TROY TECHNICAL

ALL-SOLID-STATE BATTERIES

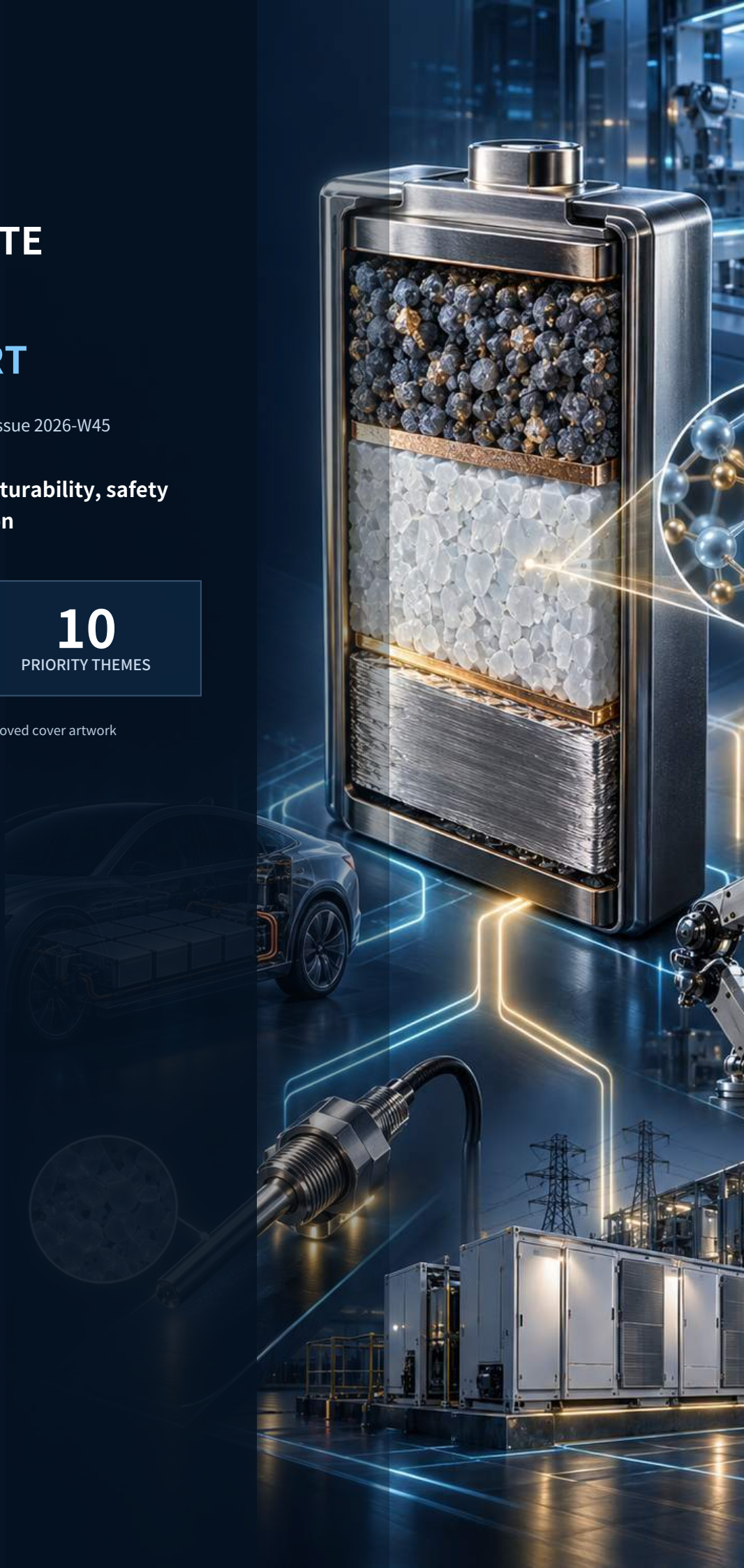
WEEKLY REPORT

November 8 - November 14, 2026 | Issue 2026-W45

Interface stability, manufacturability, safety and automotive qualification

13	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-11-14 | English edition | fixed approved cover artwork



All-Solid-State Batteries: the boundary moved from isolated claims to qualification evidence

13 English articles were reviewed independently from the Japanese edition. Ten themes are retained for management decisions.

SIGNAL 01 | ELECTROLYTE

Factorial: 450 Wh/kg solid-state cells and aerospace roadmap

Factorial has achieved an energy density of 450 Wh/kg for its aerospace-grade solid-state cells, reaching a target originally set for the end of 2026. The company has also begun generating commercial revenue ahead of its 2027 objective.

SIGNAL 02 | ELECTRODE INTERFACE

Gotion High-Tech: All-Solid-State Battery Production Roadmap 2027

Gotion High-Tech has initiated work on a 2GWh all-solid-state battery mass production line and reports that its pilot line is operating stably. The company targets small-batch production and vehicle testing by 2027.

SIGNAL 03 | CELL PROCESS

Gotion High-Tech: Lithium Sulfide Production and 2030 Roadmap

Gotion High-Tech has introduced a self-developed three-phase reaction method for producing lithium sulfide, a critical raw material for solid-state batteries. The company plans to scale production from 300 tons per year in 2026 to 50,000 tons per year by 2030.

SIGNAL 04 | VALIDATION

Solid-State Batteries: Xidian University's 12µm Coating Specs

Researchers at Xidian University have developed a 12-micrometer liquid coating that prevents dendrite formation in lithium-metal batteries. The protective layer increases critical current density to 3.5 mA cm-2 and maintains 82.3% capacity after 300 cycles.

DECISION

Focus this week's management attention on interface stability, manufacturability, safety and automotive qualification. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: compare cell evidence under practical loading, pressure, temperature and cycle conditions.
2. Suppliers: show powder, interface and process consistency together with scale and cost.
3. Executives: track loading, pressure, interface resistance, yield, safety, capacity and timing.

EVIDENCE DISCIPLINE

FACT states what the collected English source reports. BUSINESS READ and ACTION are editorial interpretations. UNKNOWN lists information that the source file does not establish. A linked article is not treated as independent confirmation of every claim.

Numbers and evidence anchors that require conditions

450 W
A07

SOURCE-BOUND CONDITION
Factorial has achieved an energy density of 450 Wh/kg for its aerospace-grade solid-state cells, reaching a target originally set for the end of 2026.

2GW
A11

SOURCE-BOUND CONDITION
Gotion High-Tech has initiated work on a 2GWh all-solid-state battery mass production line and reports that its pilot line is operating stably.

82.3%
A14

SOURCE-BOUND CONDITION
The protective layer increases critical current density to 3.5 mA cm-2 and maintains 82.3% capacity after 300 cycles.

15%
A05

SOURCE-BOUND CONDITION
Adding 15% excess lithium hydroxide monohydrate during flash sintering maximizes the room-temperature ionic conductivity of Ta-substituted LLZO at 8.20 × 10-4 S cm-1.

235.13 w
A02

SOURCE-BOUND CONDITION
By utilizing a tin and carbon bilayer and a prelithiation step, the architecture achieves a volumetric energy density of 235.13 watt-hours per liter at the 100th cycle.

HOW TO USE THESE NUMBERS
Each value is shown with the condition stated in the collected English article. Do not compare values across different test methods, device sizes, operating temperatures or commercial stages without normalizing those conditions.

Where the value chain moved

Each stage combines one leading theme and one supporting theme. The report treats handoffs as evidence transfers, not decorative arrows.

1

Electrolyte

P01/P06

Factorial has achieved an energy density of 450 Wh/kg for its aerospace-grade solid-state cells, reaching a target originally.

2

Electrode interface

P02/P07

Gotion High-Tech has initiated work on a 2GWh all-solid-state battery mass production line and reports that its pilot line is.

3

Cell process

P03/P08

Gotion High-Tech has introduced a self-devel oped three-phase reaction method for producing lithium sulfide, a critical raw.

4

Validation

P04/P09

Researchers at Xidian University have developed a 12-micrometer liquid coating that prevents dendrite formation in.

5

Vehicle deplo yment

P05/P10

Adding 15% excess lithium hydroxide monohydrate during flash sintering maximizes the room-temperature ionic conductivity of.

EVIDENCE REQUIRED AT EACH HANDOFF

Electrolyte to Electrode interface	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck loading, pressure, interface resistance, yield, safety, capacity and timing.
Electrode interface to Cell process	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck loading, pressure, interface resistance, yield, safety, capacity and timing.
Cell process to Validation	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck loading, pressure, interface resistance, yield, safety, capacity and timing.
Validation to Vehicle deployment	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck loading, pressure, interface resistance, yield, safety, capacity and timing.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented loading, pressure, interface resistance, yield, safety, capacity and timing.

Priority map: maturity and next decision locus



P01	Factorial: 450 Wh/kg solid-state cells and aerospace roadmap Business / rules | cue: revenue
P02	Gotion High-Tech: All-Solid-State Battery Production Roadmap 2027 System / adoption | cue: mass production
P03	Gotion High-Tech: Lithium Sulfide Production and 2030 Roadmap Business / rules | cue: fid
P04	Solid-State Batteries: Xidian University's 12µm Coating Specs Business / rules | cue: capacity
P05	Ta-substituted LLZO: Optimized Li Excess for High Conductivity Business / rules | cue: guideline
P06	Solid-State Battery Materials: Tohoku University's AI Framework System / adoption | cue: integrated
P07	Anode-Less Solid-State Batteries: Dongguk University's 2.77 μm Architecture Tech / process | cue: no system/business cue
P08	Solid-State Batteries: Neutron Scattering Reveals Ion Interactions Tech / process | cue: no system/business cue
P09	QuantumScape Osprey: Solid-State Architecture and QSE-5 Specs Business / rules | cue: fid
P10	All-Solid-State Battery Materials: AIST's Robotic Synthesis System System / adoption | cue: System

REPRODUCIBLE POSITIONING RULE

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. The vertical bands classify the next decision locus: Tech / process, System / adoption, or Business / rules (including supply systems). Article-title cues take precedence; the overview is used only when the title is silent. These are categories, not impact ranks. Bubble diameter reflects the editorial score.

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P01 Factorial: 450 Wh/kg solid-state cells and aerospace roadmap

A07 | Electrolyte | Product adoption

2026-11-12

FACT

Factorial has achieved an energy density of 450 Wh/kg for its aerospace-grade solid-state cells, reaching a target originally set for the end of 2026. The company has also begun generating commercial revenue ahead of its 2027 objective. These developments are supported by strategic partnerships for production scaling and integration into automotive and drone platforms.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 22/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P02 Gotion High-Tech: All-Solid-State Battery Production Roadmap 2027

A11 | Electrode interface | Scale-up

2026-11-12

FACT

Gotion High-Tech has initiated work on a 2GWh all-solid-state battery mass production line and reports that its pilot line is operating stably. The company targets small-batch production and vehicle testing by 2027.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 21/25 | MATURITY 5/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P03 Gotion High-Tech: Lithium Sulfide Production and 2030 Roadmap

A09 | Cell process | Product adoption

2026-11-10

FACT

Gotion High-Tech has introduced a self-developed three-phase reaction method for producing lithium sulfide, a critical raw material for solid-state batteries. The company plans to scale production from 300 tons per year in 2026 to 50,000 tons per year by 2030. This development aims to significantly improve reaction efficiency and purity while reducing energy consumption in the supply chain.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

P04 Solid-State Batteries: Xidian University's 12µm Coating Specs

A14 | Validation | Product adoption

2026-11-14

FACT

Researchers at Xidian University have developed a 12-micrometer liquid coating that prevents dendrite formation in lithium-metal batteries. The protective layer increases critical current density to 3.5 mA cm-2 and maintains 82.3% capacity after 300 cycles. This advancement simplifies the production of high-energy-density solid-state batteries for electric vehicles and aviation.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P05 Ta-substituted LLZO: Optimized Li Excess for High Conductivity

A05 | Vehicle deployment | Research

2026-11-08

FACT

Adding 15% excess lithium hydroxide monohydrate during flash sintering maximizes the room-temperature ionic conductivity of Ta-substituted LLZO at 8.20 × 10-4 S cm-1. This research establishes a practical lithium-excess window to compensate for volatilization, providing a synthesis guideline for high-quality solid electrolytes.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 20/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

P06 Solid-State Battery Materials: Tohoku University's AI Framework

A10 | Electrolyte | Joint evaluation

2026-11-09

FACT

Tohoku University researchers have proposed an integrated AI-driven framework to accelerate the discovery of solid electrolytes for next-generation batteries. By combining LLMs, simulation, and automated experimentation, the system aims to move beyond trial-and-error methods to identify materials with both high ionic conductivity and practical stability.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 20/25 | MATURITY 3/5 | DECISION LOCUS: SYSTEM / ADOPTION

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P07 Anode-Less Solid-State Batteries: Dongguk University's 2.77 μm Architecture

A02 | Electrode interface | Pilot

2026-11-12

FACT

Researchers at Dongguk University have developed an ultrathin anode-less thin-film battery with a total cell thickness of 2.77 micrometers. By utilizing a tin and carbon bilayer and a prelithiation step, the architecture achieves a volumetric energy density of 235.13 watt-hours per liter at the 100th cycle. This design mitigates lithium dendrite growth and interfacial delamination, enhancing cycling stability for micro-scale energy storage.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

P08 Solid-State Batteries: Neutron Scattering Reveals Ion Interactions

A01 | Cell process | Pilot

2026-11-10

FACT

Researchers have utilized neutron scattering to observe how charged particles interact and obstruct one another within a solid electrolyte. By identifying microscopic "traffic jams" that slow ion movement, this method provides a way to design materials with optimized charge conduction for solid-state batteries.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 19/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

FACT is source-bound. BUSINESS READ, ACTION and UNKNOWN are explicit editorial layers.

P09 QuantumScape Osprey: Solid-State Architecture and QSE-5 Specs

A13 | Validation | Research

2026-11-12

FACT

QuantumScape has introduced the Osprey cell architecture, which utilizes a solid sulfide electrolyte in the cathode to eliminate liquid components. While achieving 1,000 cycles at one atmosphere of pressure, the company's current commercial QSE-5 cell is revealed to be a semi-solid hybrid.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: BUSINESS / RULES

P10 All-Solid-State Battery Materials: AIST's Robotic Synthesis System

A04 | Vehicle deployment | Joint evaluation

2026-11-09

FACT

The National Institute of Advanced Industrial Science and Technology (AIST) has developed a human-collaborative automated experimental system for the mechanochemical synthesis of all-solid-state battery materials. The system enables the continuous processing of up to 10 samples per command, reducing researcher workload and accelerating material exploration.

WHY IT MATTERS

The decision relevance is interface stability, manufacturability, safety and automotive qualification. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, show powder, interface and process consistency together with scale and cost.

ACTION

Within 30 days, compare cell evidence under practical loading, pressure, temperature and cycle conditions; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: loading, pressure, interface resistance, yield, safety, capacity and timing.

EDITORIAL SCORE 19/25 | MATURITY 3/5 | DECISION LOCUS: SYSTEM / ADOPTION

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	compare cell evidence under practical loading, pressure, temperature and cycle conditions	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	show powder, interface and process consistency together with scale and cost	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map loading, pressure, interface resistance, yield, safety, capacity and timing.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW | 0-30 DAYS
Evidence ledger
Owner: Strategy + quality
Deliverable: claim, source, condition, owner

NOW | 0-30 DAYS
Risk screen
Owner: Procurement + legal
Deliverable: unknowns, alternatives, stop

NEXT | 1-12 MONTHS
Joint qualification
Owner: R&D + supplier
Deliverable: process window and failure data

NEXT | 1-12 MONTHS
Commercial gate
Owner: Business + finance
Deliverable: unit economics and capacity

LATER | 1-5 YEARS
Platform strategy
Owner: Executive team
Deliverable: portfolio and interface roadmap

LATER | 1-5 YEARS
Service layer
Owner: Operations + channel
Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

GATE	OWNER	REQUIRED EVIDENCE	NO-GO CONDITION
G1 Evidence	**Quality**	Source, test conditions and reproducibility	No traceable evidence
G2 Integration	**R&D**	Interface, process window and failure analysis	Cannot meet system conditions
G3 Commercial	**Business**	Capacity, total cost, contract and alternatives	Economics or supply cannot be supported
G4 Lifecycle	**Operations**	Monitoring, maintenance, change notice and exit	No accountable operating plan

ANALYZED ARTICLES | ITEMS 01-14

Every title and URL is displayed in full. URLs wrap without shortening and remain clickable. A verified-reference label means the translated HTML did not retain its original source URL.

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	Solid-State Batteries: Neutron Scattering Reveals Ion Interactions	https://knowridge.com/2026/11/neutrons-reveal-tiny-traffic-jams-that-could-slow-solid-state-batteries/
A02	Anode-Less Solid-State Batteries: Dongguk University's 2.77 μm Architecture	https://bioengineer.org/ultrathin-anode-less-solid-state-battery-architecture-enhances-energy-density-and-cycling-stability/
A03	Sodium Solid-State Electrolytes: Electron Beam Charging and Nucleation	https://bioengineer.org/electron-beam-charging-induces-controlled-sodium-metal-nucleation-in-solid-electrolytes/
A04	All-Solid-State Battery Materials: AIST's Robotic Synthesis System	https://eetimes.itmedia.co.jp/ee/articles/2611/09/news024.html
A05	Ta-substituted LLZO: Optimized Li Excess for High Conductivity	https://bioengineer.org/optimized-lithium-excess-boosts-conductivity-in-ta-substituted-llzo/
A06	Ni/PET/Ni Composite Foils: Current Density Impact on SSBs	https://bioengineer.org/tuned-current-density-optimizes-nickel-composite-foils-for-solid-state-batteries/
A07	Factorial: 450 Wh/kg solid-state cells and aerospace roadmap	https://battery-news.de/en/2026/11/12/factorial-reaches-450-wh-kg-with-solid-state-cells-for-aerospace/
A09	Gotion High-Tech: Lithium Sulfide Production and 2030 Roadmap	https://english.news18a.com/news/english_313398.html
A10	Solid-State Battery Materials: Tohoku University's AI Framework	https://www.bizwnews.com/news/articleView.html?idxno=151264
A11	Gotion High-Tech: All-Solid-State Battery Production Roadmap 2027	https://finance.sina.com.cn/stock/t/2026-11-12/doc-iniyniex1162290.shtml
A12	Solid Polymer Electrolytes: Peking University's Decoupled Ion Transport Framework	https://www.miragenews.com/peking-university-scientists-advance-solid-1777133/
A13	QuantumScape Osprey: Solid-State Architecture and QSE-5 Specs	https://www.arenaev.com/quantumscape_pitches_peace_in_the_solidstate_battery_war__always_read_the_small_print-news-6359.php
A14	Solid-State Batteries: Xidian University's 12µm Coating Specs	https://www.basicthinking.de/blog/2026/11/14/festkoerperbatterie/

SolidStateBattery — Selected Articles

Date: 2026-11-15

Articles: 13

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#03 Sodium Solid-State Electrolytes: Electron Beam Charging and Nucleation

#04 All-Solid-State Battery Materials: AIST's Robotic Synthesis System

#05 Ta-substituted LLZO: Optimized Li Excess for High Conductivity

#06 Ni/PET/Ni Composite Foils: Current Density Impact on SSBs

#07 Factorial: 450 Wh/kg solid-state cells and aerospace roadmap

#09 Gotion High-Tech: Lithium Sulfide Production and 2030 Roadmap

#10 Solid-State Battery Materials: Tohoku University's AI Framework

#11 Gotion High-Tech: All-Solid-State Battery Production Roadmap 2027

#12 Solid Polymer Electrolytes: Peking University's Decoupled Ion Transport Framework

#13 QuantumScape Osprey: Solid-State Architecture and QSE-5 Specs

#14 Solid-State Batteries: Xidian University's 12μm Coating Specs

#01 Solid-State Batteries: Neutron Scattering Reveals Ion Interactions

Published November 10, 2026 Knowridge Science Report USA



OVERVIEW

Researchers have utilized neutron scattering to observe how charged particles interact and obstruct one another within a solid electrolyte. By identifying microscopic "traffic jams" that slow ion movement, this method provides a way to design materials with optimized charge conduction for solid-state batteries.

IN DEPTH

Key Findings

Scientists have developed a technique using neutrons to visualize how ions affect each other's movements within a solid material. The study revealed that ions do not always move independently; instead, they can move together in patterns that either facilitate passage or create microscopic "traffic jams" that hinder the flow of charge.

Technical Details

The research team, led by Argonne National Laboratory, conducted experiments at Oak Ridge National Laboratory’s Spallation Neutron Source. They used a crystal of strontium chloride as a test material because its ion-hopping behavior is well-documented, particularly when heated above 1,200 degrees Fahrenheit.

- **Methodology:** The team aimed neutrons at the crystal and measured the resulting scattering. By rotating the crystal during data collection, they captured a comprehensive record of scattering across different directions.
- **Data Integration:** This approach allowed researchers to combine three dimensions of motion-related information with energy transfer measurements.
- **Analysis:** The process generated significantly more data than standard scattering measurements, requiring powerful neutron sources and computing resources to isolate specific ion interactions.

Background & Context

Battery performance depends on the efficiency of ions traveling through an electrolyte. While many current batteries use liquid electrolytes, solid-state batteries require solid electrolytes that provide fast enough routes for ions to ensure the battery functions effectively.

Significance & Outlook

This discovery highlights a critical distinction in material design: two solids may appear to offer similar routes for a single, isolated ion, but they will exhibit different charge movement rates if the ions hinder or help each other when moving in large numbers. While this study used strontium chloride as a proxy and did not build a working battery, applying this method to practical solids will allow scientists to verify if their models accurately capture the movements that determine charge conduction in next-generation batteries.

Source: https://knowridge.com/2026/11/neutrons-reveal-tiny-traffic-jams-that-could-slow-solid-state-batteries/

Collected: November 15, 2026 | Automated Research System (AI)

#02 Anode-Less Solid-State Batteries: Dongguk University's 2.77 μm Architecture

Published November 12, 2026 BIOENGINEER.ORG South Korea



OVERVIEW

Researchers at Dongguk University have developed an ultrathin anode-less thin-film battery with a total cell thickness of 2.77 micrometers. By utilizing a tin and carbon bilayer and a prelithiation step, the architecture achieves a volumetric energy density of 235.13 watt-hours per liter at the 100th cycle. This design mitigates lithium dendrite growth and interfacial delamination, enhancing cycling stability for micro-scale energy storage.

IN DEPTH

Key Findings

The research team led by Professor Hyun-Suk Kim has engineered a thin-film solid-state battery architecture that achieves a volumetric energy density of 235.13 watt-hours per liter at its 100th cycle when tested at a cycling rate of 0.01 C. The system maintains an overall cell thickness of 2.77 micrometers and demonstrates enhanced operational stability by preventing the formation of "dead lithium" and mechanical delamination at the interface.

Technical Details

The architecture employs an anode-less configuration where lithium ions migrate from the cathode to the current collector during the initial charge. To ensure uniform deposition, the researchers implemented the following modifications to the copper current collector:

- **Tin and Carbon Bilayer:** A tin layer lowers the energetic barrier for lithium nucleation and enhances alloy formation, while a carbon overlayer regulates crystal growth to prevent irregular dendrite morphology.
- **Prelithiation Step:** An ultrathin metallic lithium layer is deposited onto the modified collector to serve as an internal lithium reservoir.
- **Cell Composition:** The complete cell integrates an amorphous lithium vanadium oxide cathode and an inorganic lithium phosphorus oxynitride solid electrolyte.

Structural analysis indicates that a three-dimensionally textured tin-lithium alloy phase forms within the seed interlayer, providing the mechanical resilience needed to accommodate volume changes during stripping and plating cycles.

Background & Context

While all-solid-state batteries offer theoretical improvements in safety and energy density over liquid electrolytes, lithium metal anodes typically suffer from non-uniform plating and stripping. Standard anode-less designs are particularly susceptible to capacity decay due to cumulative lithium loss and the creation of electrically isolated inactive metal fragments.

Significance & Outlook

By combining interfacial surface chemistry with targeted lithium-inventory management, this architecture addresses fundamental degradation modes in anode-less systems. The results, published in Volume 16, Issue 31 of *Advanced Energy Materials*, provide a framework for increasing energy density in micro-scale and thin-film battery form factors.

Source: https://bioengineer.org/ultrathin-anode-less-solid-state-battery-architecture-enhances-energy-density-and-cycling-stability/

Collected: November 15, 2026 | Automated Research System (AI)

#03 Sodium Solid-State Electrolytes: Electron Beam Charging and Nucleation

Published November 14, 2026 BIOENGINEER.ORG USA



OVERVIEW

Researchers have identified electrostatic charging, rather than radiolysis, as the primary beam damage mechanism when imaging sodium solid-state electrolytes. By controlling this bias, the team successfully induced the nucleation of sodium metal crystals to study the interface between the electrolyte and metallic sodium.

IN DEPTH

Key Findings

A research team led by the University of Chicago Pritzker School of Molecular Engineering has determined that electrostatic charging is the dominant mechanism of beam damage in solid-state sodium battery electrolytes. The study, published in *Microscopy and Microanalysis*, demonstrates that electron irradiation creates a localized electrical bias that displaces mobile sodium ions. The researchers converted this unintended effect into a diagnostic tool, using the beam's bias to drive sodium ions across the electrolyte framework and nucleate sodium metal crystals on the opposite side of the sample.

Technical Details

The investigation utilized a collaboration between the University of Chicago, Argonne National Laboratory, and Thermo Fisher Scientific. Using an electron microscope with fast direct electron detectors and chemical spectroscopy, the team gathered data at low electron doses between 10 and 50 electrons per square angstrom. To prevent atmospheric degradation, an inert gas transfer method was used to insert specimens at room temperature.

Crucially, the team found that cryogenic cooling—typically used to suppress radiolysis damage in battery microscopy—did not mitigate beam damage in sodium closo-hydroborate electrolytes. This indicated a distinct degradation pathway. Because sodium ions possess high ionic mobility within the conductive closo-hydroborate framework, the focused electron beam's bias chased ions through the crystal structure, resulting in clean sodium metal nucleation on the opposite surface.

Background & Context

Sodium and sulfur are being explored as lower-cost, more abundant alternatives to lithium-ion batteries, which face geological constraints and reliance on transition metals like cobalt and copper. In 2024, the Laboratory for Energy Storage and Conversion, directed by Shirley Meng, debuted an anode-free sodium solid-state battery that replaces liquid electrolytes with a stable solid-state version to mitigate parasitic side reactions and resistive layer growth.

Significance & Outlook

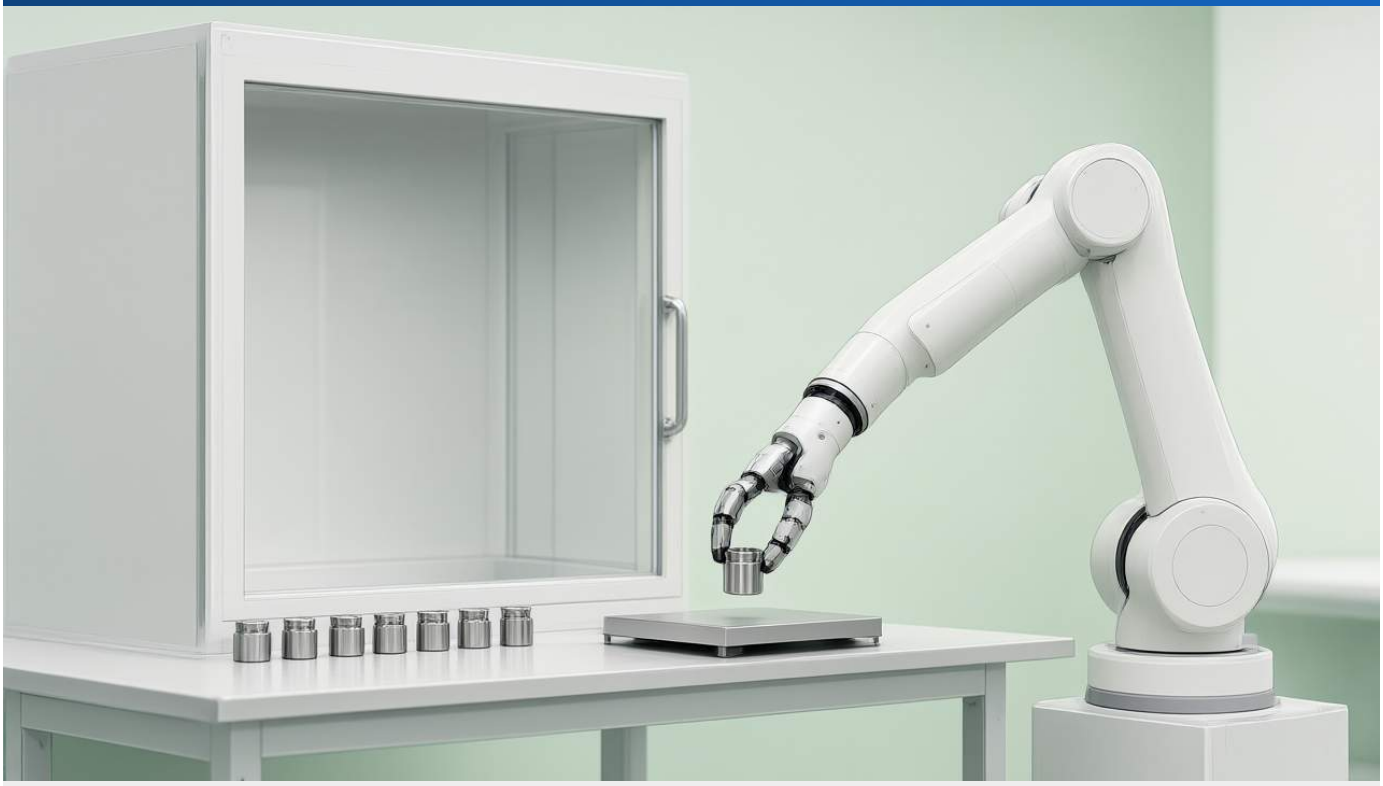
This method allows researchers to directly observe a pristine interface between a sodium solid-state electrolyte and freshly deposited sodium metal. This interface mirrors the initial deposition process occurring in anode-free solid-state batteries, providing critical insights into interphase stability and the microscopic processes that dictate battery performance and lifetime.

Source: https://bioengineer.org/electron-beam-charging-induces-controlled-sodium-metal-nucleation-in-solid-electrolytes/

Collected: November 15, 2026 | Automated Research System (AI)

#04 All-Solid-State Battery Materials: AIST's Robotic Synthesis System

Published November 09, 2026 EE Times Japan Japan



OVERVIEW

The National Institute of Advanced Industrial Science and Technology (AIST) has developed a human-collaborative automated experimental system for the mechanochemical synthesis of all-solid-state battery materials. The system enables the continuous processing of up to 10 samples per command, reducing researcher workload and accelerating material exploration.

IN DEPTH

Key Findings

AIST, in collaboration with Denso Wave, Aichi University of Technology, and the Aichi Industrial Science and Technology Center, has developed a "human-collaborative automated experimental system" designed for the end-to-end mechanochemical synthesis of all-solid-state battery materials. The system automates the process from powder weighing to sample storage, allowing for the continuous processing of up to 10 samples with a single command.

Technical Details

The system integrates specific expertise from four partners: AIST's ceramics and battery material technology, Denso Wave's human-collaborative robot technology, Aichi University of Technology's robot peripheral module development, and the Aichi Industrial Science and Technology Center's material evaluation and industrial support infrastructure. Key technical capabilities include:

- **Automated Workflow:** The system handles the transport of reagent and bead storage containers to planetary ball mill containers, performs the milling process, and manages subsequent sample storage.
- **Throughput:** The planetary ball mill processes two samples per cycle and can execute five consecutive cycles, totaling 10 samples per command.
- **Data Management:** Experimental parameters—including reagent volume, bead type/quantity, rotation speed of the ball mill, and processing time—are managed as digital data. These serve as explanatory variables for Materials Informatics (MI) and Process Informatics (PI).
- **Environment:** All operations are executed within a glove box to prevent contamination from external air.

Background & Context

Developing high-performance solid electrolytes and electrode materials for all-solid-state batteries requires investigating a vast array of material compositions and processing conditions. Previously, these experiments were performed manually, which acted as a bottleneck in development efficiency. AIST previously developed a system in 2023 that used human-collaborative robots and automated weighing to accelerate chemical sintering processes occurring below 100°C.

Significance & Outlook

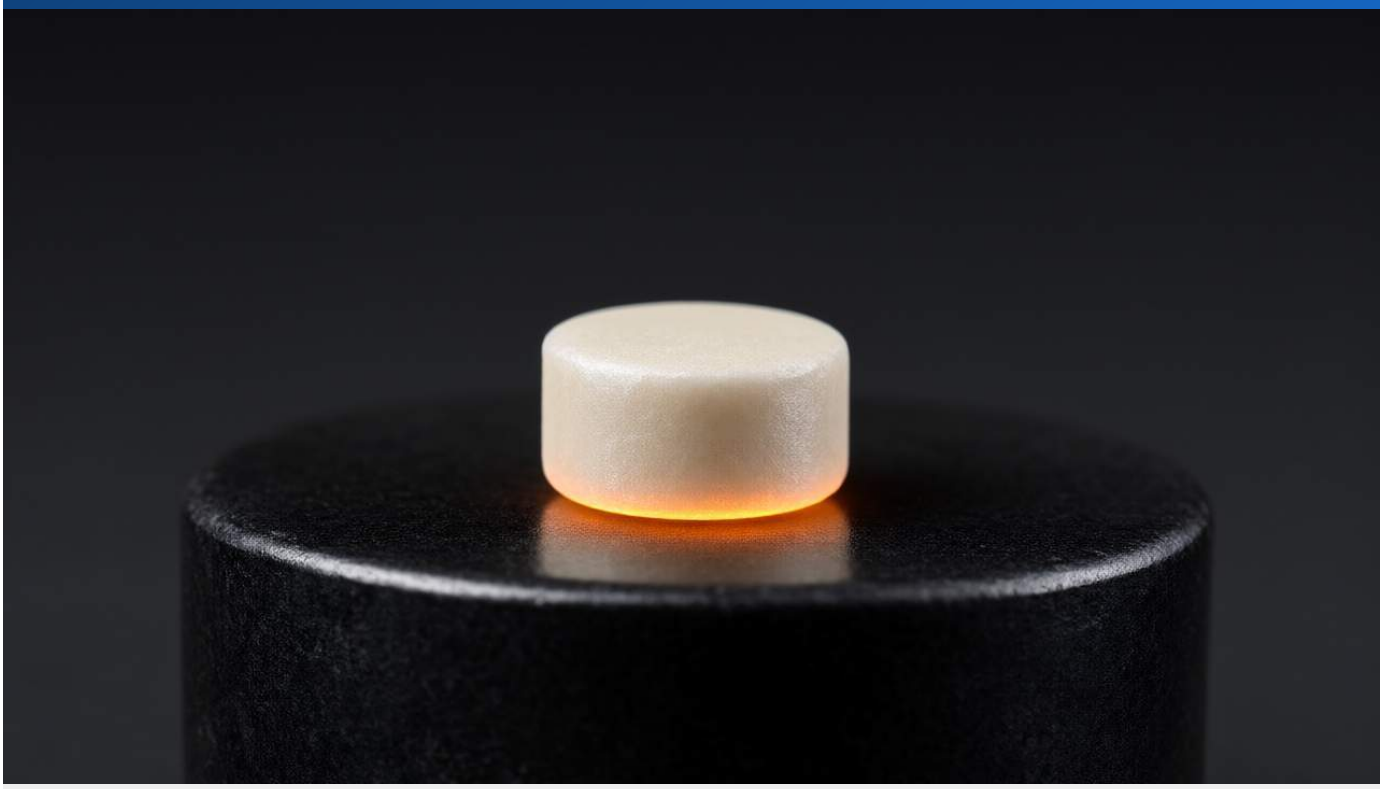
By digitizing experimental know-how and automating repetitive tasks, the system enables the systematic exploration of diverse material combinations. AIST plans to expand the system's target materials and experimental processes for broader application in ceramics development. Starting in fiscal year 2029, AIST is considering introducing the system as a shared experimental facility for regional companies to utilize as a material evaluation and development platform.

Source: https://eetimes.itmedia.co.jp/ee/articles/2611/09/news024.html

Collected: November 15, 2026 | Automated Research System (AI)

#05 Ta-substituted LLZO: Optimized Li Excess for High Conductivity

Published November 08, 2026 BIOENGINEER.ORG USA



OVERVIEW

Adding 15% excess lithium hydroxide monohydrate during flash sintering maximizes the room-temperature ionic conductivity of Ta-substituted LLZO at 8.20×10^{-4} S cm^{-1}. This research establishes a practical lithium-excess window to compensate for volatilization, providing a synthesis guideline for high-quality solid electrolytes.

IN DEPTH

Key Findings

The study identifies that 15% excess LiOH·H2O in the precursor mixture yields the highest performance among tested samples. This specific composition achieved a room-temperature ionic conductivity of 8.20×10^{-4} S cm^{-1}, a relative density of 95.97%, and an apparent activation energy for ion transport of 0.24 eV. Conversely, increasing the excess lithium to 20% led to a decrease in ionic conductivity, indicating a threshold beyond which additional lithium becomes detrimental.

Technical Details

Researchers led by Yue Yang and Wei Lü investigated Li6.4La3Zr1.4Ta1.0O12 (Ta-substituted LLZO) using a rapid flash sintering process at 800 °C for 10 minutes. The team systematically tested excess LiOH·H2O levels of 0%, 5%, 10%, 15%, and 20% to determine the impact on the final material. To analyze the structural basis of these results, the team utilized radial distribution functions to examine local lithium-oxygen ordering, linking the macroscopic conductivity to the microscopic arrangement of ions within the garnet lattice.

Background & Context

In the production of garnet electrolytes, adding excess lithium is a standard practice to compensate for lithium loss caused by volatilization during heating. However, the specific impact of this excess during the rapid flash sintering process had not been fully resolved until this study. The research aimed to clarify how varying lithium content influences the material's density, phase structure, surface composition, and local structure.

Significance & Outlook

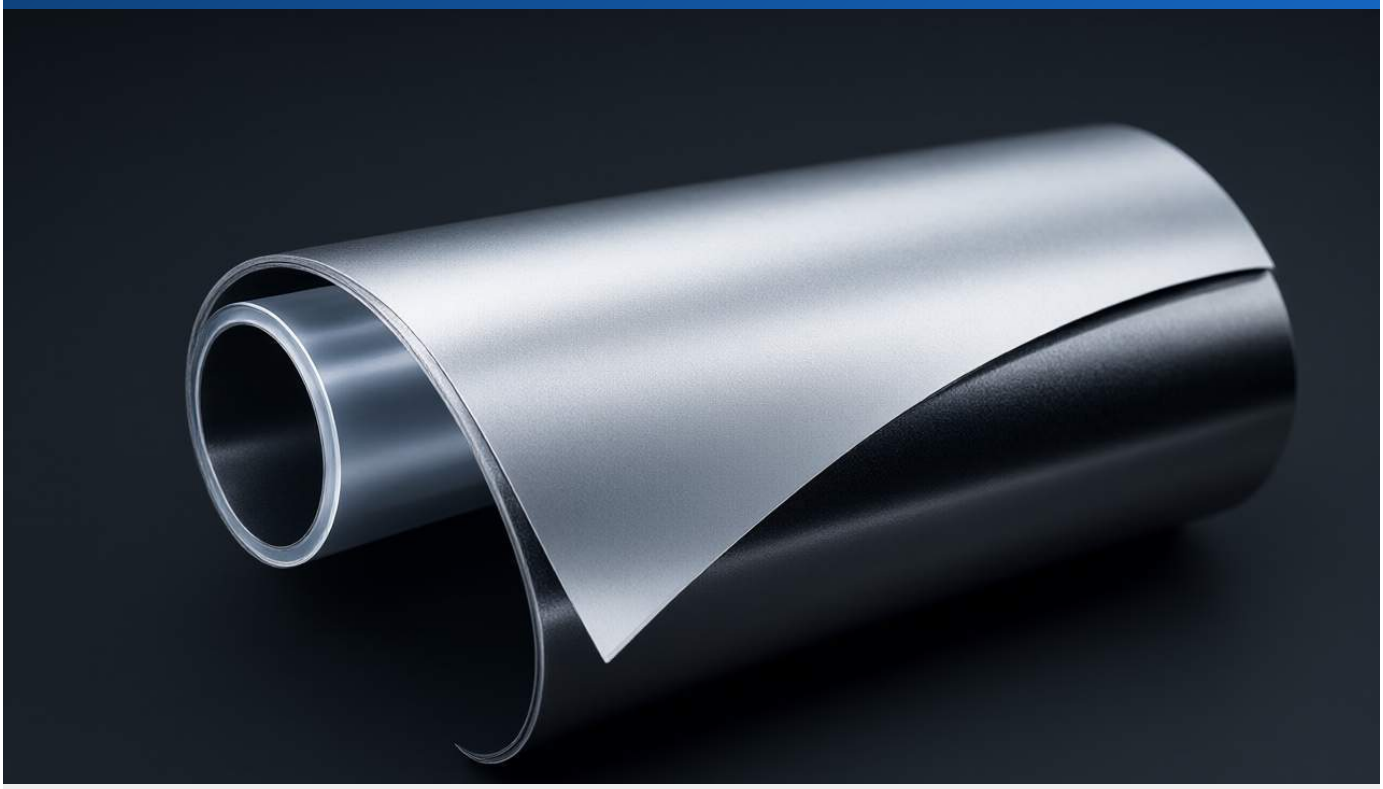
The findings provide a clear guideline for the synthesis of high-quality solid electrolytes by defining a practical excess-lithium window. While the study validated the material's potential through cell-level testing, the researchers noted that these metrics were obtained under liquid-assisted and elevated-temperature conditions, which may differ from performance in fully solid-state configurations or at room temperature. Overall, optimizing the excess lithium amount is presented as a viable strategy for enhancing the conductivity of flash-sintered Ta-substituted LLZO.

Source: https://bioengineer.org/optimized-lithium-excess-boosts-conductivity-in-ta-substituted-llzo/

Collected: November 15, 2026 | Automated Research System (AI)

#06 Ni/PET/Ni Composite Foils: Current Density Impact on SSBs

Published November 10, 2026 BIOENGINEER.ORG



OVERVIEW

Modulating electroplating current density optimizes the microstructure of Ni/PET/Ni composite foils, enhancing their performance as current collectors for solid-state batteries. The optimized CNF-1 foil demonstrates superior tensile strength, corrosion resistance, and cycling stability compared to conventional copper foils.

IN DEPTH

Key Findings

The optimization of electroplating current density significantly improves the mechanical and electrochemical properties of nickel-polyethylene terephthalate-nickel (Ni/PET/Ni) composite foils. The foil prepared at a current density of 1 A/dm², designated as CNF-1, achieved an initial discharge capacity of 597.98 mAh/g at 0.1 C when utilized as an anode current collector in silicon-carbon‖lithium half cells. This configuration outperformed conventional copper foil in terms of cycling stability.

Technical Details

The CNF-1 composite foil exhibits a refined surface morphology of 1.2 μm and a low surface roughness with an Ra value of 0.218 μm. Structural and durability assessments indicate the following specifications:

- **Tensile Strength:** 372.33 MPa
- **Corrosion Resistance:** Characterized by a current density of 1.785×10–6 A/cm²

These properties were achieved by precisely modulating the electroplating current density to engineer the nickel microstructure of the flexible composite.

Background & Context

In solid-state battery systems, conventional copper current collectors are susceptible to critical challenges, specifically corrosion and mechanical degradation. While nickel is recognized as a promising alternative due to its superior anodic stability, the specific relationship between the microstructure, properties, and performance of nickel in composite collectors had previously remained underexplored.

Significance & Outlook

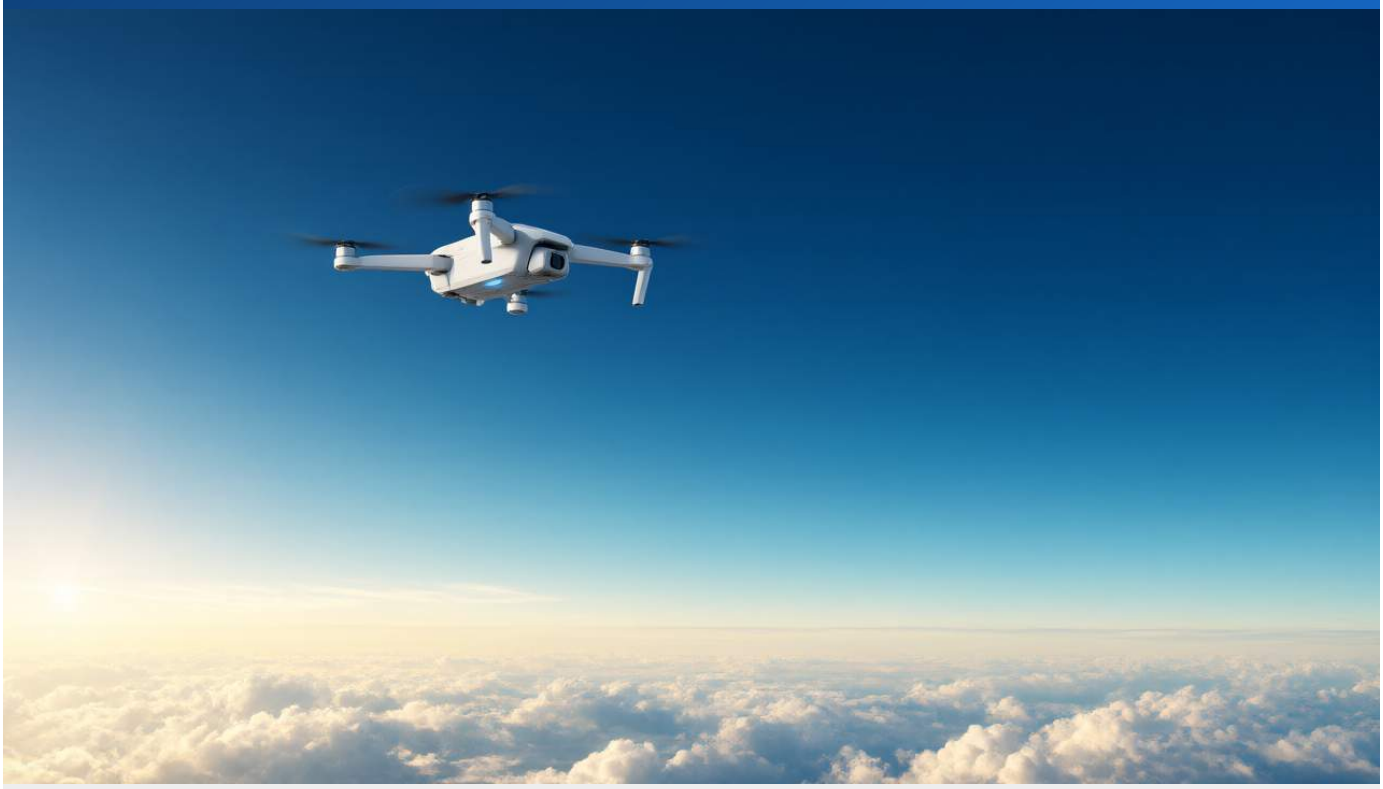
The research establishes that modulating electroplating current density is a viable strategy for designing durable, high-performance current collectors. By engineering the microstructure of Ni/PET/Ni composite foils, researchers can overcome the stability limitations of copper, providing a more robust component for advanced solid-state battery applications.

Source: https://bioengineer.org/tuned-current-density-optimizes-nickel-composite-foils-for-solid-state-batteries/

Collected: November 15, 2026 | Automated Research System (AI)

#07 Factorial: 450 Wh/kg solid-state cells and aerospace roadmap

Published November 12, 2026 Battery-News Germany



OVERVIEW

Factorial has achieved an energy density of 450 Wh/kg for its aerospace-grade solid-state cells, reaching a target originally set for the end of 2026. The company has also begun generating commercial revenue ahead of its 2027 objective. These developments are supported by strategic partnerships for production scaling and integration into automotive and drone platforms.

IN DEPTH

Key Findings

Factorial has reached an energy density milestone of 450 Wh/kg with solid-state cells developed for aerospace applications. Reported during the company's third-quarter results on November 10, this achievement precedes the original target date of late 2026. Additionally, the company has recorded its first commercial revenue, surpassing its previous objective of 2027.

Technical Details

While the 450 Wh/kg figure has been reported, Factorial has not disclosed specific details regarding the cells' chemistry, capacity, or the test conditions used. It remains unconfirmed whether these figures were independently verified. The company has not disclosed the specific amount of commercial revenue generated or the identity of the customer.

Practical applications of the technology include:

- **Aerospace:** A Group I drone powered by Factorial's technology achieved a flight-duration record of 521 minutes in 2026, covering approximately 483 kilometers (300 miles).
- **Automotive:** A lightly modified Mercedes-Benz test vehicle exceeded 1,200 kilometers (746 miles) of range on a single charge. Furthermore, Stellantis has integrated the technology into a Dodge Charger Daytona demonstration vehicle.

Background & Context

Factorial is backed by several major automotive partners, including Mercedes-Benz, Stellantis, Hyundai, and Kia. To transition from development to mass production, the company utilizes a partner-based scaling strategy.

In September 2026, Factorial entered a partnership with Japan’s Mitsui Kinzoku to scale the manufacturing of Solstice all-solid-state cells. Mitsui Kinzoku provides technical expertise in the production of solid electrolytes, although specific production capacities and timelines have not been disclosed.

Significance & Outlook

The acceleration of the 450 Wh/kg target and the early generation of revenue indicate a shift toward commercialization for Factorial's solid-state technology. The successful integration into high-endurance drones and long-range automotive prototypes demonstrates the potential for increased energy density across both the aerospace and transport sectors.

Source: https://battery-news.de/en/2026/11/12/factorial-reaches-450-wh-kg-with-solid-state-cells-for-aerospace/

Collected: November 15, 2026 | Automated Research System (AI)

#09 Gotion High-Tech: Lithium Sulfide Production and 2030 Roadmap

Published November 10, 2026 Internet Info Agency（news18a） China



OVERVIEW

Gotion High-Tech has introduced a self-developed three-phase reaction method for producing lithium sulfide, a critical raw material for solid-state batteries. The company plans to scale production from 300 tons per year in 2026 to 50,000 tons per year by 2030. This development aims to significantly improve reaction efficiency and purity while reducing energy consumption in the supply chain.

IN DEPTH

Key Findings

Gotion High-Tech has disclosed a phased capacity expansion plan and a new production technology for lithium sulfide, a core raw material used in solid-state batteries. During the 17th International Advanced Electric Vehicle Lithium Battery Conference in Hefei on November 9, 2026, the company detailed its transition from initial pilot-scale production to mass-market capacity over the next four years.

Technical Details

The company unveiled a proprietary three-phase reaction method for the preparation of lithium sulfide. According to the technical data provided, this method achieves the following performance improvements over existing processes:

- **Reaction Efficiency:** An increase of 300% in the production of lithium sulfide.
- **Energy Consumption:** A reduction of 40% during the production process.
- **Product Purity:** The resulting lithium sulfide reaches a purity level of 99.99%.

Capacity Roadmap

Gotion High-Tech has established a specific timeline to scale its lithium sulfide production capacity to meet future demand for solid-state battery integration:

- **2026:** Establishment of 300 tons/year capacity.
- **2027:** Expansion of overall capacity to 20,000 tons/year.
- **2030:** Target capacity of 50,000 tons/year.

Background and Significance

The disclosure took place at the 17th International Advanced Electric Vehicle Lithium Battery Conference, where Gotion High-Tech also shared progress regarding its all-solid-state battery and LMFP technology. By securing the production of high-purity lithium sulfide through a more energy-efficient process, the company is addressing a critical bottleneck in the raw material supply chain for next-generation battery chemistries. The aggressive scaling from 300 to 50,000 tons per year indicates a strategic move toward industrial-scale deployment of solid-state battery technology.

Source: https://english.news18a.com/news/english_313398.html

Collected: November 15, 2026 | Automated Research System (AI)

#10 Solid-State Battery Materials: Tohoku University's AI Framework

Published November 09, 2026 비즈월드 South Korea



OVERVIEW

Tohoku University researchers have proposed an integrated AI-driven framework to accelerate the discovery of solid electrolytes for next-generation batteries. By combining LLMs, simulation, and automated experimentation, the system aims to move beyond trial-and-error methods to identify materials with both high ionic conductivity and practical stability.

IN DEPTH

Key Findings

An international research team led by Associate Professor Cheng Jianfeng and Professor Li Hao of Tohoku University's Advanced Institute for Materials Research (WPI-AIMR) has developed an integrated research system for discovering promising solid electrolytes. The framework integrates material databases, AI simulations, Large Language Models (LLMs), and automated experimentation to create a closed-loop discovery process. The findings were published in the latest issue of the journal Advanced Materials.

Technical Details

The proposed platform consists of four primary technical pillars:

- **Material Database:** A repository that records specific manufacturing conditions and the resulting experimental characteristics of materials to provide training data for AI.
- **Machine Learning Models:** Interatomic interaction models used to analyze lithium-ion movement and physical properties, aiming to predict material behavior over longer timeframes and more realistic structures than conventional calculation methods.
- **LLM Integration:** The use of LLMs to extract and structure data from fragmented sources, including research papers, tables, and figures, reducing the manual effort required for data organization.
- **Automated Experimentation:** A closed-loop system where AI proposes candidate materials, physical models verify them, and automated experiments confirm performance. The resulting data is then fed back into the database to refine future AI suggestions.

Background & Context

Solid-state batteries replace the liquid electrolytes found in conventional lithium-ion batteries with solid electrolytes to reduce leakage and fire risks while increasing energy density. For a solid electrolyte to be viable, it must facilitate rapid lithium-ion transport while blocking electrons, maintain chemical stability at the electrode interface during charge/discharge cycles, and ensure mechanical strength and ease of manufacturing. The researchers noted that materials showing high ionic conductivity in laboratory settings often fail to maintain that performance and stability in actual battery applications.

Significance & Outlook

This shift from experience-based, repetitive experimentation to a data-driven systematic approach is expected to accelerate the development of materials for electric vehicles, portable electronics, and large-scale energy storage systems (ESS).

Source: https://www.bizwnews.com/news/articleView.html?idxno=151264

Collected: November 15, 2026 | Automated Research System (AI)

#11 Gotion High-Tech: All-Solid-State Battery Production Roadmap 2027

Published November 12, 2026　新浪财经（IT之家）　China



OVERVIEW

Gotion High-Tech has initiated work on a 2GWh all-solid-state battery mass production line and reports that its pilot line is operating stably. The company targets small-batch production and vehicle testing by 2027.

IN DEPTH

Key Findings

Gotion High-Tech has announced the commencement of work on a 2GWh all-solid-state battery mass production line. The company is currently advancing the research and industrialization of all-solid-state technology with a specific goal to achieve small-batch production and vehicle testing by 2027.

Technical Details

The company reports that its all-solid-state pilot line is currently in stable operation, achieving a yield rate of 90% for the cells coming off the line. Regarding the 2GWh mass production line, Gotion High-Tech is utilizing a hybrid development model that combines its own proprietary processes with the expertise of external professional equipment manufacturers. Gotion High-Tech remains the lead on the core process solutions.

Implementation Strategy

The deployment of equipment for the 2GWh production line will be executed in batches. The timing and volume of these equipment orders will be determined based on the results of verification processes and the overall rhythm of the project.

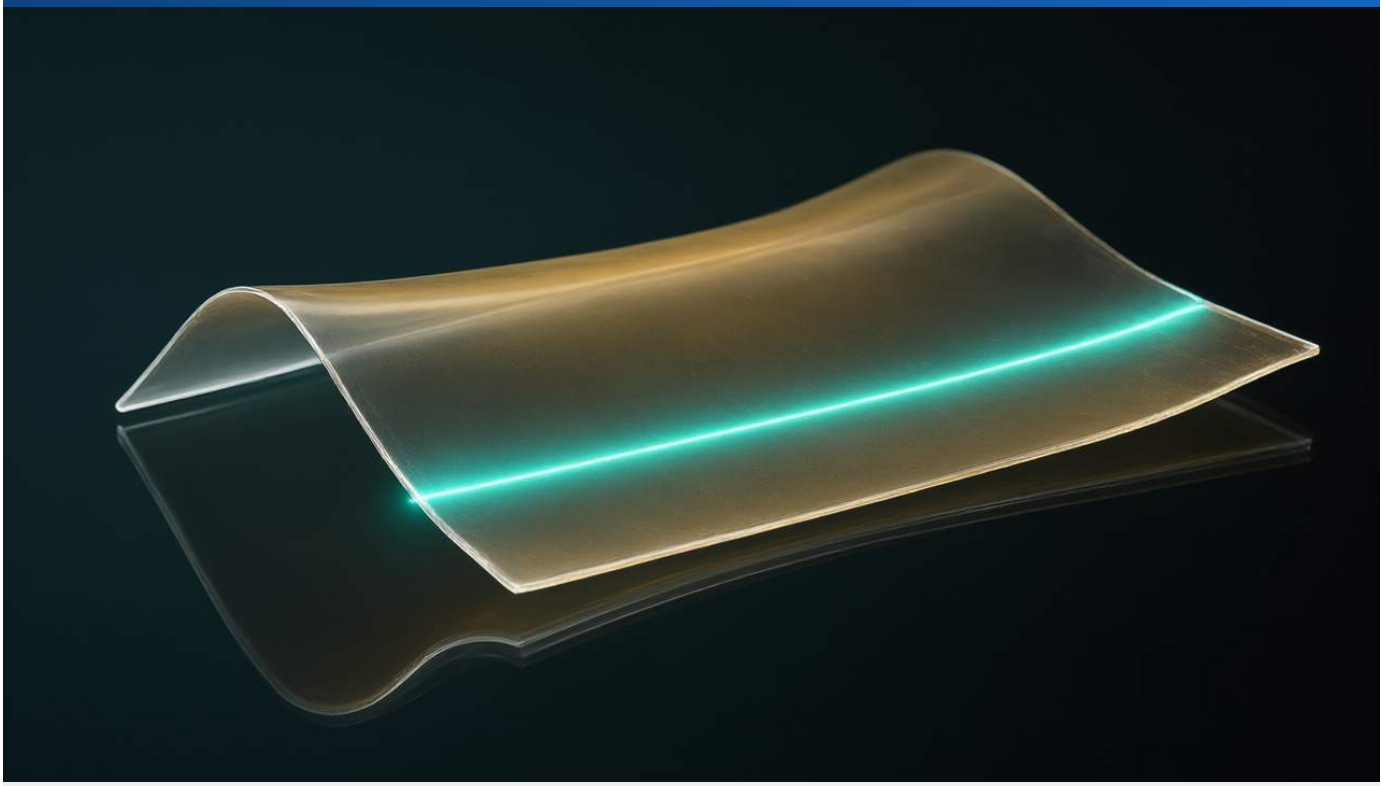
Significance and Outlook

The transition from a stable pilot line with a 90% yield to a 2GWh mass production facility represents a significant step in the company's industrialization timeline. By maintaining leadership over the core process schemes while collaborating with equipment vendors, Gotion High-Tech aims to meet its 2027 target for vehicle integration and testing.

Source: https://finance.sina.com.cn/stock/t/2026-11-12/doc-iniyniex1162290.shtml

#12 Solid Polymer Electrolytes: Peking University's Decoupled Ion Transport Framework

Published November 14, 2026 Mirage News（Shanghai Jiao Tong University Journal Center）
China



OVERVIEW

Researchers at Peking University have proposed a paradigm shift in solid polymer electrolytes (SPEs) by redefining "decoupled ion transport" to break the trade-off between ionic conductivity and mechanical strength. The framework introduces five diagnostic metrics and four molecular design levers to enable Li^+ mobility independent of polymer structural relaxation. This approach aims to transition SPEs from laboratory discoveries to industrial battery applications for electric vehicles and portable electronics.

IN DEPTH

Key Findings

Prof. Quanquan Pang and researchers at Peking University have proposed a new approach to overcome the fundamental physical trade-off in dry solid polymer electrolytes (SPEs), where high ionic conductivity typically requires low mechanical strength. The team suggests a paradigm shift toward "decoupled ion transport," redefining it as a change in the rate-limiting step of ion motion. This allows lithium ions (Li^+) to hop through local low-barrier pathways independently of the polymer host's main structural relaxation.

Technical Details

To verify that ion motion is decoupled from the polymer host, the authors establish five quantitative diagnostic metrics:

- **Arrhenius Temperature Dependence:** A shift from the Vogel–Tammann–Fulcher (VTF) relation to Arrhenius behavior.
- **Angell Decoupling Index (R τ):** The ratio of polymer structural relaxation time (τ α) to conductivity relaxation time (τ σ) at T g; values well above unity indicate fast ion motion in a frozen host.
- **Modified Walden Analysis:** Identifying superionic transport where the Walden exponent ($\alpha < 1$).
- **Conductivity at T g (σ(T g)):** Verifying Li^+ mobility while the bulk polymer is in a glassy state.
- **Haven Ratio (HR):** Comparing apparent conductivity diffusion (D σ) with tracer diffusion (D tracer).

The researchers identify four molecular design levers to achieve these properties: transitioning to "polymer-in-salt" systems for better pathway connectivity; using rigid backbones like Polymers of Intrinsic Microporosity (PIMs) to preserve permanent free volume; employing orthogonal functional separation via supramolecular clusters or dual-phase architectures; and using polymeric zwitterions or single-ion conductors to control polarity and charge selectivity.

Background & Context

In traditional SPEs such as poly(ethylene oxide) (PEO), Li^+ transport is coupled to the segmental relaxation of the polymer. Increasing ion transport usually requires lowering the glass transition temperature (T g) to increase flexibility, which unfortunately degrades mechanical stability and increases the risk of lithium dendrite penetration.

Significance & Outlook

The authors emphasize that bulk conductivity alone is insufficient for practical use. For industrial application in solid-state batteries, materials must maintain steady-state DC current, low interfacial charge-transfer resistance, and conformal contact with lithium metal anodes and high-voltage cathodes. Future research must evaluate the intersection of T g, transference numbers, and thin-film mechanical integrity.

Source: https://www.miragenews.com/peking-university-scientists-advance-solid-1777133/

Collected: November 15, 2026 | Automated Research System (AI)

#13 QuantumScape Osprey: Solid-State Architecture and QSE-5 Specs

Published November 12, 2026 ArenaEV USA



OVERVIEW

QuantumScape has introduced the Osprey cell architecture, which utilizes a solid sulfide electrolyte in the cathode to eliminate liquid components. While achieving 1,000 cycles at one atmosphere of pressure, the company's current commercial QSE-5 cell is revealed to be a semi-solid hybrid.

IN DEPTH

Key Findings

QuantumScape's new Osprey architecture achieves a milestone of 1,000 full charge and discharge cycles at room temperature under one atmosphere of pressure, retaining approximately 80% capacity. This was demonstrated using a two-layer pouch with a 50 mm by 65 mm cathode. In contrast, the company's first commercial product, the QSE-5 cell, is identified as a semi-solid hybrid because its cathode relies on a liquid catholyte, despite using a solid ceramic separator and an anode-free design.

Technical Details

The Osprey architecture combines a solid sulfide electrolyte in the cathode with a stiff ceramic separator to manage the lithium-metal anode. This configuration aims to solve the "clamping pressure" issue prevalent in sulfide-based cells. While some sulfide cells require 20 to 100 atmospheres—equivalent to roughly 5,000 kg of force for a 100 mm by 242 mm patch—Osprey operates at one atmosphere, potentially removing the need for heavy steel battery casings.

However, technical white papers indicate that headline performance figures were achieved under specific laboratory conditions:

- **Fast Charging:** A 10% to 80% charge in five minutes required heating a two-layer cell to 80ºC.
- **Cold Weather:** Operation at -20ºC was tested on a 21 mm by 21 mm single-layer square at a gentle discharge rate, resulting in a loss of nearly half its total energy.
- **Energy Density:** A projected 1,100 Wh/L (surpassing the QSE-5's 844 Wh/L and 301 Wh/kg) was derived from an 11 mm coin cell squeezed at three atmospheres for 100 cycles.

Background and Outlook

QuantumScape previously criticized sulfide electrolytes used by Toyota, Samsung SDI, BYD, and Factorial due to dendrite growth and high pressure requirements. The shift toward a sulfide-integrated cathode in Osprey suggests a change in corporate strategy to position the technology as an open platform for former rivals.

Scaling remains a significant hurdle. The 1,000-cycle test used a cell with 0.3 to 0.4 Ah capacity, whereas the QSE-5 sample holds about 5 Ah. Mass manufacturing for Osprey is still in development, and the 100 MWh pilot line for the QSE-5 is not targeted for production until 2028.

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Source:
https://www.arenaev.com/quantumscape_pitches_peace_in_the_solidstate_battery_war__always_read_the_sn
news-6359.php

Collected: November 15, 2026 | Automated Research System (AI)

#14 Solid-State Batteries: Xidian University's 12µm Coating Specs

Published November 14, 2026 BASIC thinking Germany



OVERVIEW

Researchers at Xidian University have developed a 12-micrometer liquid coating that prevents dendrite formation in lithium-metal batteries. The protective layer increases critical current density to 3.5 mA cm^{-2} and maintains 82.3% capacity after 300 cycles. This advancement simplifies the production of high-energy-density solid-state batteries for electric vehicles and aviation.

IN DEPTH

Key Findings

A research team from Xidian University has developed a thin-film liquid coating that significantly enhances the stability of lithium-metal anodes. The protected anode demonstrates a critical current density of 3.5 mA cm^{-2}, which is more than four times the 0.8 mA cm^{-2} threshold of unprotected lithium. In full-cell tests using a sulfide solid-state electrolyte, the coated cells retained 82.3% of their original capacity after 300 charging cycles, compared to only 43% for unprotected cells.

Technical Details

The "chemical armor" consists of a fluorine-containing silicone polymer and indium chloride. When applied, the mixture reacts directly on the metal to form a flexible hybrid layer measuring only 12 micrometers in thickness. The coating functions through three primary mechanisms:

- **Mechanical Buffering:** The elastic polymer network absorbs mechanical stresses caused by the expansion and contraction of the cell during charging.
- **Electronic Insulation:** A lithium fluoride phase acts as an insulator to block electrons, preventing the initiation of dendrites.
- **Ion Distribution:** Lithium-indium alloy nanoparticles act as microscopic "traffic controllers," distributing incoming lithium ions evenly to prevent the accumulation of spikes.

Background & Context

Pure lithium is a preferred battery material but is prone to forming dendrites—tree-like needles that can pierce cell barriers, causing short circuits and fire risks. This issue has historically hindered the deployment of high-performance solid-state batteries. Lithium-metal offers a theoretical energy storage capacity nearly ten times higher than the graphite used in current smartphones and electric vehicles.

Significance & Outlook

The liquid coating process is compatible with standard roll-to-roll production lines via slot-die or gravure printing, eliminating the need for expensive vacuum chambers. If scaled, this technology could enable electric vehicles with significantly lighter batteries, longer ranges, and charging times comparable to traditional refueling stops. Potential applications extend to aviation and large-scale stationary energy storage for renewable energy. The researchers also suggest this approach could be adapted to test alternative metals such as tin or zinc.

Source: https://www.basicthinking.de/blog/2026/11/14/festkoerperbatterie/

Collected: November 15, 2026 | Automated Research System (AI)