company has filed a new patent (CN121983643A) for a composite solid electrolyte membrane. This move underscores the industry's drive to achieve higher energy densities and significantly improved safety features, surpassing the inherent limitations of current liquid-electrolyte lithium-ion batteries. ASSBs are particularly attractive due to their elimination of flammable liquid electrolytes, thus drastically reducing fire risks.

Technical Characteristics of BYD's New Patent

BYD's patent focuses on a composite solid electrolyte membrane that integrates inorganic solid electrolyte particles within a polymer electrolyte fiber network. The inorganic component is designed to provide high ionic conductivity, which is essential for efficient charge and discharge. Simultaneously, the polymer fiber network offers crucial mechanical flexibility and structural integrity to the membrane. This hybrid approach aims to address common challenges in solid-state interfaces, such as high contact resistance, while concurrently boosting the overall ionic conductivity of the electrolyte and serving as a mechanical barrier against lithium dendrite formation. Such improvements are expected to lead to enhanced battery performance and extended cycle life.

Outlook for China's Battery Industry and Commercialization Targets

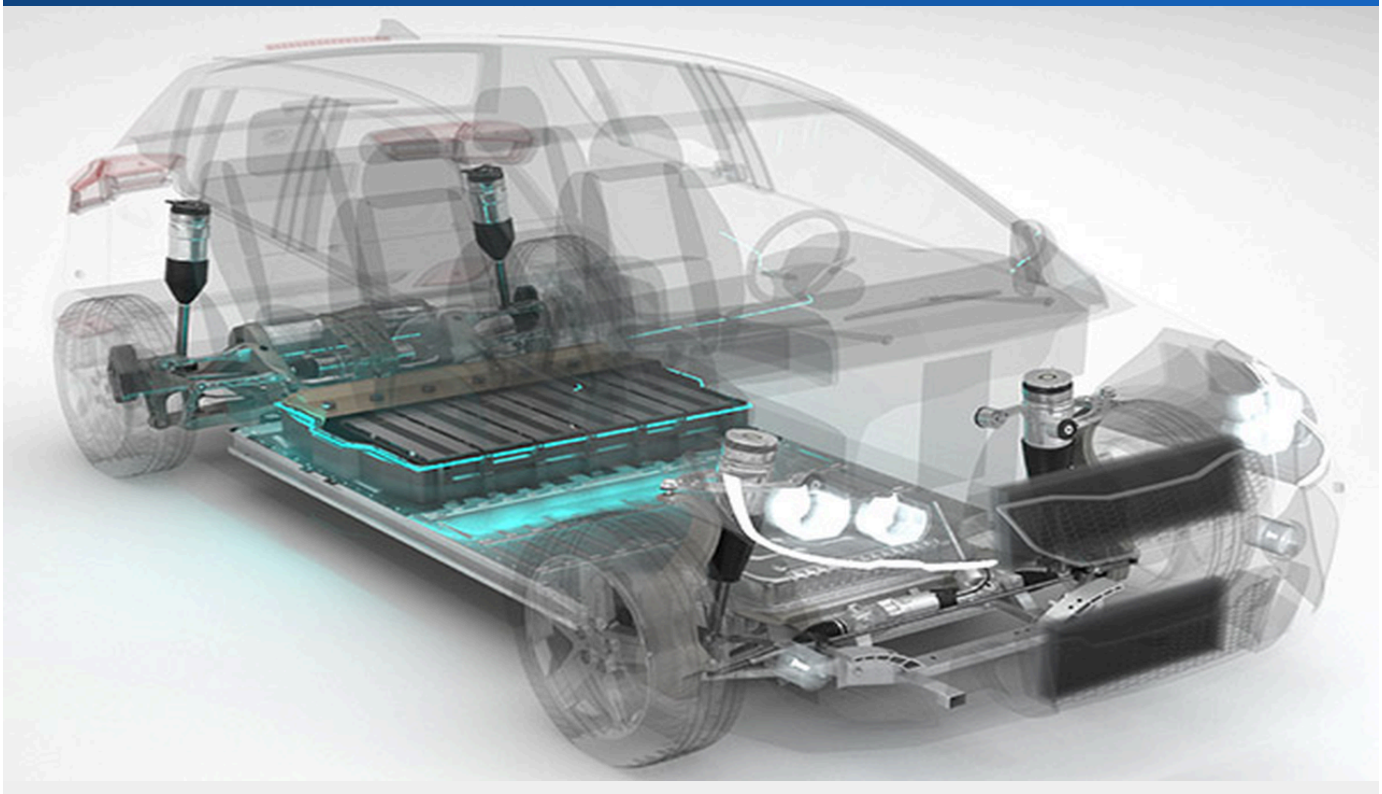
The Chinese government has designated ASSB technology as a strategic priority, and BYD's patent filing reflects the robust momentum in this sector. Numerous domestic battery manufacturers are engaged in a competitive race, with many targeting pilot production around 2027. For instance, CALB has already showcased a large-capacity 60 Ah solid-state battery prototype boasting an energy density exceeding 450 Wh/kg, demonstrating the advanced technical capabilities of Chinese firms in this domain. These concerted efforts suggest that ASSBs could see significant commercial deployment in the EV market within the next few years, potentially bringing about a transformative shift in global EV and energy storage landscapes.

Source: https://carnewschina.com/2026/05/25/byd-files-new-sulfide-solid-state-battery-patent-as-china-targets-2027-pilot-production/

Collected: May 29, 2026 | Automated Research System (Gemini API)

U.S. Department of Energy Spotlights Flow and Solid-State Batteries as Key Next-Generation Energy Solutions

Published May 22, 2026   Department of Energy   USA



OVERVIEW

The U.S. Department of Energy (DOE) is prioritizing flow batteries and all-solid-state batteries as pivotal next-generation energy storage technologies, citing their potential for enhanced performance, improved safety, and significant cost reductions. All-solid-state batteries, by employing solid instead of liquid electrolytes, drastically mitigate fire risks from leakage or thermal expansion, thus boosting safety. They also offer the critical advantage of potentially reducing or eliminating the need for critical materials like lithium and cobalt.

IN DEPTH

Strategic Focus on Advanced Energy Storage

The U.S. Department of Energy (DOE) is strategically investing in and highlighting the development of next-generation battery technologies, recognizing their crucial role in shaping the future of energy storage. Among these, flow batteries and all-solid-state batteries (SSBs) are receiving particular attention, lauded for their potential to transcend the limitations of current lithium-ion systems in terms of performance, safety, cost, and sustainability. These innovations are poised to accelerate the integration of renewable energy sources and the widespread adoption of electric vehicles (EVs), fundamentally transforming energy infrastructures globally.

Solid-State Batteries: Enhancing Safety and Sustainability

All-solid-state batteries deliver an intrinsic leap in safety by replacing flammable liquid electrolytes with non-combustible solid counterparts. This eliminates the risk of electrolyte leakage and significantly reduces the dangers of fire or explosion caused by damage or thermal runaway under high temperatures. Consequently, SSBs are highly anticipated for applications demanding stringent safety requirements, such as EVs, aerospace, and high-density stationary storage. Furthermore, a key advantage of SSBs lies in their potential to reduce or entirely eliminate the use of critical raw materials like lithium and cobalt. This capability is vital for mitigating supply chain risks, fostering greater energy independence, and paving the way for more sustainable and environmentally benign battery manufacturing practices.

Technological Outlook and Economic Impact

Beyond their superior safety profiles, solid-state batteries are theoretically capable of achieving higher energy densities and extended cycle lives. These attributes promise significant benefits, including extended EV range and reduced charging frequency. Their robust architecture also makes them suitable for operation in harsh environmental conditions. The DOE's support is aimed at bridging the gap between research and commercialization for these technologies. Ultimately, the advancement of next-generation battery technologies is expected to lead to substantial economic benefits, including reduced energy costs, enhanced national energy security, and the creation of new industries and job opportunities, driving comprehensive societal progress.

Source: https://www.energy.gov/cmei/ammto/breaking-it-down-next-generation-batteries

Collected: May 29, 2026 | Automated Research System (Gemini API)

Solid-State Battery Pioneer ProLogium to Go Public on Nasdaq via SPAC Merger, Plans French Gigafactory

Published May 27, 2026 electrek Taiwan

OVERVIEW

Taiwanese solid-state battery developer ProLogium announced plans to list on Nasdaq through a SPAC merger, valuing the company at approximately $3.8 billion. Proceeds will fund the scale-up of its 4th-generation "super-fluidic" inorganic solid-state batteries and the construction of a new gigafactory in Dunkirk, France, supported by up to €1.4 billion in French government subsidies, with production targeted for Q2 2029. The company's latest cells achieve 360 Wh/kg and are UL Solutions ARC verified as free from thermal runaway risks.

IN DEPTH

ProLogium's Strategic Nasdaq Listing and Capitalization

ProLogium Technology, a Taiwanese pioneer in solid-state battery development, has announced its intention to go public on the Nasdaq stock exchange through a merger with Translational Development Acquisition Corp., a special purpose acquisition company (SPAC). This transaction values ProLogium at approximately $3.8 billion, reflecting robust market confidence in its next-generation battery technology. The capital raised from this listing is slated to be primarily invested in significantly expanding the mass production capabilities of its 4th-generation "super-fluidic" inorganic solid-state batteries, a key innovation aimed at delivering superior performance and safety over conventional lithium-ion cells.

Major European Gigafactory Project in France

In parallel with its public listing plans, ProLogium has unveiled an ambitious project to establish a new gigafactory in Dunkirk, France, as part of its global manufacturing expansion strategy. This substantial investment is strongly supported by the French government, which has committed up to €1.4 billion in subsidies, underscoring Europe's strategic drive to bolster its electric vehicle (EV) battery supply chain. Construction of the gigafactory is projected to commence by the end of 2026, with mass production and shipments anticipated to begin in the second quarter of 2029. This European base will play a crucial role in supplying leading automotive manufacturers and accelerating ProLogium's global market penetration.

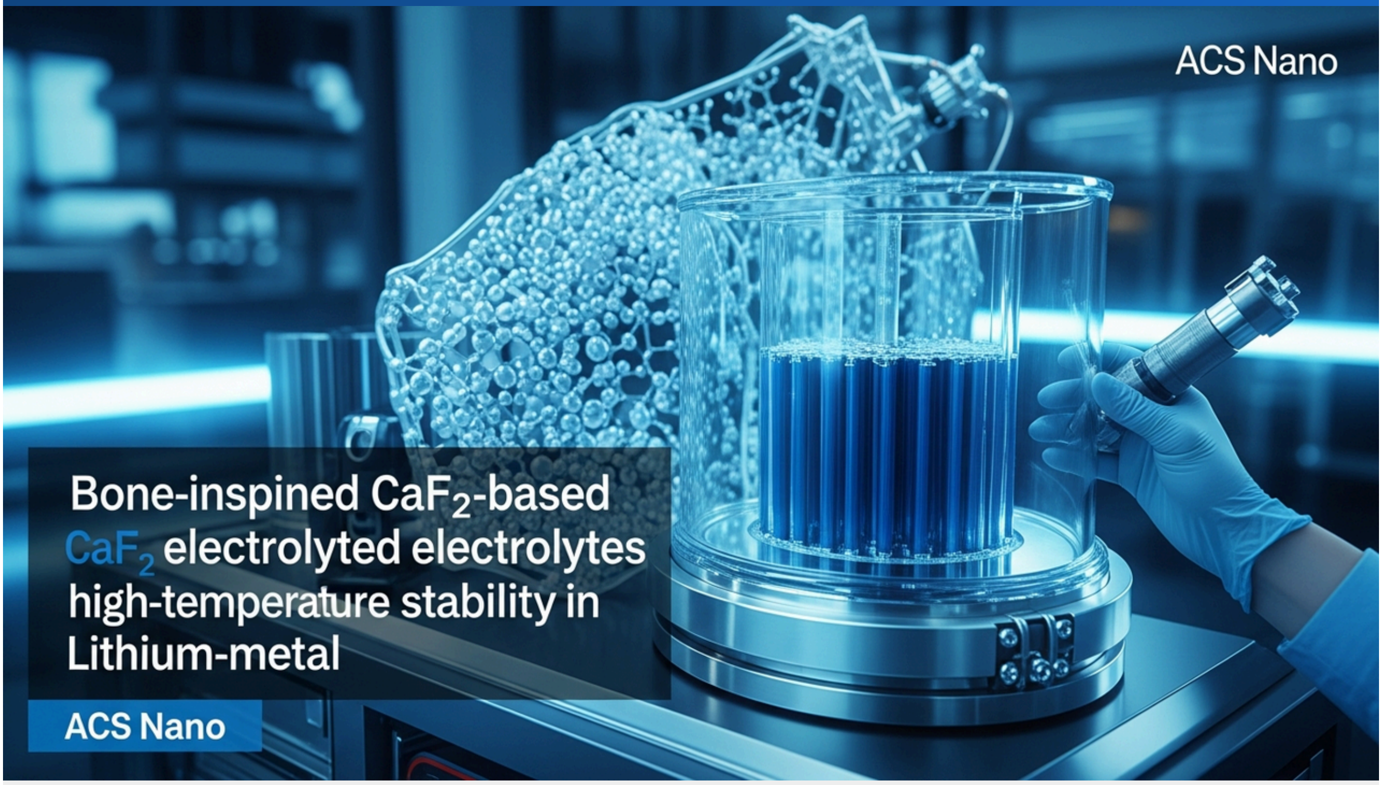
Technological Advancements and Uncompromising Safety

ProLogium's latest solid-state battery technology achieves an impressive energy density of 360 Wh/kg, surpassing the performance metrics of many existing lithium-ion solutions. A defining feature of these batteries is their use of ceramic separators combined with non-flammable solid electrolytes. This design fundamentally eliminates the risk of thermal runaway, a critical safety concern in liquid-electrolyte batteries, a fact independently verified by UL Solutions ARC. This potent combination of high performance and inherent safety is expected to drive widespread adoption across various sectors, including electric vehicles, aerospace, and stationary energy storage systems. ProLogium's public listing and substantial manufacturing investments signify a definitive shift of solid-state battery technology from the R&D phase to full commercialization.

Source: https://electrek.co/2026/05/27/another-solid-state-ev-battery-maker-going-public/

Bone-Inspired CaF2-Based Solid Solution Electrolyte Revolutionizes High-Temperature Stability in Lithium Metal Batteries

Published May 28, 2026 ACS Nano (ACS Publications) USA



OVERVIEW

A study in ACS Nano introduces a "bone-inspired solid solution electrolyte (CFSSE)" based on natural CaF2, significantly enhancing high-temperature performance in lithium metal batteries. This CFSSE exhibits a wide electrochemical window of 5.26 V and a high Li+ transference number of 0.77, effectively suppressing lithium dendrite growth. Cells coupled with a LiFePO4 (LFP) cathode retained 81.7% capacity after 200 cycles at 100°C, demonstrating stable operation under extreme conditions and marking a significant advance in electrolyte design.

IN DEPTH

Addressing Challenges in High-Temperature Lithium Metal Batteries

Lithium metal batteries (LMBs) are heralded as a next-generation power source due to their theoretically highest energy density. However, their practical implementation is hindered by critical issues such as lithium dendrite growth, electrolyte instability, and a narrow electrochemical window, especially under elevated temperatures. These problems severely compromise battery safety and cycle life, making the development of stable solid electrolytes imperative for the commercialization of high-performance LMBs. Against this backdrop, the development of new electrolytes inspired by natural materials represents a groundbreaking step forward.

Technical Details of the Bone-Inspired Solid Solution Electrolyte (CFSSE)

Recent research published in ACS Nano introduces a novel "bone-inspired solid solution electrolyte (CFSSE)" derived from naturally occurring calcium fluoride (CaF2). This innovative solid electrolyte demonstrates properties that substantially enhance the performance of lithium metal batteries. Specifically, the CFSSE exhibits an exceptionally wide electrochemical window of 5.26 V, broadening its applicability for high-voltage systems. Furthermore, its high lithium ion transference number (Li+ transference number) of 0.77 signifies efficient lithium ion migration, contributing directly to the effective suppression of dendrite growth. This is a crucial advancement, as it mitigates the short-circuiting and performance degradation commonly associated with dendrite formation in conventional electrolytes.

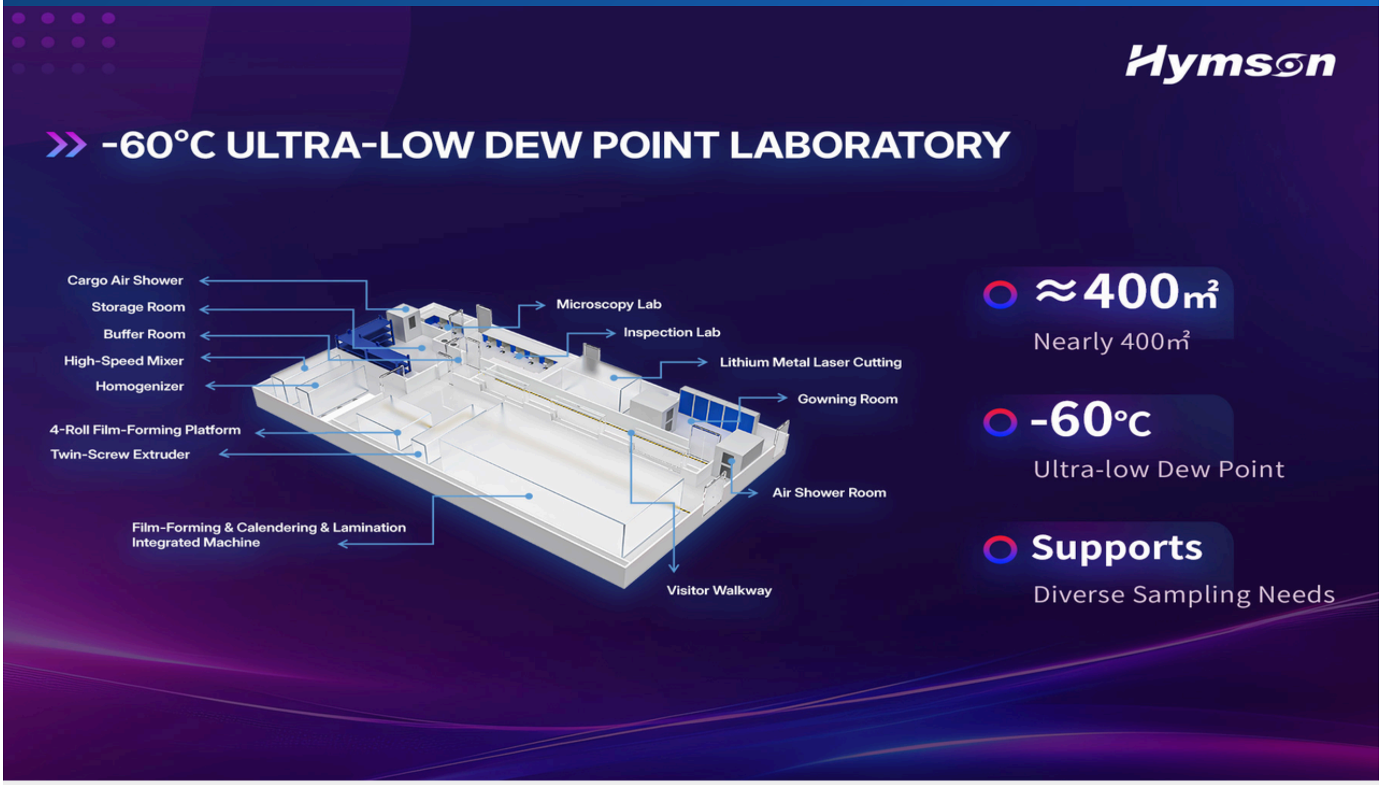
Exceptional High-Temperature Performance and Future Prospects

Lithium metal cells incorporating this CFSSE, when paired with a $LiFePO_4$ (LFP) cathode, demonstrated remarkable stability and performance under demanding high-temperature conditions. The cells successfully maintained 81.7% of their initial capacity after 200 charge-discharge cycles at an elevated temperature of 100°C. This robust performance is highly significant for applications requiring extreme environmental tolerance, such as automotive batteries operating in diverse climates or stationary energy storage systems exposed to thermal fluctuations. This "bone-inspired" design paradigm highlights the burgeoning potential of biomimetics in battery material science, offering a new directional pathway for the development of future-generation lithium metal batteries that can operate reliably and safely in harsh environments.

Source: https://pubs.acs.org/doi/10.1021/acsnano.6c03537

Hymson's Dry Electrode Technology Revolutionizes Solid-State Battery Manufacturing with Major Cost and Efficiency Gains

Published May 28, 2026 electrive.com Germany



OVERVIEW

Hymson's dry electrode technology eliminates solvents in solid-state battery (SSB) manufacturing, projecting up to 66% CAPEX and 81% OPEX reductions compared to traditional wet slurry processes. This innovation enables electrodes thicker than 500 μm, boosting energy density. Crucially for highly moisture-sensitive sulfide solid electrolytes, the dry process, conducted in -60°C dew point environments, is claimed to reduce moisture-induced reaction rates by over tenfold, making it indispensable for advanced SSB production.

IN DEPTH

The Imperative of Dry Electrode Technology in Next-Gen Battery Manufacturing

All-solid-state batteries (SSBs) are regarded as a foundational technology for the future of electric vehicles (EVs) and other high-energy-demand applications, primarily due to their superior safety profile and potential for higher energy density. However, their manufacturing processes diverge significantly from conventional liquid-electrolyte lithium-ion batteries, presenting unique challenges stemming from the properties of solid electrolyte materials. In this landscape, Hymson's dry electrode technology emerges as a transformative solution, promising dramatic improvements in efficiency and cost reduction for SSB production.

Economic and Technical Advantages of Hymson's Dry Electrode Process

Hymson's dry electrode technology completely eliminates the use of solvents in the electrode manufacturing process. This innovative approach is reported to reduce Capital Expenditure (CAPEX) by up to 66% and Operating Expenditure (OPEX) by up to 81% when compared to conventional wet slurry coating and drying processes. These significant savings stem from the elimination of expensive solvents and energy-intensive drying and recovery equipment, leading to substantial economic benefits across the entire battery production lifecycle. From a technical perspective, this process enables the fabrication of electrodes with thicknesses exceeding 500 μm, directly contributing to higher battery energy density. The technology also integrates unique powder processing techniques designed to suppress electrode cracking and ensure uniform active material distribution, critical for optimal performance.

Indispensable Contribution to Sulfide-Based Solid-State Battery Production

Sulfide-based solid electrolytes, in particular, are extremely sensitive to atmospheric moisture, posing a risk of generating toxic hydrogen sulfide gas upon contact with water. Traditional wet processes, which use water or organic solvents for electrolyte layer formation, necessitate stringent environmental control. Hymson's dry electrode process, by eliminating solvents, inherently minimizes the risk of moisture ingress. The company asserts that by enabling manufacturing in ultra-low dew point environments (e.g., -60°C), the rate of moisture-induced side reactions can be reduced by more than tenfold compared to conventional methods. This characteristic is crucial for enhancing the reliability and manufacturability of sulfide-based solid-state batteries, cementing dry electrode technology's role as the "missing link" for next-generation battery production.

Source: https://www.electrive.com/2026/05/28/beyond-slurry-based-coating-why-dry-electrode-is-the-missing-link-for-solid-state-battery-manufacturing/

Anode-Free Lithium Metal Batteries: Ushering in Ultra-High Energy and Green Storage Solutions

Published May 26, 2026 RSC Publishing UK

OVERVIEW

Anode-Free Lithium Metal Batteries (AFLMBs) aim for 400-480 Wh/kg, increasing energy density by 25-40% by eliminating traditional graphite anodes. This review highlights that next-generation solid electrolytes, such as polymer-ceramic composites and sulfide-based materials, are effective in suppressing dendrite growth. However, interfacial stability and long-term cycle life remain critical challenges. An integrated approach combining interfacial engineering, pre-lithiation techniques, and optimized operating conditions is deemed essential for AFLMB commercialization.

Pursuing Ultra-High Energy Density and Sustainable Storage

Anode-Free Lithium Metal Batteries (AFLMBs) represent a transformative next-generation technology poised to revolutionize energy storage. By eliminating the conventional graphite anode found in current lithium-ion batteries, AFLMBs hold the potential to significantly boost battery energy density by 25-40%, targeting an ambitious 400-480 Wh/kg. Beyond superior performance, this design promises environmental and economic benefits, including reduced carbon footprint associated with graphite production and lower material costs. Consequently, AFLMBs are gaining increasing attention as a sustainable and high-performance solution for diverse applications.

Challenges in Dendrite Suppression and Interfacial Stability

This comprehensive review, published by RSC Publishing, meticulously analyzes the key technical challenges and advancements in AFLMBs. Next-generation solid electrolytes, particularly polymer-ceramic composites and sulfide-based solid electrolytes, are identified as promising solutions for effectively suppressing the notorious growth of lithium dendrites. These solid electrolytes offer both mechanical strength and excellent ionic conductivity, mitigating the risk of internal short circuits caused by dendrite formation. However, critical challenges persist concerning interfacial stability between the electrolyte and anode, as well as maintaining long-term cycle life. Overcoming these fundamental issues is paramount for the successful commercialization of AFLMBs.

Integrated Approaches for Practical Implementation

The review concludes that a multi-faceted research and development approach is indispensable for the commercial success of AFLMBs. This integrated strategy encompasses several key elements: firstly, "interfacial engineering" to optimize the interface between the electrode and electrolyte, ensuring stable, low-resistance ion transport pathways. Secondly, the implementation of "pre-lithiation techniques" to stabilize the initial formation of the lithium metal anode, thereby improving first-cycle efficiency. Lastly, defining "optimized operating conditions," including charging rates, temperature, and pressure, to maximize overall battery performance and lifespan. By integrating these advanced technologies, AFLMBs can fully realize their potential as ultra-high energy and green energy storage solutions, with anticipated applications spanning electric vehicles, drones, and portable electronic devices.

Source: https://pubs.rsc.org/en/content/articlehtml/2026/ra/d6ra01751g?page=search

Collected: May 29, 2026 | Automated Research System (Gemini API)

Calendering Process for Solid-State Batteries: Precision Control Crucial for Performance and Integrity

Published May 27, 2026 PatSnap Eureka USA

OVERVIEW

Calendering for solid-state batteries (SSBs) demands precise control over pressure (30-100 MPa) and temperature (60-120°C) to prevent solid electrolyte damage and minimize interfacial resistance. Improper calendering can increase interfacial resistance by 200-500%, highlighting the critical need for uniform pressure distribution. Particularly in roll-to-roll manufacturing, advanced control is essential to prevent delamination and cracking of brittle solid electrolyte materials, which directly impacts cell performance and manufacturability.

IN DEPTH

The Pivotal Role of Calendering in Battery Manufacturing

In the battery manufacturing process, calendering is a crucial step that determines the physical properties of electrodes, such as density, thickness, and surface roughness, thereby significantly impacting the final cell performance. For conventional liquid-electrolyte lithium-ion batteries, calendering involves compressing dried electrode slurries with rollers after coating. However, for all-solid-state batteries (SSBs), which utilize brittle solid electrolytes, the calendering conditions differ substantially, requiring a much higher degree of precision and control.

Specialized Requirements for Solid-State Battery Calendering

According to a report from PatSnap Eureka, calendering for solid-state batteries necessitates a distinct pressure range and temperature control compared to traditional batteries. To prevent fracture or cracking of the solid electrolyte while minimizing interfacial resistance between the electrodes and electrolyte, pressures are typically adjusted within the 30-100 MPa range, combined with controlled heating between 60-120°C. Inadequate calendering can lead to poor interfacial contact, potentially increasing interfacial resistance by an alarming 200-500%. This severe increase can significantly degrade battery performance, leading to higher internal resistance, reduced power density, and increased heat generation within the cell.

Challenges of Precision Pressure Control in Roll-to-Roll Manufacturing

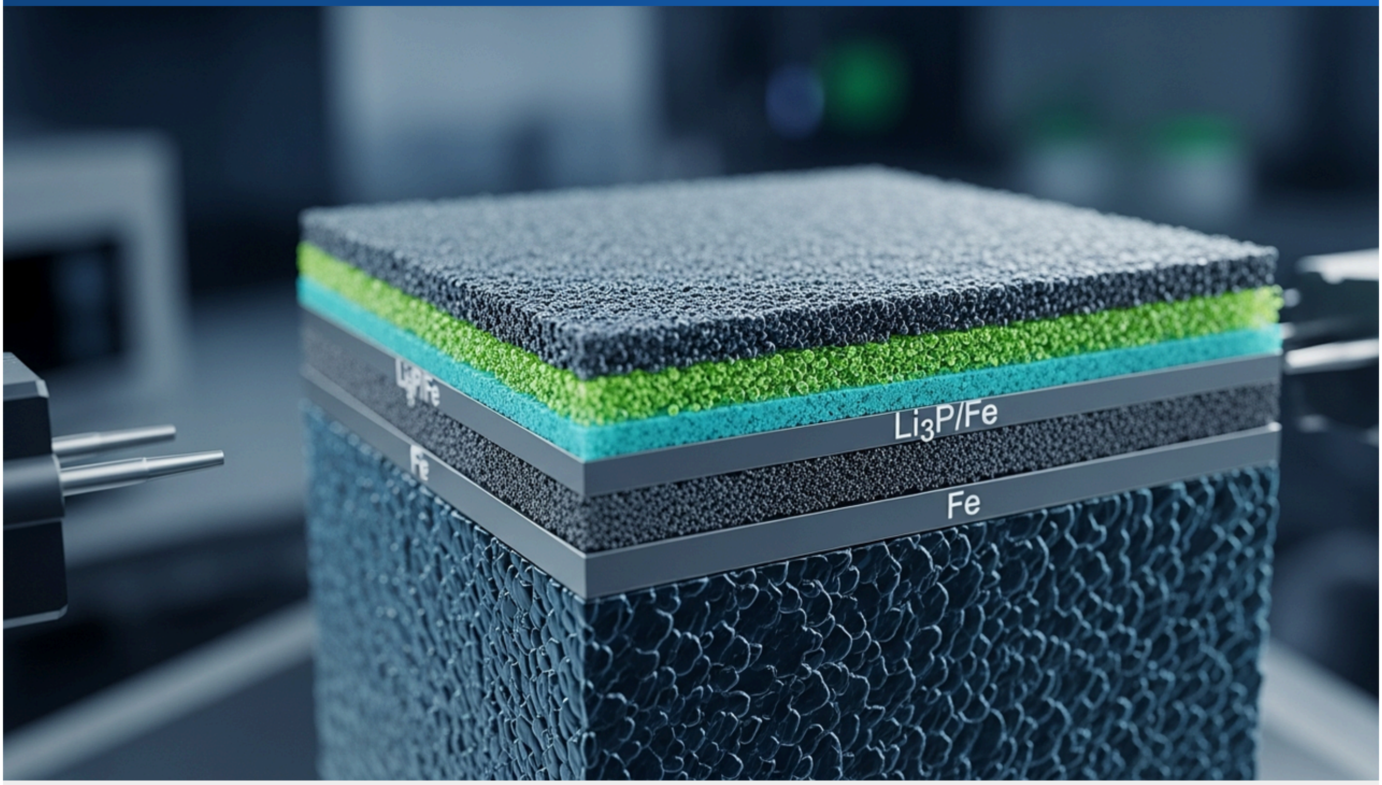
In large-scale roll-to-roll manufacturing environments, calendering for solid-state batteries presents even more complex challenges. To prevent delamination and microscopic cracking of the inherently brittle solid electrolyte materials, an exceptionally uniform and precise pressure distribution across the entire roll width is indispensable. Even slight pressure inconsistencies can damage the solid electrolyte layer, disrupting ion conduction pathways. Therefore, the optimization of calender roll design, material selection, temperature management, and process parameters constitutes a critical research and development area for SSB mass production. The integration of advanced sensor technologies and real-time control systems is essential to overcome these challenges and ensure the stable production of high-quality solid-state batteries.

Source: https://eureka.patsnap.com/report-comparing-calendering-effects-on-lithium-ion-vs-solid-state-batteries

Collected: May 29, 2026 | Automated Research System (Gemini API)

Constructing Li3P/Fe Dual-Conductive Interface for High-Performance Garnet Solid-State Lithium Metal Batteries

Published May 26, 2026 ACS Publications USA



OVERVIEW

A study in ACS Publications introduces a novel Li3P/Fe dual-conductive composite interfacial layer, formed in-situ by coating FeP on garnet LLZTO solid electrolytes and reacting with molten lithium. This synergistic design significantly reduces interfacial impedance from 712.04 Ω cm–2 to 77.52 Ω cm–2 through combined ionic (Li3P) and electronic (Fe) conductivity. The interface enables stable Li plating/stripping for over 2200 hours at 0.1 mA cm–2, effectively suppressing dendrite formation and penetration, crucial for high-performance solid-state lithium metal batteries.

Overcoming Interfacial Challenges in Garnet Solid-State Batteries

All-solid-state batteries (SSBs) are garnering significant attention as a next-generation battery technology due to their potential for high safety and energy density. Garnet-type solid electrolytes, such as $Li_7La_3Zr_2O_{12}$ (LLZTO), are particularly promising due to their high ionic conductivity. However, direct contact with a lithium metal anode often leads to issues like chemical reactivity and high interfacial resistance. This high interfacial resistance impedes efficient lithium ion transport and significantly degrades battery performance, representing a major hurdle for practical implementation. To address this, novel interfacial engineering approaches are being explored.

Construction and Efficacy of the Li3P/Fe Dual-Conductive Interface

Recent research published in ACS Publications proposes an innovative solution: creating an in-situ Li3P/Fe composite interfacial layer by coating the surface of garnet LLZTO solid electrolytes with FeP (iron phosphide) and subsequently reacting it with molten lithium. This "Li3P/Fe dual-conductive interface" leverages the synergistic effects of ionically conductive Li3P and electronically conductive Fe to dramatically reduce interfacial impedance. Specifically, the impedance was cut from a high of 712.04 $\Omega\ cm^{-2}$ to a significantly lower 77.52 $\Omega\ cm^{-2}$, representing an approximate 90% reduction. This low-resistance interface facilitates fast and uniform lithium ion migration, thereby reducing the battery's internal resistance and improving its overall efficiency.

Dendrite Suppression and Enhanced Long-Term Stability

The innovative interfacial layer has been demonstrated to substantially enhance the stability of the lithium metal anode. Under a relatively high current density of 0.1 mA cm^{-2}, the system achieved stable lithium plating/stripping (charge/discharge) for over 2200 hours. This impressive longevity confirms the effective suppression of lithium dendrite formation and penetration into the electrolyte, a pervasive problem in traditional lithium metal batteries that compromises both safety and cycle life. This research represents a crucial breakthrough for the commercialization of garnet-based solid-state lithium metal batteries, accelerating the realization of next-generation battery technology that combines high energy density with superior safety characteristics.

Source: https://pubs.acs.org/doi/10.1021/acsami.5c25615

Collected: May 29, 2026 | Automated Research System (Gemini API)

Basquevolt Launches BQV400L: A Hybrid Lithium Metal Battery Paving the Way for Solid-State Commercialization

Published Published May 22, 2026   electrive.com   スペイン

OVERVIEW

Spanish battery innovator Basquevolt has launched its BQV400L lithium metal battery cell, marking its first commercially available product. This fourth-generation cell integrates an NMC cathode, a lithium metal anode, and a proprietary 'hybrid' polymer electrolyte, positioning it as a crucial stepping stone towards all-solid-state battery technology. The BQV400L promises high energy density, improved safety, and is immediately available for integration.

IN DEPTH

Introduction: Pioneering Next-Generation Battery Commercialization

Basquevolt, an innovative battery development company based in Spain, has announced the commercial launch of its new lithium metal battery cell, the "BQV400L," introducing a compelling new option to the energy storage market. This announcement marks a significant milestone in the broader push towards integrating all-solid-state battery (ASSB) technology into electric vehicles (EVs) and other high-energy-density applications. Basquevolt describes this cell as being based on a "hybrid electrolyte," strategically positioning it as a foundational precursor technology on the path to fully solid-state batteries.

BQV400L Technical Specifications and Electrolyte Innovation

The BQV400L cell integrates a high-nickel NMC (Nickel-Manganese-Cobalt) cathode, a lithium metal anode optimized for high energy density, and Basquevolt's proprietary polymer electrolyte. Polymer electrolytes offer distinct advantages over traditional liquid electrolytes, including enhanced safety due to reduced flammability and greater flexibility in cell design. Basquevolt states that this hybrid electrolyte is engineered to achieve a critical balance between ionic conductivity and mechanical stability. This balance is crucial for suppressing lithium dendrite formation, thereby ensuring a long cycle life and high performance. The BQV400L represents the fourth generation of lithium metal technology developed by Basquevolt and is their first commercially available product, signifying a successful transition from research and development to market deployment.

Market Implications and Strategic Future Trajectory

The immediate launch of Basquevolt's BQV400L signals a clear shift towards the practical implementation of next-generation battery technologies. Its prompt availability allows customers to rapidly evaluate and integrate this new lithium metal technology into their applications. This innovation holds significant potential, particularly for the EV market, where it could contribute to extending driving range, shortening charging times, and enhancing overall safety. Basquevolt aims to pave the way for the establishment of full solid-state battery technology through this product, contributing significantly to the global evolution of energy storage solutions. Future technological refinements and scaling of production are anticipated to lead to even higher performance and more cost-effective solid-state batteries, further solidifying the company's position in the advanced battery landscape.

Source: https://www.electrive.com/2026/05/22/basquevolt-launches-lithium-metal-battery-cell/

Collected: May 29, 2026 | Automated Research System (Gemini API)

Solid-State Batteries: The New Frontier for Robotics Powering Advanced Autonomous Systems

Published May 27, 2026 eScience Energy Switzerland

OVERVIEW

The rapid evolution of robotics is exposing limitations of conventional lithium-ion batteries, with solid-state batteries (SSBs) emerging as a promising solution. SSBs offer key attributes like non-flammability, wide temperature tolerance, bipolar stacking capability, and geometric versatility, aligning with the unique power demands of modern robotic systems. A recent review examines oxide, sulfide, and polymer-based solid electrolytes for robotics, highlighting that battery demand from this sector has been largely underestimated.

IN DEPTH

Evolving Energy Storage Requirements in Robotics

The swift advancement of robotics, spanning from industrial manipulators to autonomous mobile robots and humanoids, continuously expands their functionalities and application domains. However, this rapid progress increasingly underscores the inherent limitations of conventional liquid-electrolyte lithium-ion batteries, particularly concerning safety, energy density, and adaptability to specific operating environments. To bridge this gap, all-solid-state batteries (SSBs) are attracting significant attention as the next-generation power solution for the field of robotics.

Solid-State Battery Characteristics and Suitability for Robotics

Solid-state batteries possess several crucial characteristics that align well with the stringent demands of robotic systems. Firstly, by utilizing non-flammable solid electrolytes, the risk of fire in the event of an operational accident is drastically reduced, leading to a significant enhancement in safety. Secondly, SSBs can operate stably across a wide temperature range, thereby increasing the reliability of robots in diverse environmental conditions. Furthermore, their potential for high voltage and energy density through bipolar stacking, combined with "geometric versatility" (the ability to be designed in various shapes), offers a major advantage for integrating batteries into complex robotic body structures. The review paper thoroughly discusses how oxide, sulfide, and polymer-based solid electrolytes can be optimized for robotic applications based on their respective properties.

Underestimated Battery Demand in Robotics and Future Prospects

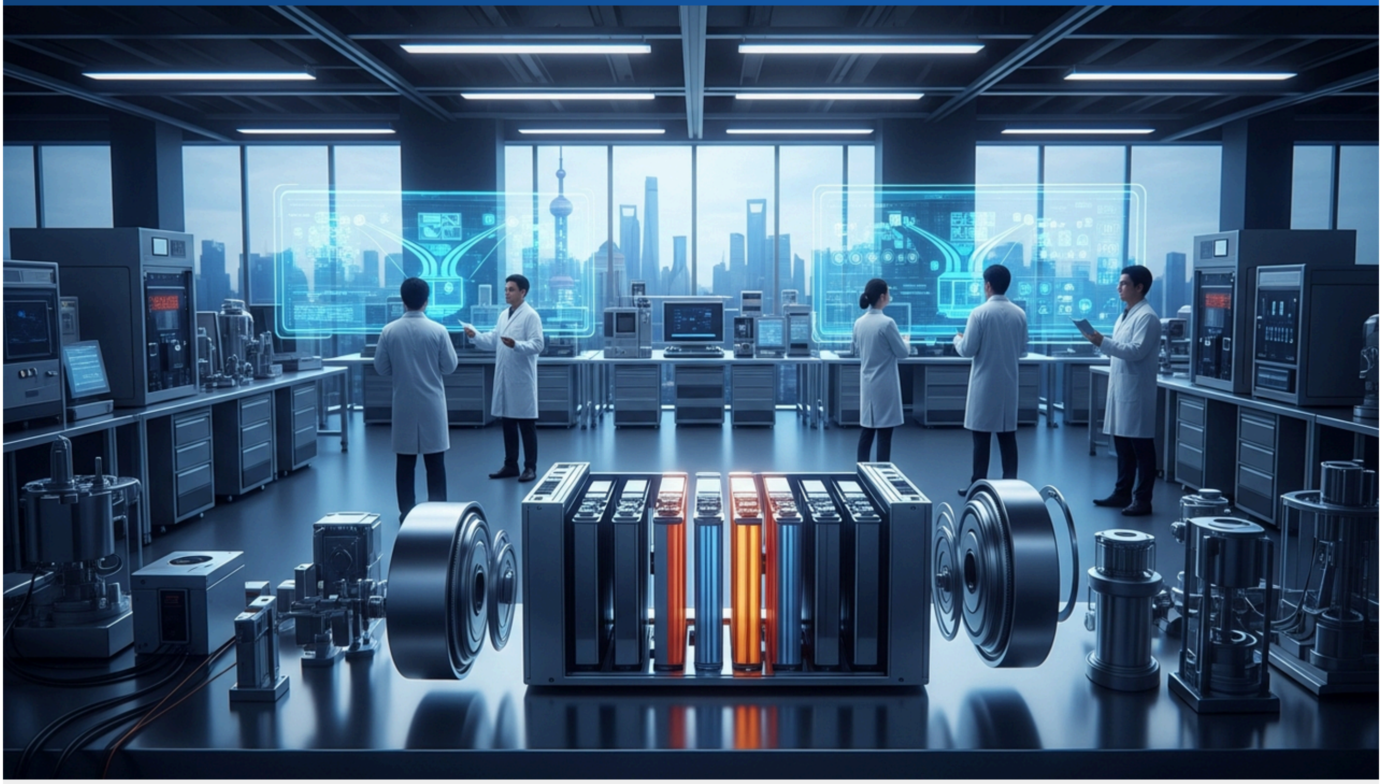
The review emphasizes that the battery demand from the robotics sector has been largely underestimated to date. However, for future robots to operate autonomously and for extended durations, safer and higher-density energy sources are indispensable. SSBs offer the potential for smaller and lighter designs compared to traditional batteries, thereby enhancing a robot's payload capacity and operational uptime. This for, SSB technology is expected not only to improve robot performance but also to enable the creation of new robotic applications and the realization of robotic systems that surpass current limitations. The synergy between robotics and battery technology is poised to play a critical role in the development of future smart societies.

Source: https://www.frontiersin.org/journals/batteries-and-electrochemistry/articles/10.3389/fbael.2026.1873385/full

Collected: May 29, 2026 | Automated Research System (Gemini API)

CIBF2026 Reveals Solid-State Battery Drive Amidst Divergent Technology Pathways

Published May 21, 2026 Shanghai Metals Market (SMM) China



OVERVIEW

CIBF2026 highlighted that while solid-state battery (SSB) adoption is "mandatory," technological pathways (sulfide/oxide/semi-solid) remain fragmented, with most products still in sample verification. Sinoma Science & Technology unveiled a 20μm composite skeleton-supported sulfide solid electrolyte membrane, claiming it's the "world's first scalable for mass production" and compatible with existing liquid battery lines. Equipment manufacturers also showcased numerous SSB-specific dry electrode and coating solutions.

IN DEPTH

Current State of the Solid-State Battery Market at CIBF2026

The China International Battery Fair (CIBF) 2026 served as a crucial platform for showcasing the latest trends in solid-state battery (SSB) technology. The exhibition clearly indicated that the industry views the transition to solid-state as a "mandatory" strategic objective. However, it also revealed a fragmented landscape, with major technological pathways—including sulfide, oxide, polymer, and semi-solid batteries—still diverging without a unified direction. The prevalent presence of products in the sample verification stage suggests that full-scale commercial mass production is yet to be widely achieved, reflecting the ongoing developmental challenges.

Key Company Announcements and Moves Towards Mass Production

Several companies made notable technological announcements at CIBF2026. Particularly, Sinoma Science & Technology showcased a 20μm thick composite skeleton-supported sulfide all-solid-state electrolyte membrane. The company positioned this membrane as the "world's first scalable for mass production" and highlighted its direct compatibility with existing liquid electrolyte battery manufacturing lines. Such compatibility holds immense potential for reducing manufacturing costs and lowering adoption barriers, which are critical for accelerating the market introduction of SSBs. Beyond battery material developers, numerous equipment manufacturers also presented new technologies and specialized equipment for SSB mass production, including dry electrode equipment, solid electrolyte coating lines, and precision calendering machines, demonstrating innovation across the entire supply chain.

Technical Challenges and Future Outlook

Despite the rapid advancements, significant technical challenges persist for the full commercialization of solid-state batteries. These include reducing interfacial resistance, suppressing dendrite growth, extending cycle life, and further lowering manufacturing costs. Sulfide electrolytes are attractive for their high ionic conductivity but are sensitive to atmospheric moisture. Oxide systems offer superior stability but tend to have lower ionic conductivity. Semi-solid batteries are also being explored as an intermediate solution. CIBF2026 underscored China's leadership in SSB development while also reflecting the intensifying competition among different technological pathways to establish dominance. The coming years will be crucial in determining how these technologies evolve and which pathways will emerge as mainstream in the market.

Source: https://news.metal.com/th/newscontent/103912524-CIBF2026-Solid-State-Toward-Solid-State-Still-Testing

Collected: May 29, 2026 | Automated Research System (Gemini API)

Solidion Technology Achieves First Quarterly Revenue and Secures Patent for Solid-State Battery Production Conversion

Published May 21, 2026   Solidion Technology (via PRNewswire)   USA

OVERVIEW

Solidion Technology has reached a commercial milestone with its first quarterly revenue and secured a U.S. patent for its unique technology enabling the conversion of existing lithium-ion manufacturing facilities to solid-state battery production. This innovation significantly reduces fire risks by transforming flammable liquid electrolytes into solid ones. The company's Li-S batteries currently achieve 380 Wh/kg (targeting 450 Wh/kg), with high-power 9.5Ah pouch cells slated for commercial availability in Q2 2026 for industrial and military drones.

IN DEPTH

Commercial Milestones and Patent Acquisition

Solidion Technology, a developer of solid-state battery technology, has announced significant commercial milestones, including reporting its first quarterly revenue. This achievement signals growing market validation for its proprietary technologies. Furthermore, Solidion Technology has been granted a U.S. patent for its innovative method that enables the conversion of existing lithium-ion battery manufacturing facilities into solid-state battery production lines. This patent is crucial for achieving cost-effective production processes and accelerating the widespread adoption of solid-state batteries.

Solidion Technology's Technical Features and Safety Profile

Solidion Technology's core technology is based on its ability to convert conventional flammable liquid electrolytes into non-flammable solid ones. This significantly reduces the fire risk associated with batteries, thereby dramatically enhancing safety. Such inherent safety is a critical advantage, particularly in sectors demanding high reliability and stringent safety standards, such as drones, aerospace, and military applications. The company's developed Li-S (lithium-sulfur) batteries currently achieve an energy density of 380 Wh/kg, with an ambitious future target of 450 Wh/kg. Beyond high energy density, Li-S batteries benefit from using sulfur, an abundant and inexpensive material, which promises strong cost competitiveness.

Market Introduction and Future Outlook

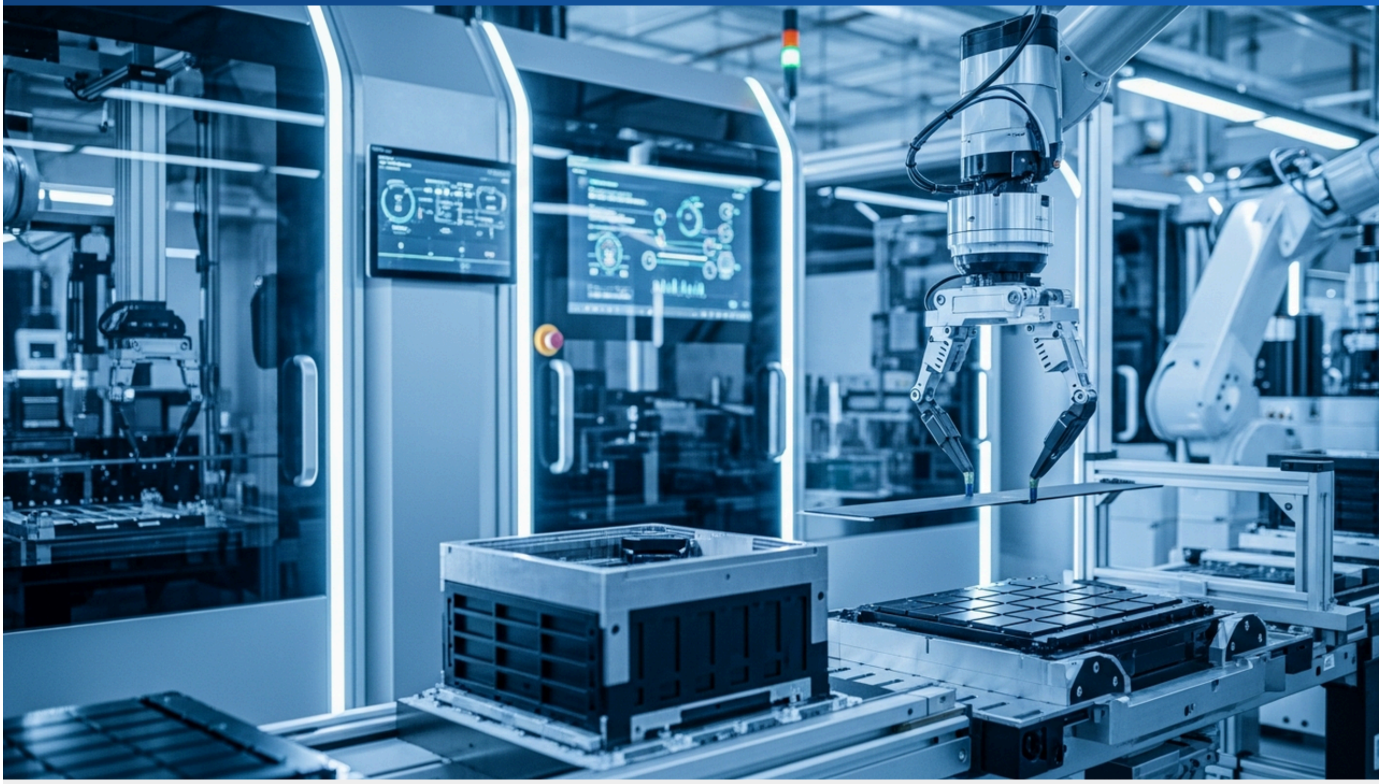
Solidion Technology is developing high-power 9.5Ah pouch cells, which are projected to be commercially available for industrial and military drone applications by the second quarter of 2026. The drone market, requiring long flight endurance and high safety, is expected to benefit significantly from Solidion's technology. Initial success in this niche market is anticipated to provide a stepping stone for broader applications, particularly in the electric vehicle (EV) sector. The patent acquisition and initial revenue generation clearly indicate Solidion Technology's transition from the development phase to full commercialization, reinforcing its growing presence in the next-generation battery market.

Source: https://www.prnewswire.com/news-releases/solidion-technology-marks-commercial-milestone-with-first-ever-quarterly-revenue-302778467.html

Collected: May 29, 2026 | Automated Research System (Gemini API)

IPCO Showcases Enhanced Manufacturing Capabilities for Dry Electrode and Solid-State Batteries

Published May 26, 2026 electrive.com Germany



OVERVIEW

IPCO presented its expanded roll-to-roll and double belt press capabilities for continuous production of dry electrodes and solid-state batteries at The Battery Show Europe 2026. The acquisition of New Era strengthened its technical platform across web handling, coating, laminating, embossing, and calendering. This allows IPCO to offer integrated continuous manufacturing concepts catering to both dry electrode fabrication and all-solid-state battery architectures.

IN DEPTH

Evolution of Next-Generation Battery Manufacturing

IPCO, a Swedish provider of advanced manufacturing solutions, showcased its expanded capabilities at The Battery Show Europe 2026, specifically targeting the production of next-generation battery technologies, including dry electrode processes and all-solid-state batteries (SSBs). This exhibition reflects the battery industry's ongoing transition towards more sustainable and efficient manufacturing processes, positioning IPCO as a key enabler with its core technologies.

IPCO's Enhanced Manufacturing Platform

Through its recent acquisition of New Era, IPCO has significantly bolstered its technological platform. This expansion has augmented its expertise and technical prowess across crucial stages of battery electrode manufacturing, including web handling (the conveyance of sheet materials), precision coating, laminating, embossing, and calendering. These capabilities are integrated into two primary continuous production methods: "roll-to-roll (R2R)" and "double belt press" technologies. R2R production facilitates continuous material feeding and processing, dramatically improving manufacturing speed and efficiency. The double belt press technology is particularly vital for optimizing material density and interfacial contact, especially in dry electrode processes and the fabrication of solid electrolyte membranes, by applying uniform pressure and temperature.

Contribution to Dry Electrode and Solid-State Battery Manufacturing

The enhanced manufacturing solutions offered by IPCO are designed to maximize the advantages of dry electrode manufacturing processes. Dry electrodes eliminate the use of solvents, not only reducing environmental impact and production costs but also offering the potential to increase electrode thickness and energy density. Furthermore, in the production of solid-state batteries, it is critically important to form uniform, high-quality electrodes without damaging brittle solid electrolytes or delicate interfacial layers. IPCO's integrated continuous manufacturing concept addresses these challenges, providing a foundational framework for accelerating the mass production of next-generation batteries. This represents an indispensable contribution to supplying the market with safer and higher-performing battery solutions.

Source: https://www.pffc-online.com/news/19058-ipco-to-showcase-expanded-battery-manufacturing-capability

Nayuan New Materials Unveils Anode-Free All-Solid-State Sodium-Ion Battery with 320 Wh/kg Energy Density

Published May 29, 2026 Shanghai Metals Market China

OVERVIEW

Nayuan New Materials Technology (Wuxi) Co., Ltd. introduced an anode-free all-solid-state sodium-ion battery at the 2026 SMM Battery Technology Industry Conference. This novel battery boasts an energy density of 320 Wh/kg, operates on a high-voltage 3.7V platform, and is water-soluble for easy recycling. It is projected to reduce material costs by 70-80% compared to LFP batteries, aiming to surpass mainstream LFP performance levels.

IN DEPTH

Pioneering the Future of Sodium-Ion Batteries

Amid growing concerns over the uneven distribution and price volatility of lithium resources, sodium-ion batteries (NIBs) are emerging as a promising next-generation energy storage technology. Notably, Nayuan New Materials Technology (Wuxi) Co., Ltd. announced groundbreaking achievements in NIB technology at the 2026 SMM Battery Technology Industry Conference. The company has developed an anode-free all-solid-state sodium-ion battery, emphasizing its high performance and sustainability credentials.

Key Characteristics of Nayuan New Materials' New Technology

The anode-free all-solid-state sodium-ion battery introduced by Nayuan New Materials exhibits several remarkable features. Firstly, it achieves an energy density of 320 Wh/kg, which is exceptionally high for a sodium-ion battery. Furthermore, it operates on a high-voltage platform of 3.7V, indicating its potential applicability in high-power applications. A significant environmental advantage is its water-solubility, making it easily recyclable and thus lowering its environmental footprint. The company states that this battery can reduce material costs by 70-80% compared to conventional Lithium Iron Phosphate (LFP) batteries. This substantial cost reduction is a crucial factor for significantly decreasing battery manufacturing costs and enhancing market competitiveness.

Market Impact and Future Outlook

This novel anode-free all-solid-state sodium-ion battery aims to surpass the performance levels of mainstream LFP batteries. While LFP batteries are valued for their cost-efficiency and safety, they have inherent limitations in energy density. If Nayuan New Materials' technology achieves commercialization, it could offer a battery solution combining low cost, high energy density, superior safety, and easy recyclability. This would have a significant impact on markets for electric vehicles (EVs), stationary energy storage, and other power applications. Sodium-ion batteries, by reducing reliance on lithium resources, are poised to become a vital option for building more decentralized and sustainable energy systems, and their future development is keenly anticipated.

Source: https://news.metal.com/en/newscontent/103924715-Nayuan-New-Materials-Technology-Wuxi-Co-Ltd-Made-a-Grand-Appearance-at-the-2026-SMM-Battery-Technology-Industry-Conferen

Collected: May 29, 2026 | Automated Research System (Gemini API)