SolidStateBattery

Weekly Intelligence Report

2026-06-27 | 42 articles | 10 countries

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This Week's Keyword

SSB Commercialization

Race intensifies with hybrid solutions & IP

42	10	32,786+	$3 Billion
articles	countries	patent families	USD
Total Articles Analyzed	Source Countries/Regions	SSB Patents (2020-2026)	US DOE Battery Grants

All 42 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	Xnergy Electrolyte Guide	Analysis	●●○○○	●○○○○	●●○○○	●●●○○	●●●●●	Xnergy guide analyzes sulfide, oxide, halide solid electrolytes, highlighting interface resistance.
#02	Next-Gen EV Battery Trends	Market Overview	●○○○○	●○○○○	●●●○○	●●○○○	●●●●○	Report highlights solid-state and sodium-ion batteries as key for EV safety, energy density, charging.
#03	Volta Energy PFAS-Free SSB	Corporate Strategy	●●●○○	●●○○○	●●●○○	●●●○○	●●●●●	Volta Energy secures $1.5M grant for PFAS-free, cobalt-free solid-state battery development, TRL 6.
#04	China's TIES Hybrid Cells	New Product	●●●○○	●●●●○	●●●●○	●●●○○	●●●●○	China's TIES unveils 314Ah/588Ah liquid-solid hybrid cells, compatible with existing Li-ion lines.
#05	PVDF Gel Electrolyte	Research	●●●●○	●●○○○	●●●○○	●●●●○	●●●○○	Chinese Academy develops PVDF-based gel composite electrolyte, 84% capacity after 350 cycles.
#06	CATL SSB Production View	Corporate Strategy	●○○○○	●●○○○	●●●●○	●●●○○	●●●●○	CATL Chairman: SSB mass production is 'Level 4,' targets small-scale by 2027, cautions over-optimism.
#07	QuantumScape & Honda	Corporate Strategy	●●●●○	●●●○○	●●●●○	●●●○○	●●●●●	QuantumScape and Honda partner to accelerate solid-state battery development, including manufacturing.
#08	Dendrite Dual-Engineering	Research	●●●●○	●○○○○	●●●○○	●●●●●	●●●○○	Dual-engineering strategy (PVDF + ALD) suppresses lithium dendrite growth in argyrodite electrolytes.
#09	NIO 1,046km Semi-SSB	New Product	●●●○○	●●●●○	●●●●○	●●●●○	●●●●○	NIO ET7 sedan achieves 1,046km range with WELION's 150 kWh semi-solid-state battery in real-world test.
#10	AgCl Argyrodite Boost	Research	●●●●○	●○○○○	●●●○○	●●●●●	●●●○○	AgCl addition boosts argyrodite solid electrolyte performance, achieving high ionic conductivity and suppressed dendrite growth.
#11	SSB Thermal Instability	Analysis	●●○○○	●○○○○	●●●○○	●●●●●	●●●○○	Review highlights inherent thermal instability challenges in all-solid-state batteries, urging redesign for true safety.
#12	Solid Power DOE Grant	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	Solid Power secures DOE grant for continuous production scale-up of sulfide-based solid electrolyte materials.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#13	EU SOLVE Project	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	EU Horizon Europe project SOLVE kicks off, led by CIDETEC, to accelerate Gen4b solid-state battery mass production.
#14	Dragonfly IP Portfolio	Corporate Strategy	●●●○○	●●○○○	●●●○○	●●●○○	●●●●●	Dragonfly Energy strengthens IP with U.S. patent allowance for powderized solid-state electrolyte manufacturing.
#15	Li/S SSB 1080 mAh/g	Research	●●●●○	●○○○○	●●●○○	●●●●●	●●●○○	Li/S SSBs achieve 1080 mAh/g capacity retention after 50 cycles with Br-doped lithium argyrodite electrolyte.
#16	Dendrite Internal Pressure	Research	●●●●●	●○○○○	●●●●○	●●●●●	●●●●●	Scientists uncover lithium dendrite internal pressure as primary cause of SSB short circuits, enabling new suppression.
#17	WeLion Semi-SSB Prod.	New Product	●●●○○	●●●●○	●●●●○	●●●○○	●●●●○	WeLion initiates semi-solid-state battery production, targeting 1,000km+ range EVs, intensifying global competition.
#18	ZrO2-Doped Li-Argyrodite	Research	●●●●○	●○○○○	●●●○○	●●●●●	●●●○○	ZrO2-doped Li-argyrodite SSE achieves 3.97 mS/cm conductivity and 79.3% capacity retention after 100 cycles.
#19	PatSnap Patent Report	Market Overview	●○○○○	●○○○○	●●●●○	●●●○○	●●●●●	PatSnap report: 32,786+ SSB patent families (2020-2026), halide electrolytes lead growth (396%), China surging.
#20	F-Doped Argyrodite SSE	Research	●●●●○	●○○○○	●●●○○	●●●●●	●●●●●	OSTI reports solvent-based synthesis of F-doped Li argyrodite SSEs, achieving 3.5×10^-4 S cm^-1 conductivity and superior Li stability.
#21	PVDF Gel Electrolyte	Research	●●●●○	●●○○○	●●●○○	●●●●○	●●●○○	Dalian Institute develops PVDF-based gel composite electrolyte, 84% capacity after 350 cycles for SSBs.
#22	EU Horizon Batt. Prod.	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	EU Horizon Europe launches integrated support for next-gen Li-based battery production, from TRL 4-5 to mass production.
#23	US DOE $3B Grants	Corporate Strategy	●○○○○	●●●●●	●●●●●	●●●●○	●●●●●	U.S. DOE commits $3B to domestic battery manufacturing and recycling grants to fortify North American supply chain.
#24	Toyota SSB Pilot Line	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●○	Toyota achieves stable yields and enhanced cell consistency in solid-state battery pilot line for EVs.
#25	QuantumScape $300M Fund	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	QuantumScape secures $300M Series F funding to accelerate solid-state battery production scale-up, B-samples by late 2026.
#26	Samsung SDI 950 Wh/L	New Product	●●●●○	●●●○○	●●●●○	●●●○○	●●●●○	Samsung SDI unveils all-solid-state battery prototype with over 950 Wh/L energy density, pilot production by 2027.
#27	ProLogium EU Partner	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●●	ProLogium partners with European automaker for solid-state battery module supply, validation samples this year.
#28	Record Halide 25 mS/cm	Research	●●●●●	●○○○○	●●●●○	●●●●●	●●●●○	Novel halide solid electrolyte achieves record 25 mS/cm ionic conductivity at room temperature, published in Nature Energy.
#29	Solid Power Gen2 Qual.	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●●	Solid Power confirms Gen2 solid-state cell production for BMW and Ford automotive qualification.
#30	CATL $2B Semi-SSB Exp.	Corporate Strategy	●●○○○	●●●○○	●●●●○	●●●○○	●●●●○	CATL invests over $2B in semi-solid battery production expansion, targeting 2028 operation.
#31	Nio 1,100km Hybrid SSB	New Product	●●●○○	●●●●○	●●●●○	●●●○○	●●●●○	Nio and WeLion collaborate on 1,100km+ range hybrid semi-solid battery for ET7 refresh.

#	Article Title	Type	Tech Novelty	Market Proximity	Market Impact	Data Reliability	US/EU Relevance	Summary
#32	US DOE $150M Grant	Corporate Strategy	●○○○○	●●●○○	●●●●○	●●●●○	●●●●●	U.S. DOE awards $150M grant to solid-state battery manufacturing consortium to accelerate domestic production.
#33	Anode-Free SSB 500 Cycles	Research	●●●●○	●○○○○	●●●○○	●●●●●	●●●○○	Anode-free solid-state battery achieves over 500 stable cycles with novel interfacial layer, boosting energy density.
#34	Japan Sulfide Precursor	New Material	●●●○○	●●●○○	●●●○○	●●●○○	●●●●○	Japanese chemical firm develops and pilots high-purity precursor for sulfide solid electrolytes, enhancing consistency.
#35	VW QuantumScape Testing	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	Volkswagen accelerates solid-state battery integration, initiates QuantumScape A-sample testing for future EVs.
#36	Factorial Pilot Contract	Corporate Strategy	●●●○○	●●●●○	●●●●○	●●●○○	●●●●●	Factorial Energy secures pilot manufacturing contract with Tier 1 auto supplier for semi-solid batteries.
#37	China SSB Patents	Corporate Strategy	●●●○○	●●○○○	●●●●○	●●●○○	●●●●●	Major Chinese battery manufacturer files extensive patents for solid-state battery technologies, intensifying IP race.
#38	EU Bipolar SSB Project	Corporate Strategy	●●●○○	●●○○○	●●●●○	●●●○○	●●●●●	EU Horizon Europe funds major project for advanced bipolar solid-state battery architectures, for EVs and storage.
#39	Cold Pressing SSB Prod.	Research	●●●●○	●●○○○	●●●●○	●●●●●	●●●●○	Cold pressing techniques advance SSB production, significantly reducing cost and energy compared to sintering.
#40	Toppan Coating Tech	New Technology	●●●○○	●●○○○	●●●○○	●●●○○	●●●●○	Toppan develops high-precision coating technology for thin-film solid electrolytes, enhancing SSB quality.
#41	SES AI R&D; Expansion	Corporate Strategy	●●●○○	●●●○○	●●●●○	●●●○○	●●●●●	SES AI expands U.S. R&D; facility to accelerate hybrid lithium metal battery development with GM and Hyundai.
#42	Murata Microbattery	New Product	●●●○○	●●●●○	●●○○○	●●●○○	●●●○○	Murata Manufacturing enhances all-solid-state microbattery energy density and cycle life for wearables.

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

Three Questions That Demand Your Decision This Week

❶ Is your SSB roadmap realistic against Asian pragmatism?

Chinese firms like TIES and WeLion are rapidly deploying 'liquid-solid hybrid' or 'semi-solid' batteries, achieving 1,000km+ EV ranges now. CATL's chairman cautions full SSB mass production is distant (Level 4, 2027 small-scale). Are US/EU strategies too focused on pure solid-state, risking market share to near-term hybrid solutions?

❷ How will US/EU government funding impact your strategy?

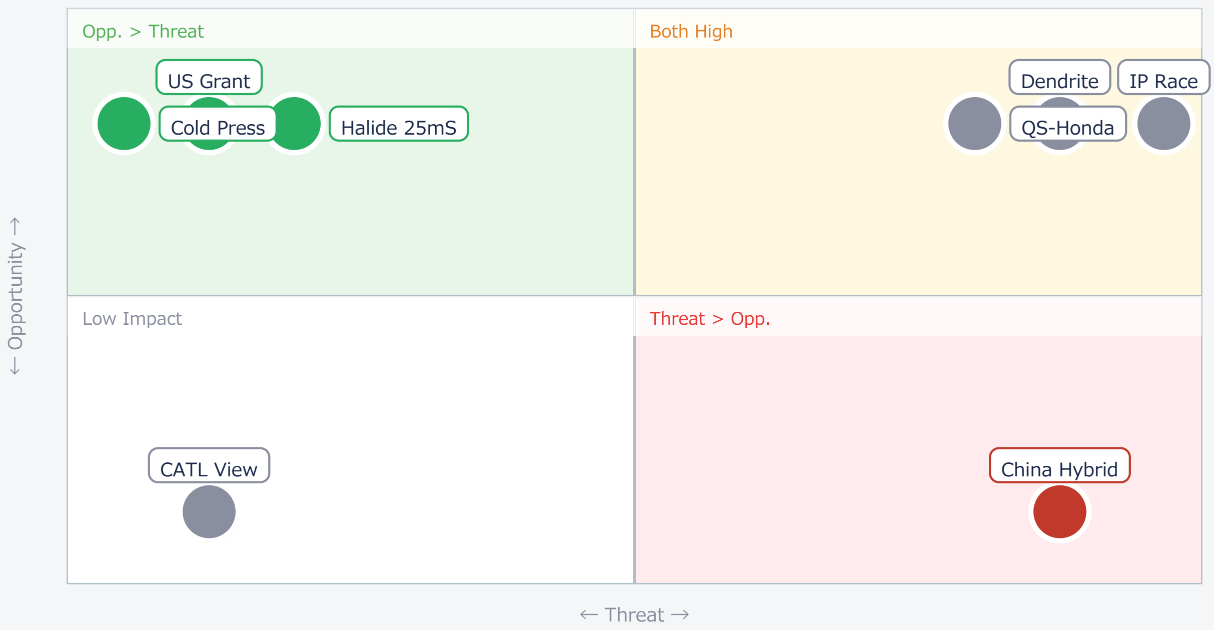
The US DOE has committed $3B to domestic battery manufacturing and recycling, plus $150M for SSB consortia. The EU's Horizon Europe is funding Gen4b SSB mass production and bipolar architectures. Are you actively leveraging these grants and partnerships to secure your supply chain and accelerate R&D;, or risk being outpaced by domestically funded competitors?

❸ Is your IP strategy robust against the global patent surge?

Over 32,786 SSB patent families have been filed since 2020, with China showing a significant surge since 2022, especially in halide electrolytes. Are your IP teams actively monitoring this landscape, identifying potential infringement risks, and strategically filing patents to protect your innovations, particularly in critical areas like interface engineering and novel electrolyte compositions?

Opportunities vs. Threats for US/European Companies

Opportunity vs. Threat Matrix for US/European Companies



Item	Quadrant	↑ Opportunity	↓ Threat
● US Grant	Opp.	Domestic funding	Excl. non-US
● Cold Press	Opp.	Cost reduction	High cost mfg
● Halide 25mS	Opp.	New material	Tech shift
● Dendrite	Critical	New design paths	Competitor lead

● QS-Honda	Critical	Joint dev.	OEM lock-in
● IP Race	Critical	IP strategy	China IP surge
● CATL View	Ref.	Realistic plan	Over-optimism
● China Hybrid	Threat	Learn from hybrid	Fast market entry

Deep Dive ① — Dendrite Internal Pressure Discovery

#16 | 2026/06/20 | SciTechDaily | Tech Novelty●●●●● Proximity●○○○○ Market Impact●●●●○ Data Reliability●●●●● US/EU Relevance●●●●●

Researchers discovered that internal pressure within lithium dendrites, not tip accumulation, causes solid-state battery short circuits. This fundamental insight explains how soft lithium penetrates stiff ceramic electrolytes, challenging previous assumptions.

This breakthrough, supported by simulations and measurements, opens new avenues for dendrite suppression. Strategies include developing crack-resistant electrolytes, introducing microscopic voids, or applying protective coatings to lithium electrodes.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: This is a critical academic breakthrough that redefines a core technical barrier for all-solid-state batteries. Published numbers are highly reliable due to advanced characterization. The main technical barrier is translating this fundamental understanding into scalable material and interface engineering solutions. [Opportunity] for US/EU materials & IP holders to develop next-gen dendrite-resistant electrolytes and coatings. [Threat] if US/EU R&D; fails to capitalize on this insight, allowing Asian competitors to integrate solutions first. Next actions: [R&D;] immediately review internal dendrite models and material development strategies against this new mechanism. [Strategy] assess potential IP opportunities for novel electrolyte designs by Q3 2026.

Deep Dive ② — US DOE $3B Battery Supply Chain Grants

#23 | 2026/06/26 | U.S. Department of Energy | Tech Novelty●○○○○ Proximity●●●●● Market Impact●●●●● Data Reliability●●●●○ US/EU Relevance●●●●●

The U.S. Department of Energy (DOE) is allocating $3 billion through its Battery Manufacturing and Recycling Grants Program to establish a viable domestic manufacturing and recycling capability for a North American battery supply chain.

These grants support demonstration projects, construction of commercial-scale facilities, and retrofitting existing facilities, with $600M annually from FY22-26. This initiative aims to bolster U.S. battery industry independence and competitiveness.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: This funding is a concrete, near-term opportunity for US companies, with high reliability as it's a government announcement. The primary technical barrier is scaling existing or near-commercial technologies efficiently. [Opportunity] for US materials suppliers, OEMs, and recyclers to secure significant capital for domestic expansion, reducing reliance on foreign supply chains. [Threat] for non-US companies if they cannot access this funding or if US domestic production becomes significantly more competitive. Next actions: [Business Dev] identify relevant grant opportunities and prepare proposals immediately. [Procurement] evaluate domestic supplier capabilities and potential partnerships for future projects by end of Q3 2026.

Deep Dive ③ — QuantumScape & Honda Partnership

#07 | 2026/06/22 | CleanTechnica | Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

Solid-state battery developer QuantumScape (US) and Honda (Japan) announced a multi-year R&D; partnership to accelerate SSB market launch, including manufacturing process refinement.

This collaboration leverages QuantumScape's 'anode-less' technology, aiming for 80% higher energy density, with Honda's automotive engineering expertise to advance high-performance EVs. QuantumScape aims to deliver B-samples to OEMs by late 2026.

> ▶ Strategic Analyst's Perspective
>
> Strategic Analyst's Perspective: This partnership is a strong signal of confidence in QuantumScape's technology and a critical step towards automotive integration. The published details are corporate announcements, so reliability is moderate but credible. Technical barriers remain in scaling anode-less technology and ensuring long-term automotive-grade reliability. [Opportunity] for US/EU OEMs to explore similar partnerships or accelerate internal SSB development to avoid being locked out of key technologies. [Threat] for competing SSB developers if QuantumScape and Honda achieve early commercialization, potentially setting industry standards. Next actions: [R&D;] analyze QuantumScape's anode-less tech and its implications for your SSB roadmap by end of Q3 2026. [Strategy] assess competitive landscape for OEM partnerships and potential technology licensing by Q4 2026.

Other Notable Articles

Solid Power Confirms Gen2 Solid-State Cell Production for BMW and Ford Automotive Qualification (GlobeNewswire)
Tech Novelty●●●○○ Proximity●●●●○ Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

US-based Solid Power producing Gen2 cells for BMW/Ford qualification, on track for late 2020s commercialization.

Samsung SDI Unveils All-Solid-State Battery Prototype with Over 950 Wh/L Energy Density (The Korea Economic Daily)
Tech Novelty●●●●○ Proximity●●●○○ Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●○

Samsung SDI's high-density SSB prototype (950 Wh/L) with oxide electrolyte and Ag-C anode signals strong Asian competition.

EU Horizon Europe Project SOLVE Kicks Off: CIDETEC Energy Storage Leads Initiative to Accelerate Gen4b Solid-State Battery Mass Production for Electromobility (CIDETEC Energy Storage)
Tech Novelty●●●○○ Proximity●●●○○ Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

Major EU project to accelerate Gen4b SSB mass production, including digital tools and recycling, bolstering European competitiveness.

Major Chinese Battery Manufacturer Files Extensive Patents for Solid-State Battery Technologies (IP Watchdog)
Tech Novelty●●●○○ Proximity●●○○○ Market Impact●●●●○ Data Reliability●●●○○ US/EU Relevance●●●●●

Chinese firms are aggressively building IP in SSBs (sulfide, oxide, interfaces, roll-to-roll), intensifying the global patent race.

Recommended Actions This Week

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

Immediate (this week)

- [R&D;] Review lithium dendrite suppression strategies based on new internal pressure findings (#16).
- [IP/Legal] Initiate urgent review of global SSB patent landscape, focusing on China's surge and halide electrolytes (#19, #37).
- [Strategy] Assess competitive threat from Chinese 'liquid-solid hybrid' batteries achieving 1000km+ range (#04, #09, #17, #31).

Short-term (1 month)

- [Business Dev] Identify and apply for relevant US DOE ($23, #32) and EU Horizon Europe grants (#13, #22, #38) for SSB development and manufacturing.
- [Procurement] Evaluate domestic supply chain options for SSB materials, leveraging government incentives (#23, #12).
- [R&D;] Investigate cold pressing techniques for SSB manufacturing to reduce costs and energy consumption (#39).

Medium-long term (quarter+)

- [Strategy] Develop a comprehensive SSB roadmap that balances pure solid-state breakthroughs with pragmatic hybrid solutions, considering market entry timelines (#06).
- [R&D;] Prioritize research into novel halide solid electrolytes with record ionic conductivity and stability (#28).
- [Executive] Formulate long-term strategy to secure critical materials and IP for SSB production, mitigating geopolitical risks and supply chain vulnerabilities (#23, #19).

SolidStateBattery — Selected Articles

Date: 2026-06-27

Articles: 42

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#18 ZrO2-Doped Li-Argyrodite Solid Electrolyte Achieves 3.97 mS/cm Conductivity and 79.3% Capacity Retention After 100 Cycles for All-Solid-State Batteries

#19 PatSnap's 2026 Report: Solid-State Battery Patent Families Exceed 32,786 Over 7 Years, Halide Electrolytes Lead with 396% Growth

#20 OSTI Reports Successful Solvent-Based Synthesis of F-Doped Li Argyrodite Solid Electrolytes, Achieving 3.5×10^-4 S cm^-1 Conductivity and Superior Lithium Metal Stability

#21 Dalian Institute of Chemical Physics Develops PVDF-Based Gel Composite Electrolyte Achieving Over 84% Capacity Retention After 350 Cycles for Solid-State Batteries

#22 EU Horizon Europe Program Launches Integrated Support for Next-Gen Lithium-Based Battery Production and Development: From TRL 4-5 Prototypes to Mass Production Demonstration

#23 U.S. Department of Energy Commits $3 Billion to Domestic Battery Manufacturing and Recycling Grants Program to Fortify North American Supply Chain

#24 Toyota Achieves Stable Yields and Enhanced Cell Consistency in Solid-State Battery Pilot Line for EVs

#25 QuantumScape Secures $300M Series F Funding to Accelerate Solid-State Battery Production Scale-Up

#26 Samsung SDI Unveils All-Solid-State Battery Prototype with Over 950 Wh/L Energy Density

#27 ProLogium Forges Strategic Partnership with European Automaker for Solid-State Battery Module Supply

#28 Novel Halide Solid Electrolyte Achieves Record 25 mS/cm Ionic Conductivity at Room Temperature

#29 Solid Power Confirms Gen2 Solid-State Cell Production for BMW and Ford Automotive Qualification

#30 CATL Pours Over $2 Billion into Semi-Solid Battery Production Expansion, Targeting 2028 Operation

#31 Nio and WeLion Collaborate on 1,100km+ Range Hybrid Semi-Solid Battery for ET7 Refresh

#32 U.S. DOE Awards $150 Million Grant to Solid-State Battery Manufacturing Consortium

#33 Anode-Free Solid-State Battery Achieves Over 500 Stable Cycles with Novel Interfacial Layer

#34 Japanese Chemical Firm Develops and Pilots High-Purity Precursor for Sulfide Solid Electrolytes

#35 Volkswagen Accelerates Solid-State Battery Integration, Initiates QuantumScape A-Sample Testing

#36 Factorial Energy Secures Pilot Manufacturing Contract with Tier 1 Auto Supplier for Semi-Solid Batteries

#37 Major Chinese Battery Manufacturer Files Extensive Patents for Solid-State Battery Technologies

#38 EU Horizon Europe Funds Major Project for Advanced Bipolar Solid-State Battery Architectures

#39 Cold Pressing Techniques Advance Solid-State Battery Production, Significantly Reducing Cost and Energy

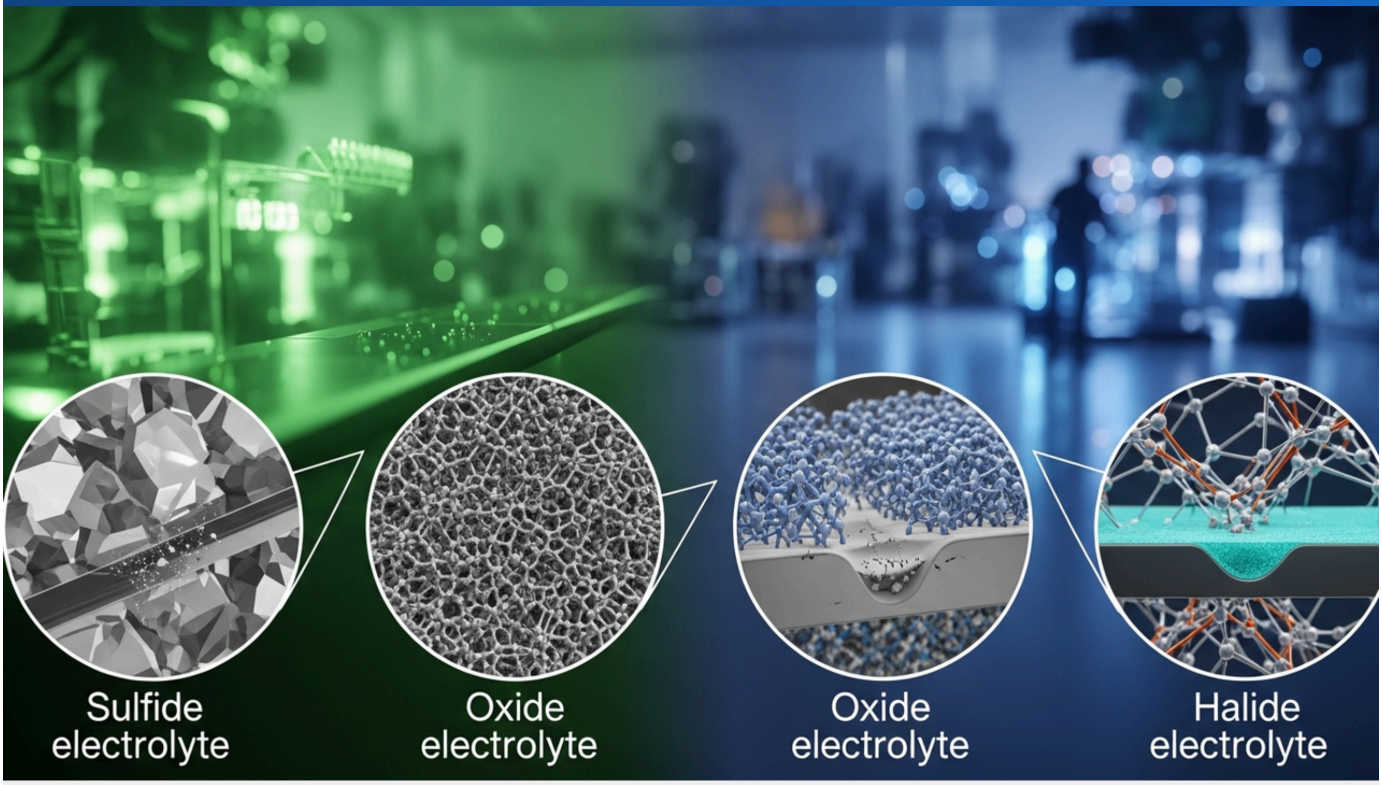
#40 Toppan Develops High-Precision Coating Technology for Thin-Film Solid Electrolytes

#41 SES AI Expands U.S. R&D Facility to Accelerate Hybrid Lithium Metal Battery Development

#42 Murata Manufacturing Enhances All-Solid-State Microbattery Energy Density and Cycle Life for Wearables

#01 Xnergy Materials Details Solid-State Electrolytes: Sulfides, Oxides, and Halides, Highlighting Interface Challenges

Published June 23, 2026 Xnergy Materials USA



OVERVIEW

Xnergy Materials released a guide analyzing the properties and challenges of sulfide, oxide, and halide solid electrolytes crucial for solid-state batteries. The report emphasizes high energy density, enhanced safety, and extended lifespan as key advantages while identifying interface resistance as a major hurdle. This resource aims to deepen understanding and guide R&D strategies in next-generation battery technology.

IN DEPTH

Key Findings

Xnergy Materials' "Solid-State Batteries: The 2026 Guide to Chemistry & Status" provides an in-depth analysis of the properties, advantages, and challenges associated with the three primary solid electrolyte families—sulfides, oxides, and halides—that dictate solid-state battery (SSB) performance. Critically, the guide identifies interfacial contact resistance as a significant barrier to SSB commercialization, underscoring the necessity for targeted solutions.

Technical / Clinical Details

- **Sulfide Solid Electrolytes:** Characterized by high room-temperature ionic conductivity (above 10^-3 S/cm), comparable to liquid electrolytes in conventional Li-ion batteries. However, their instability in air and moisture, alongside the risk of hydrogen sulfide gas generation, presents manufacturing and sealing challenges.
- **Oxide Solid Electrolytes:** Offer excellent chemical and thermal stability, making them relatively easier to handle in ambient conditions. Prominent examples include garnet-type (e.g., LLZO) and NASICON-type materials, though they typically exhibit lower ionic conductivities than sulfides and higher interfacial resistance with electrodes.
- **Halide Solid Electrolytes:** Represent a newer class of electrolytes, promising high voltage stability and improved ionic conductivity. These are still largely in the R&D phase, requiring further validation regarding stability and cost-effectiveness.

Beyond comparing these electrolyte characteristics, the guide elaborates on how interfacial resistance between electrodes and solid electrolytes is a primary driver of increased internal resistance, reduced power output, and diminished cycle life in SSBs. It specifically points to insufficient physical contact and parasitic chemical reactions at the solid-solid interface as key inhibitors of lithium ion transport.

Background & Context

Solid-state batteries are garnering significant attention as a next-generation power source for electric vehicles (EVs), stationary energy storage, and portable electronics, primarily due to their inherent safety advantages—eliminating the risks of electrolyte leakage and fire associated with liquid electrolytes. They also promise higher energy density and longer cycle life. Nevertheless, the commercialization of SSBs faces substantial hurdles, including the selection of suitable solid electrolytes, compatibility with electrode materials, manufacturing costs, and the persistent interfacial challenges.

Strategic Significance & Outlook

The Xnergy Materials guide suggests that critical approaches for overcoming these challenges include advanced interfacial layer formation techniques, optimized electrode materials, and high-pressure stacking technologies. For practical implementation, leveraging the strengths of each electrolyte family through hybrid approaches and innovating to reduce production costs will be essential. This technical guide serves as a valuable resource for SSB researchers, engineers, and investors to understand market dynamics and technical impediments, thereby informing future development strategies.

Source: https://xnergy.us/solid-state-batteries-2026-guide/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#02 Next-Gen EV Battery Trends: Solid-State and Sodium-Ion Technologies Promise Enhanced Safety and Ultra-Fast Charging

Published Published June 23, 2026　業界トレンド分析レポート　Unknown

OVERVIEW

Next-generation electric vehicle (EV) battery technologies, such as solid-state and sodium-ion types, are emerging as crucial enablers for substantial improvements in safety, energy density, and charging speed. Automakers and battery manufacturers are forging strategic alliances to rapidly develop and mass-produce these innovative solutions, poised to revolutionize the EV market, enhance performance, and accelerate consumer adoption.

IN DEPTH

Background

The global automotive industry is rapidly accelerating its shift towards electrification, with battery technology at the core of competitive differentiation. Current lithium-ion battery technology is approaching its performance limits, and challenges related to fluctuating material costs and concentrated resource availability persist. Against this backdrop, automakers and battery suppliers are forging unprecedented collaborations to expedite the development and manufacturing readiness of next-generation battery technologies. Major players like Tesla, Volkswagen, and Toyota are actively pursuing technological leadership through in-house development and investments in innovative startups.

Key Findings

According to the latest industry trend analysis, the future of electric vehicle (EV) batteries is entering a new era, primarily driven by solid-state batteries (SSBs) and sodium-ion batteries. These next-generation technologies promise transformative improvements over current lithium-ion batteries, particularly in terms of safety, range, and charging speed. The focus on increased energy density, reduced fire risk, and ultra-fast charging capabilities is highlighted as a critical factor in accelerating global EV adoption.

Technical Details

- **Solid-State Batteries (SSBs):** By replacing liquid electrolytes with solid counterparts, SSBs inherently offer significantly enhanced safety, eliminating risks of leakage and thermal runaway. They are also expected to achieve much higher energy densities, potentially exceeding 300-400 Wh/kg, by enabling the use of high-voltage and high-capacity electrode materials. This advancement will substantially extend EV range, reducing reliance on extensive charging infrastructure.
- **Sodium-Ion Batteries:** Utilizing abundant and cheaper sodium instead of lithium dramatically lowers battery manufacturing costs and mitigates supply chain risks. While their energy density is generally lower than lithium-ion, sodium-ion batteries excel in low-temperature performance and can support ultra-fast charging, making them attractive for short-range EVs and stationary energy storage applications.

- **Ultra-Fast Charging Technologies:** Innovations in electrolyte and separator materials, combined with the adoption of solid-state architectures, are bringing the vision of EVs fully charged in mere minutes closer to reality. This capability would mirror the refueling experience of gasoline cars, addressing one of the most significant barriers to widespread EV adoption.

Strategic Significance & Outlook

The commercialization of solid-state and sodium-ion batteries has the potential to revolutionize not only the EV market but also broader energy infrastructures, including the integration of renewable energy and the development of smart grids. Crucially, improvements in safety and performance will bolster consumer confidence in EVs, serving as a powerful catalyst for increased adoption. It is projected that as these technologies enter mass production and hit the market in the coming years, EV performance and cost-efficiency will improve dramatically, accelerating the realization of a sustainable mobility society.

Source: #

#03 Canada's Volta Energy Secures $1.5M Government Grant for PFAS-Free Solid-State Battery Development, Targeting TRL 6

Published June 25, 2026   Cantech Letter   Canada

OVERVIEW

Volta Energy Inc., a Canadian advanced battery technology company, has secured a $1.5 million grant from the Government of Canada's Innovative Solutions Canada (ISC) program to accelerate the development of PFAS-free and cobalt-free solid-state lithium-ion battery technology. This two-year project aims to develop and validate a prototype system, targeting Technology Readiness Level 6 (TRL 6). This initiative promises to deliver high energy density, enhanced safety, and reduced reliance on critical minerals, accelerating sustainable battery solutions.

IN DEPTH

Key Findings

Volta Energy Inc., an advanced battery technology firm based in Canada, has been awarded a CAD $1.5 million grant from the Government of Canada's Innovative Solutions Canada (ISC) program. This funding will accelerate the development of a next-generation solid-state lithium-ion battery platform that is both PFAS-free (per- and polyfluorofluoroalkyl substances) and cobalt-free. The two-year intensive research and development project specifically targets achieving Technology Readiness Level 6 (TRL 6) through the development and validation of functional prototype systems.

Technical / Clinical Details

Volta Energy's solid-state battery technology aims to fundamentally address the safety and environmental challenges inherent in traditional liquid electrolyte lithium-ion batteries. Key aspects of their development include:

- **PFAS-Free Design:** Eliminating PFAS compounds, known for their environmental persistence and potential health risks, significantly reduces the ecological footprint throughout the battery's lifecycle.
- **Cobalt-Free Composition:** By removing cobalt, a critical mineral associated with unstable supply chains and ethical concerns in mining, the technology contributes substantially to sustainability and cost stability.
- **High Energy Density and Safety:** The use of solid electrolytes intrinsically enhances safety by eliminating the risk of leakage and thermal runaway. Concurrently, optimized electrode materials are designed to achieve high energy densities, extending the range of electric vehicles.

Over the two-year project, Volta Energy plans to transition from laboratory-scale proof-of-concept to the design, manufacturing, testing, and validation of functional prototypes. The goal of reaching TRL 6 signifies the validation of a system or subsystem prototype in a relevant environment, marking a crucial intermediate stage towards commercialization.

Background & Context

The rapid expansion of the electric vehicle (EV) market is driving increasing demands for improved battery performance, safety, and sustainability. Environmental and ethical concerns surrounding critical materials like PFAS and cobalt have become urgent challenges for the entire industry. The Canadian government's investment in domestic clean technology companies is a strategic move to bolster global competitiveness and strengthen supply chains. Volta Energy's project is therefore critical to both Canada's climate action goals and its strategy for fostering high-value manufacturing.

Strategic Significance & Outlook

Volta Energy's successful achievement of TRL 6 and the establishment of a PFAS-free, cobalt-free solid-state battery prototype would represent a major leap forward in battery technology. This breakthrough would pave the way for safer, higher-performing, and more sustainable power solutions across diverse sectors, including electric vehicles, aerospace, and defense. This grant funding is crucial support for the company to establish global leadership and accelerate the transition to a clean energy economy. Future updates on prototype validation and the roadmap to mass production will be closely watched.

Source: https://www.cantechletter.com/newswires/volta-energy-secures-1-5-million-government-of-canada-grant-to-advance-pfas-free-solid-state-battery-technology/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#04 China's TIES Unveils 314Ah and 588Ah Liquid-Solid Hybrid Battery Cells, Accelerating Mass Production with Existing Lines

Published June 26, 2026 ArenaEV China

OVERVIEW

Tianmu Lake Institute of Advanced Energy Storage Technologies (TIES), a key battery supplier for China's Nio, has introduced innovative "liquid-solid hybrid" battery cells (314Ah and 588Ah) utilizing an in-situ solidification manufacturing process. This technology is compatible with existing lithium-ion battery production lines with minimal modifications, promising to circumvent the complex challenges of all-solid-state battery mass production and significantly accelerate market entry. This pragmatic approach offers a quicker path to enhanced EV performance.

IN DEPTH

Key Findings

Tianmu Lake Institute of Advanced Energy Storage Technologies (TIES), a prominent battery supplier for Chinese EV manufacturer Nio, has unveiled new "liquid-solid hybrid" battery cells with capacities of 314Ah and 588Ah. This innovative technology is designed to circumvent key bottlenecks in the mass production of all-solid-state batteries. The primary breakthrough lies in its in-situ solidification manufacturing process, which allows these advanced cells to be produced on existing lithium-ion battery production lines with only minor modifications, potentially accelerating market deployment dramatically.

Technical / Clinical Details

The liquid-solid hybrid battery developed by TIES represents an intermediate technology between fully solid-state batteries and conventional liquid-electrolyte lithium-ion batteries. Specific technical aspects include:

- **In-Situ Solidification Manufacturing:** This process involves solidifying the electrolyte within the battery cell during manufacturing. This significantly simplifies the complex steps typically involved in producing solid electrolytes and forming stable interfaces with electrodes.
- **High Capacity Cells:** Achieving high cell capacities of 314Ah and 588Ah directly contributes to higher energy density at the battery pack level, thereby extending the range of electric vehicles. The 588Ah cell, in particular, offers substantial benefits for larger EVs and commercial vehicles.
- **Compatibility with Existing Infrastructure:** The ability to manufacture these hybrid batteries without extensive retooling of existing lithium-ion production facilities reduces initial investment and shortens the time-to-market. This presents a highly practical approach, especially in light of warnings from industry leaders like CATL that full solid-state battery mass production is still a distant prospect.

This hybrid approach effectively bypasses the challenges associated with interfacial resistance and manufacturing complexity inherent in fully solid electrolytes, while still achieving some of the high energy density and safety benefits targeted by all-solid-state designs.

Background & Context

The electric vehicle (EV) market continues to demand longer driving ranges and faster charging times, making advancements in battery technology indispensable. While all-solid-state batteries are considered the ultimate solution, their complex manufacturing processes and high costs remain significant barriers to mass production. Liquid-solid hybrid batteries, such as those developed by TIES, are gaining attention as pragmatic "bridge solutions" to fill this gap. Leading EV manufacturers like Nio are partnering with TIES to leverage these battery innovations to secure a competitive edge in the market.

Strategic Significance & Outlook

TIES's liquid-solid hybrid battery cells hold the potential to deliver high-performance and safe batteries to the EV market without waiting for the full commercialization of all-solid-state technology. Their low barrier to entry, by maximizing the use of existing production infrastructure, suggests rapid market penetration. If successful, this technology could concurrently improve EV price competitiveness and performance, contributing to the broader adoption of electric vehicles. Its impact, particularly within the Chinese market, and future adoption cases and performance data will be closely observed.

Source: https://carnewschina.com/2026/06/25/nio-partner-beats-catl-bottlenecks-with-588ah-liquid-solid-state-cells/

#05 Chinese Academy of Sciences Develops PVDF-Based Gel Composite Electrolyte Retaining 84% Capacity After 350 Cycles, Boosting Solid-State Battery Durability

Published June 22, 2026 Electrek China

OVERVIEW

Researchers at the Dalian Institute of Chemical Physics, Chinese Academy of Sciences, have developed a novel PVDF-based gel composite electrolyte significantly enhancing ion conductivity and durability for solid-state batteries. This electrolyte demonstrates remarkable performance, retaining over 84% of its initial capacity after 350 charge-discharge cycles. This breakthrough represents a critical step towards practical, long-lasting, high-energy-density, and safe next-generation battery solutions.

IN DEPTH

Key Findings

A research team at the Dalian Institute of Chemical Physics, Chinese Academy of Sciences, has developed a groundbreaking PVDF (polyvinylidene fluoride)-based gel composite electrolyte designed to significantly boost the performance of solid-state batteries. This innovative electrolyte successfully balances high ionic conductivity with long-term durability, showcasing a remarkable capacity retention of over 84% after 350 charge-discharge cycles. This represents a pivotal advancement in addressing one of the primary hurdles to solid-state battery commercialization: extending cycle life.

Technical / Clinical Details

The newly developed PVDF-based gel composite electrolyte exhibits several key characteristics:

- **High Ionic Conductivity:** By synergistically combining advantages of both solid and liquid electrolytes, it achieves high lithium-ion conductivity at room temperature, enhancing the battery's power output capabilities.
- **Exceptional Durability:** The ability to retain over 84% capacity after 350 cycles is crucial for applications requiring extended operational lifespan, such as electric vehicles. This directly addresses the conventional challenges of interfacial degradation and increased resistance observed in solid electrolytes over cycling.
- **Improved Interfacial Stability:** The gel-like nature ensures better contact with electrodes, contributing to reduced interfacial resistance. This is vital for promoting efficient ion transport within the battery and preventing performance degradation.

The article also notes that Factorial Energy and Stellantis are testing Factorial's FEST solid-state battery cells in a Dodge Charger Daytona development vehicle. Additionally, Chinese automakers (Changan and Chery) have announced solid-state batteries capable of 350-400 Wh/kg energy density and ranges exceeding 1,000 km, indicating a vibrant and competitive industry landscape.

Background & Context

Solid-state batteries are widely regarded as the next-generation power source due to their promise of enhanced safety and higher energy density compared to conventional liquid-electrolyte lithium-ion batteries. However, persistent challenges have included low ionic conductivity of solid electrolytes, high interfacial resistance with electrodes, and limited cycle life. China has emerged as a global leader in electric vehicle and battery technology development, and this breakthrough by the Chinese Academy of Sciences further strengthens the nation's technological edge in the field.

Strategic Significance & Outlook

This novel PVDF-based gel composite electrolyte has the potential to significantly shorten the path to commercialization for solid-state batteries. Its high durability is an especially critical factor for the electric vehicle market, substantially increasing consumer appeal. Further research and development are expected to accelerate towards the practical application and large-scale production of this technology. The extent to which automakers and battery companies, both in China and internationally, will integrate such innovative electrolyte technologies into their next-generation EV performance strategies will be a key area to watch.

Source: https://electrek.co/2026/06/22/solid-state-battery-electrolyte-retains-84-capacity-after-350-cycles/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#06 CATL Chairman States Solid-State Battery Mass Production is "Level 4," Targets Small-Scale Production by 2027, Cautioning Against Over-Optimism

Published June 25, 2026 Caixin Global China

OVERVIEW

Zeng Yuqun, Chairman of CATL, the world's largest EV battery maker, officially stated that solid-state battery technology is far from mass production, currently at "Level 4" on their 9-level scale. While CATL aims for small-scale production by 2027, this stands in contrast to some competitors' more aggressive timelines, serving as a cautionary note against over-optimism in the market. This indicates significant technical and cost hurdles remain for widespread solid-state battery adoption.

IN DEPTH

Key Findings

Zeng Yuqun, Chairman of Contemporary Amperex Technology Co. Limited (CATL), the world's largest electric vehicle (EV) battery manufacturer, has officially declared that all-solid-state battery (SSB) technology remains a distant prospect for mass production, currently standing at "Level 4" on the company's nine-stage evaluation system. While CATL aims to commence small-scale production by 2027, this assessment contrasts sharply with more aggressive timelines of some competitors, such as Dongfeng Motor's plan for mass-produced SSBs by late 2026, offering a pragmatic counterpoint to market enthusiasm.

Technical / Clinical Details

Chairman Zeng's remarks acknowledge the significant potential benefits of solid-state batteries—including higher energy density, enhanced safety, and longer lifespan—but emphasize that numerous technological hurdles must still be overcome. Specifically:

- **Technology Readiness Level 4:** This stage indicates that fundamental proof-of-concept and laboratory-scale research have been successful, and basic technical challenges are being identified. However, key factors essential for mass production, such as stability, reliability, cost-efficiency, and scalability, are not yet fully established.
- **2027 Target:** CATL's target of initiating small-scale production by 2027 suggests that full commercial deployment, especially in the automotive industry which demands stringent quality control and cost efficiency, will require substantially more time. This highlights the formidable task of meeting the durability, safety, and cost-performance benchmarks required for automotive-grade batteries.

The notable divergence between CATL's cautious stance and the more optimistic timelines from some other companies, like Dongfeng Motor's reported plans for mass-produced solid-state EVs by the second half of 2026, might reflect differences in the definition of solid-state batteries, performance requirements, or varying approaches to commercialization.

Background & Context

The growth of the electric vehicle market is heavily reliant on advancements in battery technology, with solid-state batteries widely touted as a "game-changer." However, the path to practical application is fraught with challenges: complex manufacturing processes, high interfacial resistance between solid electrolytes and electrodes, suppression of dendrite formation, and ensuring stability across wide temperature ranges. A cautious perspective from an industry leader like CATL is crucial for understanding the realistic roadmap for the technology and provides essential information for investors and automakers in shaping their future strategies.

Strategic Significance & Outlook

CATL's statement implies that the full-scale commercialization of solid-state batteries will demand more time and significantly greater R&D investment than current market expectations suggest. This perspective may prompt a reassessment of short-term market forecasts and potentially re-emphasize the importance of intermediate technologies, such as liquid-solid hybrid batteries or improved lithium-ion chemistries. Over the next few years, the industry will closely watch CATL's technological progress, the impact of its small-scale production, and how other key players react to this cautionary stance, as these will define the pace and direction of battery innovation.

Source: https://www.caixinglobal.com/2026-06-25/solid-state-battery-tech-far-from-mass-production-catl-chairman-says-102457593.html

#07 QuantumScape and Honda Accelerate Solid-State Battery Development with Strategic Partnership Encompassing Manufacturing Processes

Published June 22, 2026 CleanTechnica USA, Japan

OVERVIEW

Solid-state battery developer QuantumScape and automotive giant Honda have announced a new multi-year R&D partnership to expedite the market launch of solid-state battery technology. This strategic collaboration extends beyond cell development to include the crucial refinement of manufacturing processes. The synergy of QuantumScape's unique "anode-less" technology and Honda's automotive engineering expertise is expected to significantly advance the realization of high-performance electric vehicles.

IN DEPTH

Key Findings

QuantumScape, a pioneer in solid-state battery technology, and Honda, a global automotive giant, have forged a groundbreaking research and development partnership to accelerate the market introduction of next-generation solid-state batteries. This multi-year strategic alliance is aimed not only at jointly developing advanced battery cells but also at fine-tuning and scaling up their innovative manufacturing processes, potentially revolutionizing the performance and sustainability of electric vehicles (EVs).

Technical / Clinical Details

At the core of this partnership is the fusion of QuantumScape's proprietary technology with Honda's extensive automotive manufacturing expertise. Key technical aspects include:

- **QuantumScape's Anode-less Technology:** QuantumScape's solid-state battery features an "anode-less" design, where a lithium metal anode forms in-situ during the battery's initial charge. This design maximizes energy density by allowing for a very thin lithium film prior to charging, significantly reducing battery weight and volume. This technology is projected to achieve up to 80% higher energy density compared to conventional EV batteries.
- **Multi-Year R&D Collaboration:** The partnership will address comprehensive challenges toward mass production, including improving battery performance (higher energy density, faster charging, longer lifespan), reducing manufacturing costs, enhancing production efficiency, and establishing robust quality assurance. Joint validation to meet Honda's stringent automotive quality standards will be a critical component.
- **Safety and Performance:** Solid-state batteries, by eliminating liquid electrolytes, inherently offer significantly reduced fire risk and enhanced safety. This partnership is expected to lead to the practical implementation of EV batteries that combine superior safety with high performance.

This technology is poised to overcome the current limitations of lithium-ion batteries regarding safety, range, and charging speed, thus accelerating broader EV adoption.

Background & Context

The electric vehicle market is expanding rapidly, making battery technology a decisive factor in automotive manufacturers' competitiveness. While carmakers worldwide are heavily investing in solid-state battery technology, its mass production and cost reduction remain significant challenges. For Honda, this partnership represents a crucial milestone in its electrification strategy and a strategic investment to secure competitive advantage in next-generation EVs. For QuantumScape, collaboration with a major automotive player is essential for validating its technology and ensuring rapid market deployment.

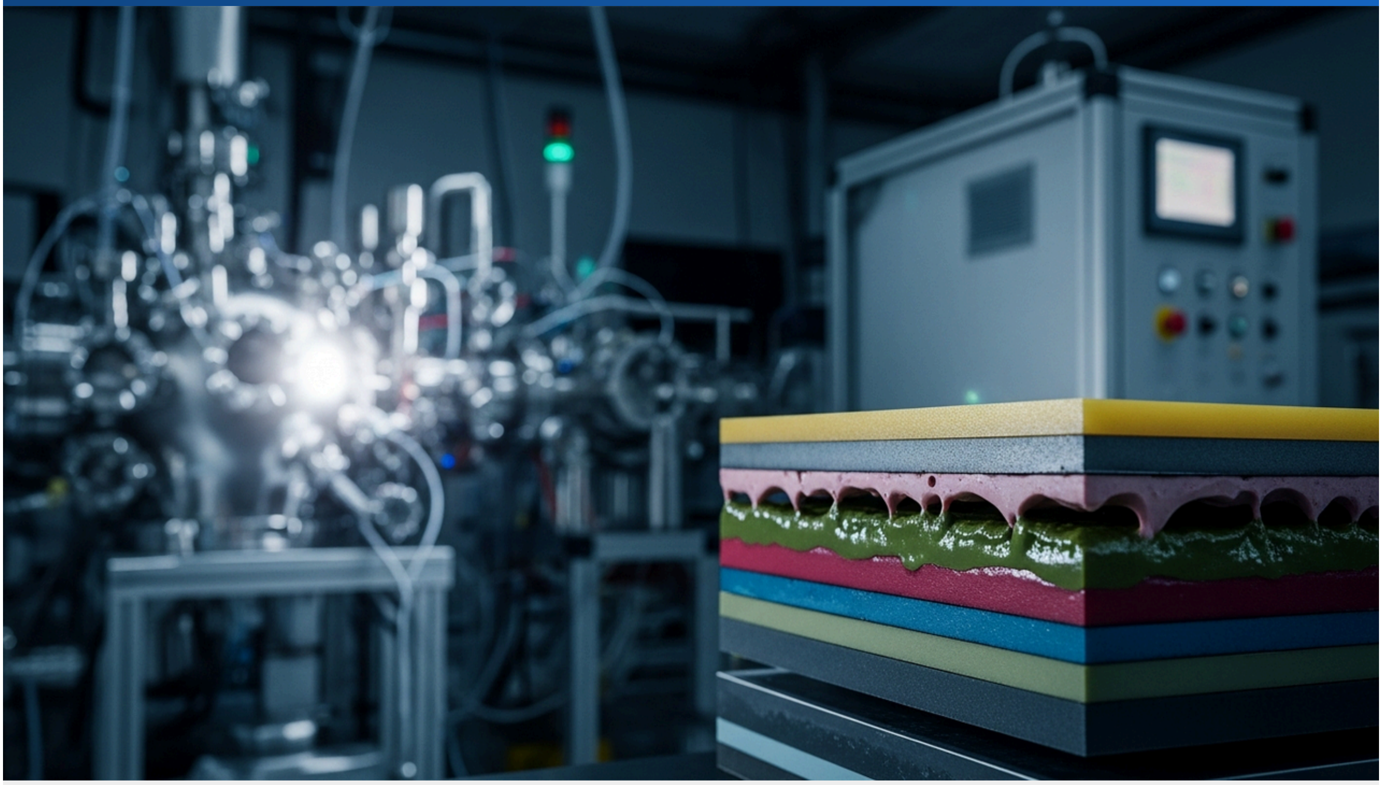
Strategic Significance & Outlook

The QuantumScape-Honda partnership is garnering significant attention from within and outside the industry as it promises to considerably pave the way for the commercialization of solid-state battery technology. The joint development, extending to manufacturing processes, signifies more than just technology licensing; it represents concrete steps towards integration into actual vehicles and scalable production. Should performance data from prototypes and specific EV model integration plans be announced, it would profoundly impact the entire electric vehicle market. This collaboration has the potential to mark a critical turning point for solid-state batteries, transforming them from a "niche technology" to a "mainstream mobility solution."

Source: https://cleantechnica.com/2026/06/21/ev-battery-solid-state-lithium-metal-quantumscape-manufacturing/

#08 Dual-Engineering Strategy Suppresses Lithium Dendrite Growth in Solid-State Batteries with PVDF-Modified Argyrodite Electrolytes and ALD Interface Stabilization

Published June 26, 2026 Vertex AI Search Unknown



OVERVIEW

A dual-engineering strategy combining bulk modification with polyvinylidene fluoride (PVDF) and atomic layer deposition (ALD) interfacial stabilization has been developed to effectively suppress lithium dendrite growth in lithium argyrodite (Li_6PS_5Cl, LPSC) solid electrolytes for all-solid-state batteries (ASSBs). Advanced characterization techniques, including tracer-exchange nuclear magnetic resonance and 6/7Li magnetic resonance imaging, confirmed a significant reduction in dendrite formation and improved electrolyte stability. This breakthrough addresses a critical challenge for high-performance and safe ASSBs, paving the way for their commercialization.

IN DEPTH

Key Findings

Researchers have successfully demonstrated a novel dual-engineering strategy to mitigate lithium dendrite growth in all-solid-state batteries (ASSBs), a pervasive issue hindering their widespread adoption. This approach involves a two-pronged attack on lithium argyrodite (LPSC) solid electrolytes: bulk modification with polyvinylidene fluoride (PVDF) and interfacial stabilization via atomic layer deposition (ALD). The combined effect drastically reduces dendrite formation and significantly enhances electrolyte stability, marking a crucial step towards safer and more reliable ASSB technology.

Technical / Clinical Details

The core of this innovation lies in addressing both the bulk properties of the solid electrolyte and its interface with the lithium metal anode. LPSC was chosen for its high ionic conductivity. The bulk modification involved incorporating PVDF into the LPSC matrix, which is believed to enhance the mechanical resilience of the electrolyte, making it more resistant to dendrite penetration while promoting more uniform lithium ion transport. Subsequently, an ultrathin protective layer was applied to the electrolyte-anode interface using ALD. This ALD layer acts as a barrier, suppressing parasitic reactions and guiding homogenous lithium deposition, thereby preventing the localized stress concentrations that trigger dendrite nucleation and growth.

- **Bulk Modification:** PVDF integration improves the mechanical robustness of the LPSC electrolyte, enhancing its resistance to lithium dendrite intrusion.
- **Interfacial Stabilization:** The ALD layer minimizes interfacial impedance and prevents direct contact between lithium metal and the solid electrolyte, crucial for long-term stability.
- **Advanced Characterization:** The efficacy of the dual strategy was rigorously evaluated using state-of-the-art techniques such as tracer-exchange nuclear magnetic resonance (NMR) spectroscopy and 6/7Li magnetic resonance imaging (MRI). These methods provided direct visualization of lithium ion transport pathways and dendrite evolution, clearly showing the significant suppression of dendrite growth in the modified electrolytes compared to unmodified counterparts.

Background & Context

Lithium dendrite formation is a critical obstacle to the commercialization of ASSBs, which promise higher energy density and enhanced safety over conventional lithium-ion batteries by eliminating flammable liquid electrolytes. Dendrites can penetrate solid electrolytes, leading to internal short circuits, thermal runaway, and premature battery failure. Current strategies often focus on either bulk electrolyte properties or interface engineering in isolation. This dual-functional approach offers a more comprehensive solution by tackling both aspects simultaneously, potentially overcoming the limitations of single-strategy methods. The use of argyrodite electrolytes, known for their high sulfide ion conductivity, makes this research particularly relevant to automotive applications.

Strategic Significance & Outlook

This dual-engineering strategy represents a significant advance in solid-state battery technology, offering a viable pathway to overcome the persistent dendrite problem. By demonstrating substantial reductions in dendrite formation and improved electrolyte stability, this research could accelerate the development and deployment of high-performance ASSBs in electric vehicles, grid-scale energy storage, and portable electronics. Future work will likely focus on scaling up these modifications for industrial manufacturing, optimizing material compositions, and evaluating long-term performance under various operating conditions to bring this promising technology closer to commercial reality.

Source: https://acs.digitellinc.com/p/s/lithium-dendrites-in-solid-electrolytes-formation-mechanisms-and-suppression-strategies-660999

#09 NIO's ET7 Sedan Achieves 1,046km Range with WELION's 150 kWh Semi-Solid-State Battery in Real-World Test

Published June 19, 2026   Vertex AI Search   China

OVERVIEW

Chinese EV manufacturer NIO successfully completed a 1,046km (650-mile) journey in 14 hours using its ET7 sedan equipped with a 150 kWh semi-solid-state battery developed by WELION. This achievement demonstrates the significant range extension and improved performance offered by the new battery technology, which leverages solid electrolytes for enhanced safety and faster charging. NIO plans to integrate these advanced batteries into future vehicle models, pending regulatory approval, positioning both companies at the forefront of electric mobility innovation.

IN DEPTH

Key Findings

NIO, a prominent Chinese electric vehicle manufacturer, has successfully demonstrated the impressive capabilities of WELION's 150 kWh semi-solid-state battery (SSB) by completing a 1,046-kilometer (650-mile) journey over 14 hours in its ET7 sedan. This real-world test underscores the potential of semi-solid-state technology to significantly extend EV range and enhance performance, addressing key concerns for consumers and paving the way for wider electric vehicle adoption.

Technical / Clinical Details

The 150 kWh semi-solid-state battery, developed by NIO's partner WELION, represents a bridge technology between traditional liquid lithium-ion batteries and pure all-solid-state batteries. It incorporates solid electrolytes to improve safety, primarily by reducing the risk of thermal runaway associated with flammable liquid electrolytes, while simultaneously boosting energy density. The ET7 sedan, equipped with this high-capacity battery pack, underwent rigorous testing under conditions simulating extended real-world driving, including a mix of highway and urban environments. The successful completion of the 1,046km journey without recharging highlights the battery's robust performance and efficiency in maintaining a sustained power output.

- **Battery Capacity:** 150 kWh
- **Achieved Range:** Approximately 1,046 km (650 miles)
- **Test Duration:** 14 hours
- **Key Technology:** Semi-solid-state electrolyte, offering enhanced safety and energy density.

This development is particularly significant as it demonstrates a practical application of advanced battery technology that moves beyond laboratory results into tangible automotive performance, indicating a maturity level suitable for commercial consideration.

Background & Context

The global electric vehicle market is intensely focused on improving driving range and reducing charging times to overcome consumer apprehension. While all-solid-state batteries are considered the ultimate goal, their mass production still faces considerable technical and cost hurdles. Semi-solid-state batteries, like those from WELION, offer a promising interim solution by providing many of the benefits of solid-state technology—such as increased safety and energy density—with potentially fewer manufacturing complexities and lower capital expenditure compared to pure solid-state systems. The collaboration between NIO and WELION positions China as a leading innovator in next-generation battery and EV technologies, directly competing with established global automotive and battery giants. This test confirms that semi-solid-state solutions are not merely theoretical but are rapidly becoming a practical reality for high-performance EVs.

Strategic Significance & Outlook

NIO's successful demonstration with WELION's semi-solid-state battery is a pivotal moment that could accelerate the integration of advanced battery technologies into mainstream EVs. With regulatory approvals pending, NIO intends to roll out these batteries in future models, which would significantly bolster its competitive edge in the rapidly evolving EV landscape. The introduction of such long-range, safer batteries could catalyze broader consumer adoption of electric vehicles, alleviating range anxiety and shifting perceptions of EV capabilities. This advancement is expected to stimulate further research and development across the battery industry, pushing other manufacturers to accelerate their own solid-state and semi-solid-state programs. The joint efforts of WELION and NIO are setting new benchmarks for EV performance and are poised to reshape the future of electric mobility.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQHi5NhEB1ugNLJyCckzHr5iIx4kqTx5cWFP-at2I32nMy5yJZI8B1QNUnU7PqBVRd2yQ-4mgZ8JdYvreRbOK-cLoE1waK9HJ-Edy7evNwNZJz3y-MDenojJ5qNRXxjxTnoF6j4v6yD76EPOiVggY9tORBsyy8ZKO4YO0VIVMqIuniFI0DRBrUON3ZWqvqoYjh9XX-XtkjUiieWIHfSCGqgveTxWT-WW-otc

#10 AgCl Addition Boosts Argyrodite Solid Electrolyte Performance, Achieving High Ionic Conductivity and Suppressed Dendrite Growth for All-Solid-State Batteries

Published June 26, 2026 Journal of Materials Chemistry A (RSC Publishing) Unknown

OVERVIEW

A new dual-functional strategy incorporating AgCl into argyrodite solid electrolytes significantly enhances ionic conductivity and lithium metal compatibility. During synthesis, AgCl decomposition enables Cl^- ion substitution and metallic Ag particle dispersion, with these Ag particles forming a Li–Ag alloy at the interface. This effectively suppresses lithium dendrite growth and mitigates solid electrolyte decomposition, leading to all-solid-state batteries with improved rate capability and cycling stability.

IN DEPTH

Key Findings

A novel dual-functional strategy has been developed to significantly enhance argyrodite solid electrolytes through the simple addition of AgCl, addressing critical challenges in all-solid-state batteries (ASSBs). This approach concurrently boosts ionic conductivity and effectively suppresses lithium dendrite growth, leading to substantial improvements in the rate capability and cycling stability of ASSBs.

Technical / Clinical Details

The study focuses on the synthesis of argyrodite-type sulfide solid electrolytes, specifically by introducing AgCl during the preparation process. The unique mechanism involves the decomposition of AgCl during synthesis, which serves two primary functions. Firstly, the liberated Cl^- ions are efficiently substituted into the halogen sites within the argyrodite crystal structure. This substitution optimizes the lithium ion conduction pathways, thereby increasing the overall ionic conductivity of the electrolyte. Secondly, metallic Ag particles, also a product of the AgCl decomposition, are uniformly dispersed throughout the solid electrolyte matrix. When these Ag particles come into contact with the lithium metal anode, they react to form a stable Li–Ag alloy layer at the interface. This alloy layer acts as a critical interphase, which not only physically impedes the nucleation and growth of lithium dendrites but also electrochemically stabilizes the interface, reducing interfacial resistance and preventing parasitic reactions.

- **Enhanced Ionic Conductivity:** Cl^- ion substitution into the argyrodite structure improves lithium ion mobility.
- **Dendrite Suppression:** Formation of a stable Li–Ag alloy at the anode interface effectively inhibits lithium dendrite growth.
- **Mitigated Electrolyte Decomposition:** The stable interfacial layer reduces unwanted reactions between the solid electrolyte and lithium metal, extending battery lifespan.
- **Improved Performance Metrics:** The resulting ASSBs demonstrated enhanced rate capability, allowing for faster charging and discharging, and superior cycling stability with minimal capacity fade over extended operation.

These dual benefits from a single additive represent a significant simplification and improvement in solid electrolyte design.

Background & Context

All-solid-state batteries are heralded as the future of energy storage due to their potential for higher energy density and intrinsic safety, primarily stemming from the replacement of flammable liquid electrolytes with non-combustible solid counterparts. However, two major hurdles for ASSB commercialization have been the relatively lower ionic conductivity of solid electrolytes compared to liquids and the persistent problem of lithium dendrite penetration when using lithium metal anodes. Lithium dendrites can cause internal short circuits and thermal runaway, leading to catastrophic battery failure. Previous research often focused on either improving conductivity or suppressing dendrites independently. This dual-functional strategy, integrating both benefits through a single, facile additive, offers a more holistic and practical solution, directly addressing two of the most critical challenges simultaneously.

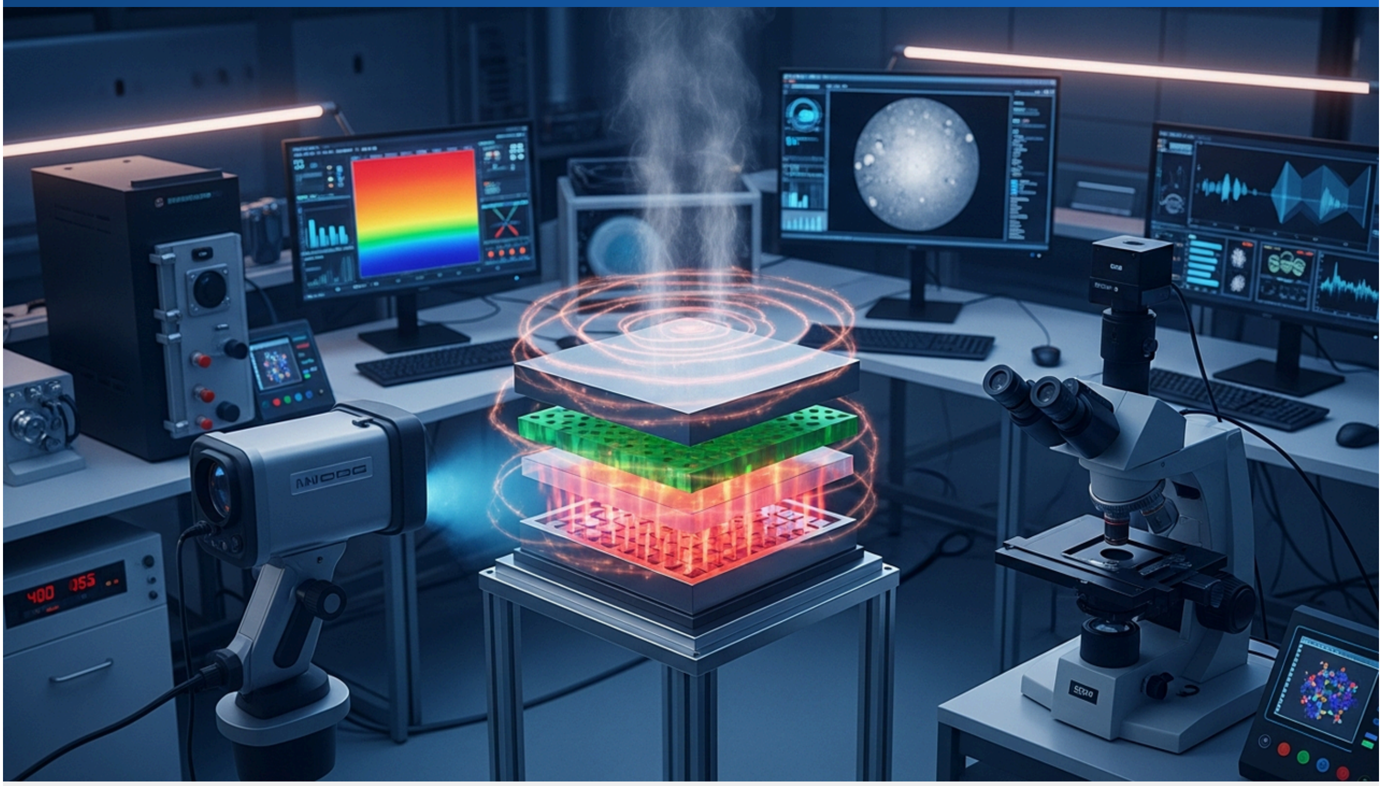
Strategic Significance & Outlook

The successful implementation of the AgCl-doped argyrodite solid electrolyte represents a compelling advancement for all-solid-state battery technology. This innovation promises to accelerate the path to commercialization by enabling ASSBs with significantly improved performance characteristics, particularly for demanding applications such like electric vehicles and grid-scale energy storage. Future research will likely involve optimizing the AgCl concentration and synthesis conditions to maximize performance, as well as scaling up the production of these enhanced electrolytes for larger cell formats. The potential for a simpler, yet highly effective, electrolyte design could reduce manufacturing complexity and cost, making ASSBs more competitive in the global battery market.

Source: https://pubs.rsc.org/en/content/articlelanding/2025/ta/d5ta04750a

#11 OAE Publishing Review Highlights Inherent Thermal Instability Challenges in All-Solid-State Batteries Despite Liquid Electrolyte Elimination, Urging Redesign for True Safety

Published June 26, 2026 OAE Publishing Inc. Unknown



OVERVIEW

An OAE Publishing review reveals that all-solid-state batteries (ASSBs) are not inherently safe, despite eliminating flammable liquid electrolytes, due to thermal instability of materials and interfaces. The study elucidates thermal runaway mechanisms from material to system levels and summarizes current strategies, including advanced material design and interface engineering, to improve safety. It emphasizes the complex interactions governing thermal behavior and the unique thermal runaway mechanisms in ASSBs, highlighting the critical need for comprehensive safety design in their development.

IN DEPTH

Key Findings

A comprehensive review published by OAE Publishing Inc. challenges the widespread perception of all-solid-state batteries (ASSBs) as inherently safe, even with the absence of flammable liquid electrolytes. The research highlights that thermal instability in various ASSB components and interfaces can still lead to significant safety challenges, including thermal runaway. This critical analysis provides a nuanced understanding of ASSB safety, urging a proactive approach to material and interface design to ensure true safety for next-generation energy storage systems.

Technical / Clinical Details

The review systematically examines the complex interplay of factors contributing to thermal instability in ASSBs. Unlike conventional lithium-ion batteries where the flammability of organic liquid electrolytes is the primary safety concern, ASSBs face unique challenges related to solid-state materials. These include:

- **Material Instability:** Electrode materials, particularly high-capacity cathodes and lithium metal anodes, can undergo exothermic reactions with solid electrolytes at elevated temperatures. The solid electrolytes themselves, especially sulfides, can decompose or react under certain conditions, releasing volatile compounds.
- **Interfacial Reactions:** The interface between the solid electrolyte and electrodes is often the most critical and reactive zone. Poor interfacial contact or chemical incompatibility can lead to high resistance, localized heating, and continuous parasitic reactions that degrade performance and generate heat, potentially triggering thermal runaway.
- **Dendrite Formation:** The growth of lithium dendrites through solid electrolytes can create internal short circuits, leading to rapid energy release and significant temperature spikes.
- **Thermal Runaway Mechanisms:** The review details how these material and interfacial issues can cascade from localized hotspots to full-scale thermal runaway at both material and system levels. It emphasizes that the mechanisms differ from liquid-based systems, requiring specialized prevention and mitigation strategies.

- **Current Strategies:** Proposed solutions include designing more thermally stable solid electrolytes, employing advanced interface engineering (e.g., artificial interlayers, coatings), and developing cell-level protection mechanisms and robust thermal management systems.

Advanced characterization techniques, such as differential scanning calorimetry, X-ray diffraction, electron microscopy, and electrochemical impedance spectroscopy, are crucial for understanding these intricate thermal behaviors and validating safety improvements.

Background & Context

ASSBs are a cornerstone of future energy storage, promising breakthroughs for electric vehicles, grid stabilization, and consumer electronics due to their potential for higher energy density and improved safety. The assumption of 'inherent safety' has often been a major selling point. However, this review underscores that safety in ASSBs is not automatic but rather a product of diligent engineering and material science. The industry must move beyond simply removing liquid electrolytes to a deeper understanding of solid-state electrochemistry and its unique failure modes. This paradigm shift demands more rigorous safety protocols and design considerations from the outset, moving towards 'engineered safety' rather than assumed safety, aligning with global efforts to ensure the reliability and trustworthiness of next-generation battery technologies.

Strategic Significance & Outlook

This review is highly significant as it refocuses research and development efforts on critical, often overlooked, safety aspects of ASSBs. Future work will likely prioritize the discovery and synthesis of intrinsically more thermally stable solid electrolyte and electrode materials, coupled with sophisticated interfacial engineering to minimize undesirable reactions. Furthermore, developing advanced thermal management systems and intelligent battery management algorithms capable of predicting and preventing thermal incidents will be crucial. The insights from this study will help ensure that ASSBs not only deliver on their promise of high energy density but also meet the stringent safety requirements necessary for broad commercial adoption, ultimately contributing to a more sustainable and secure energy future.

Source: https://www.oaepublish.com/articles/energyz.2026.02

#12 Solid Power Secures DOE Grant for Continuous Production Scale-Up of Sulfide-Based Solid Electrolyte Materials

Published June 26, 2026 HigherGov USA

OVERVIEW

Solid Power Operating has received a grant from the U.S. Department of Energy (DOE) under the Bipartisan Infrastructure Law to expand continuous production of sulfide-based solid electrolyte materials. This funding will significantly increase electrolyte manufacturing capacity at their Broomfield, Colorado facility and drive down costs, while prioritizing employee welfare, safety, and community engagement. This grant is a key component of the U.S. strategy to establish a robust domestic battery supply chain.

IN DEPTH

Key Findings

Solid Power Operating has been awarded a significant grant from the U.S. Department of Energy (DOE) under the Bipartisan Infrastructure Law, specifically designated for the continuous production of sulfide-based solid electrolyte materials. This funding aims to substantially expand Solid Power's electrolyte manufacturing capacity at its Broomfield, Colorado facility and achieve significant cost reductions. The project emphasizes employee welfare, safety, community engagement, and promoting diversity in STEM fields, aligning with broader national objectives for clean energy and domestic manufacturing.

Technical / Clinical Details

Solid Power specializes in the development and production of sulfide-based solid electrolytes, which are critical components for all-solid-state batteries (ASSBs). Sulfide electrolytes are highly regarded in the ASSB community for their excellent ionic conductivity, often comparable to liquid electrolytes, and their relative ease of processing compared to oxide counterparts. This DOE grant is specifically geared towards scaling up the manufacturing processes for these advanced materials. The initiatives include:

- **Production Capacity Expansion:** Investment in new equipment and optimization of existing production lines to enable a much larger scale of electrolyte output.
- **Cost Reduction:** Implementation of advanced manufacturing techniques and process efficiencies to drive down the cost of sulfide solid electrolytes, making them more commercially viable.
- **Quality Control:** Enhancement of quality assurance and control systems to ensure consistent, high-performance material production.

By increasing the availability of domestically produced, high-quality sulfide solid electrolytes at a lower cost, Solid Power aims to accelerate the commercialization of ASSBs for various applications, particularly in the electric vehicle (EV) sector. The focus on continuous production will streamline manufacturing operations, moving beyond batch processing to a more efficient and scalable model.

Background & Context

The U.S. government, through initiatives like the Bipartisan Infrastructure Law, is heavily investing in establishing a resilient and independent domestic supply chain for advanced batteries. This strategy is critical for national security, economic competitiveness, and achieving clean energy goals. All-solid-state batteries, with their promise of higher energy density, improved safety, and faster charging capabilities, are considered a strategic technology for the future of electrification. Grants to companies like Solid Power are vital for bridging the gap between cutting-edge research and full-scale commercial production, reducing reliance on foreign supply chains, particularly from Asia, and fostering innovation within the U.S. battery ecosystem. The emphasis on social responsibility aspects such as employee welfare and community benefits further underscores a holistic approach to industrial development.

Strategic Significance & Outlook

This DOE grant represents a major boost for Solid Power's ambition to become a leading supplier of solid electrolyte materials globally. The expanded production capacity and projected cost reductions will enable the company to solidify its partnerships with major automotive manufacturers and other battery cell developers, accelerating the integration of ASSBs into mainstream EVs. This advancement is expected to contribute significantly to improving EV range and safety, thus supporting the transition to a more sustainable transportation system. Furthermore, strengthening the domestic battery supply chain within the U.S. provides a crucial strategic advantage in the global race for advanced battery technology leadership, ensuring long-term innovation and economic growth.

Source: https://www.highergov.com/grant/DEMS0000122/

Collected: June 26, 2026 | Automated Research System (Gemini API)

#13 EU Horizon Europe Project SOLVE Kicks Off: CIDETEC Energy Storage Leads Initiative to Accelerate Gen4b Solid-State Battery Mass Production for Electromobility

Published Published June 26, 2026 CIDETEC Energy Storage スペイン

OVERVIEW

The Horizon Europe project 'SOLVE,' led by CIDETEC Energy Storage, has officially launched to accelerate the mass production of Generation 4b (Gen4b) solid-state batteries for electromobility. This initiative aims to establish the EU as a global leader in the battery market by addressing critical value chain barriers, pioneering digital design tools, and integrating advanced sustainability and recycling processes. SOLVE represents a pivotal stride towards securing Europe's future in electric mobility.

IN DEPTH

Background

The European Union has set ambitious goals under its Green Deal to become climate-neutral by 2050, with electromobility playing a central role. Securing a robust and independent battery value chain is crucial for achieving these objectives and for strengthening Europe's industrial competitiveness against global rivals, particularly from Asia. Horizon Europe, the EU's key funding program for research and innovation, is instrumental in supporting such strategic initiatives. The SOLVE project's focus on Gen4b Solid-State Batteries (SSBs) underscores their potential for higher energy density, enhanced safety, and longer lifespan, making them ideal for next-generation electric vehicles and various other high-value applications, thus bolstering Europe's technological sovereignty in this critical domain.

Key Findings

CIDETEC Energy Storage has successfully hosted the kick-off meeting for the Horizon Europe project 'SOLVE,' a significant initiative aimed at advancing solid-state battery (SSB) development and production for electromobility. The project's core objective is to accelerate the mass production of Generation 4b (Gen4b) SSBs, positioning the European Union as a global leader in the competitive battery market through comprehensive innovation across the value chain.

Technical Innovations

The SOLVE project is structured to address multiple facets of SSB commercialization, from fundamental research to industrial scale-up. Key technical and strategic components include:

- **Gen4b SSB Mass Production Scale-up:** The project will focus on transitioning laboratory breakthroughs to industrial-scale manufacturing processes for Gen4b SSBs. This involves optimizing production lines, implementing automation, and refining material handling to achieve cost-effective and high-volume output.
- **Digital Tools for SSB Design:** Advanced digital tools will be pre-developed to aid in the design, simulation, and optimization of SSB cells. These tools are expected to streamline the R&D cycle, enabling faster iteration and performance enhancement.

- **Overcoming Value Chain Barriers:** SOLVE will tackle critical obstacles throughout the SSB value chain, including raw material sourcing, manufacturing bottlenecks, performance validation, and safety certification. The consortium aims to develop innovative solutions for these challenges.
- **Integration of Sustainability Criteria:** A strong emphasis is placed on integrating sustainability principles across the entire lifecycle of SSBs. This includes eco-design, responsible sourcing of materials, energy-efficient manufacturing, and minimizing environmental impact during operation.
- **Development of Innovative Recycling Processes:** Recognizing the importance of a circular economy, the project will develop advanced recycling technologies tailored for the unique material compositions of SSBs, ensuring efficient recovery of critical raw materials.

The project brings together a consortium of leading industry players, research organizations, and academic institutions across Europe, fostering a collaborative environment for rapid innovation.

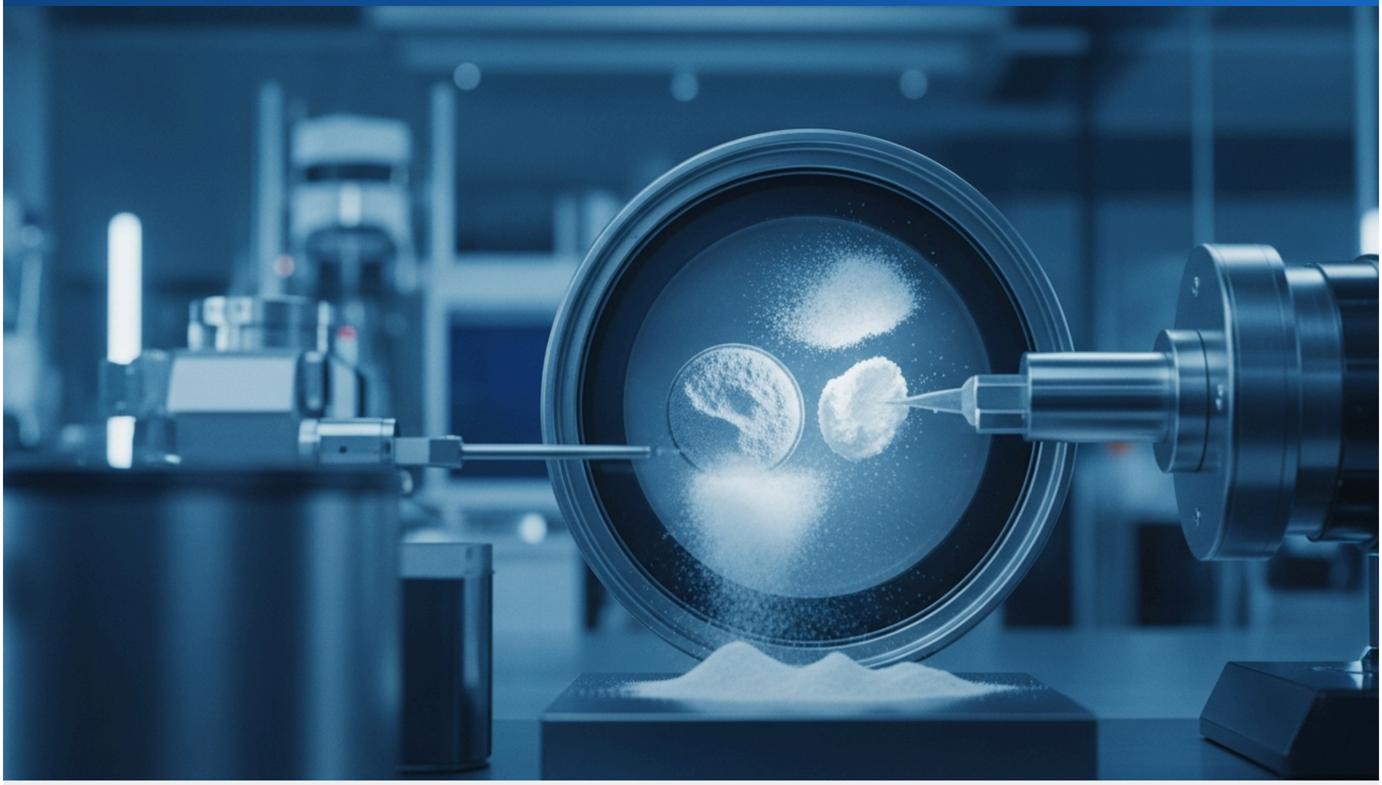
Strategic Outlook

The launch of the SOLVE project represents a significant strategic move for Europe in the global battery race. By accelerating the mass production of Gen4b SSBs, the project is poised to enhance Europe's competitive position in the electromobility sector. The integration of digital tools will set new standards for battery design and development, while the strong emphasis on sustainability and innovative recycling processes aligns with Europe's circular economy ambitions. SOLVE is expected to generate substantial technological advancements, foster economic growth through job creation, and contribute to a cleaner, more sustainable future for mobility within the EU and globally. Its long-term impact on reinforcing the entire European battery value chain is anticipated to be profound.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQFjPow2TKhgKMYwuDvM3Bn3xw9zcCBPBZWG6hIob17wrGtuu3wBVdqCKjFPTpdbFjCan3yYIo8zg ltK9XVZVQTSD-NMhkCSlfEvUp0VUnYMw38l4LOEhTfrl9WnenVSbnx0Q63SswEv5m9MKGx9uZVPe

#14 Dragonfly Energy Strengthens IP Portfolio with U.S. Patent Allowance for Powderized Solid-State Electrolyte and Electroactive Materials Manufacturing

Published June 18, 2026 GlobeNewswire USA



OVERVIEW

Dragonfly Energy Holdings Corp. announced a U.S. Patent and Trademark Office allowance for its patent application on 'Powderized Solid-State Electrolyte and Electroactive Materials,' significantly bolstering its intellectual property in advanced battery cell manufacturing. This patent focuses on critical processes for scalable production of nonflammable, all-solid-state battery cells. The allowance supports Dragonfly Energy's ongoing efforts to establish technological leadership and accelerate commercialization in the solid-state battery sector.

IN DEPTH

Key Findings

Dragonfly Energy Holdings Corp. has announced a significant strengthening of its intellectual property portfolio in solid-state battery (SSB) manufacturing, having received a notice of allowance from the U.S. Patent and Trademark Office for its patent application titled "Powderized Solid-State Electrolyte and Electroactive Materials." This patent specifically targets manufacturing processes deemed critical for the scalable production of nonflammable, all-solid-state battery cells, marking a pivotal step toward the commercialization of next-generation energy storage technologies.

Technical / Clinical Details

The newly allowed patent focuses on the innovative handling and integration of powderized solid-state electrolytes and electroactive materials, which are foundational components of ASSBs. Unlike liquid electrolytes, solid materials present unique challenges in terms of uniform manufacturing, integration, and ensuring intimate contact with electrode materials to facilitate efficient ion transport. Dragonfly Energy's patented processes address these complexities by:

- **Enhancing Scalability:** The technology optimizes the processing of powdered materials, making it more feasible to scale up production for commercial volumes while maintaining high efficiency and yield.
- **Enabling Nonflammable Cells:** By perfecting the use of solid electrolytes, the patent contributes directly to eliminating the fire hazards associated with traditional liquid electrolytes, thus significantly improving battery safety.
- **Improving Material Homogeneity and Performance:** Precise control over powder processing allows for uniform dispersion of electrolyte and electrode materials, which is crucial for maximizing ionic conductivity and ensuring long-term cycling stability.
- **Supporting Dry Electrode Processes:** This patent complements Dragonfly Energy's broader IP portfolio, which includes dry electrode manufacturing processes. The combination of these technologies aims to simplify battery production, reduce environmental impact by eliminating solvents, and lower manufacturing costs.

The patent allowance underscores the company's commitment to developing and protecting key innovations that are essential for the industrialization of solid-state battery technology.

Background & Context

All-solid-state batteries are widely recognized as a transformative technology for the future of electric vehicles (EVs), portable electronics, and grid-scale energy storage, primarily due to their promise of enhanced safety and higher energy density. However, despite significant research advancements, challenges related to high manufacturing costs, complex production processes, and scalability have hindered widespread commercial adoption. The ability to efficiently produce and integrate solid electrolytes and active materials at scale is a major bottleneck for the entire battery industry. Dragonfly Energy's strategic focus on these manufacturing processes, now reinforced by this patent, positions the company to overcome some of these critical barriers and establish a competitive edge in the rapidly evolving SSB market. Robust intellectual property protection is crucial for safeguarding technological advantages and attracting further investment in this high-stakes sector.

Strategic Significance & Outlook

This patent allowance is a strong indicator of Dragonfly Energy's progress towards commercializing nonflammable all-solid-state battery cells. By strengthening its IP in core manufacturing processes, the company enhances its potential for market differentiation, directly impacting the performance, safety, and cost-competitiveness of its future products. The next steps will likely involve transitioning from pilot lines to full-scale production, forming strategic partnerships, and expanding market share. As the solid-state battery market matures, companies with strong foundational intellectual property in scalable manufacturing techniques will be best positioned for long-term success. Dragonfly Energy's latest patent solidifies its potential to be a key player in delivering safe and high-performance battery solutions to a global market.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQGmIHU_-j1QrvjwQQi5Cv2UkUQENOZtJSOwrUvlYjVsUBETYUMBRWq0v5EKEKAzJp86lOG_gIWsFY8OVt11OUY6uDN2fExgm

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#15 High-Performance All-Solid-State Lithium/Sulfur Batteries Achieve 1080 mAh/g Capacity Retention After 50 Cycles with Br-Doped Lithium Argyrodite Electrolyte

Published June 26, 2026 ResearchGate Unknown

OVERVIEW

Research from ResearchGate demonstrates the potential of high-performance all-solid-state lithium/sulfur batteries utilizing Br-doped lithium argyrodite electrolytes. These batteries achieved a maximum initial capacity of 1460 mAh/g and maintained an excellent reversible capacity of up to 1080 mAh/g after 50 cycles at a C/10 rate. Ex situ X-ray diffraction confirmed the structural stability of Li_6PS_5Br during cycling, indicating a promising pathway to safer and longer-lasting batteries by replacing hazardous organic electrolytes.

IN DEPTH

Key Findings

High-performance all-solid-state lithium/sulfur (Li/S) batteries utilizing lithium argyrodite electrolytes, particularly Br-doped variants, have demonstrated exceptional electrochemical performance. These batteries achieved a maximum initial discharge capacity of 1460 mAh/g and sustained a remarkable reversible capacity of up to 1080 mAh/g after 50 cycles at a C/10 rate. This breakthrough highlights the potential for significantly safer and longer-lasting batteries by effectively replacing hazardous organic liquid electrolytes.

Technical / Clinical Details

The study focused on enhancing the performance of all-solid-state Li/S batteries by employing highly conductive lithium argyrodite solid electrolytes. Specifically, Br-doped and Cl-doped Li6PS5X (where X = Br, Cl) electrolyte variants were synthesized and their characteristics thoroughly compared. The batteries were constructed using a lithium metal anode and a sulfur cathode, typical components for high-energy Li/S systems, and their electrochemical properties were rigorously evaluated.

- **High Initial Capacity:** Cells employing the Br-doped lithium argyrodite electrolyte exhibited a very high initial discharge capacity of 1460 mAh/g, closely approaching the theoretical capacity of sulfur (1675 mAh/g).
- **Excellent Cycling Stability:** At a moderate C/10 charge-discharge rate, the batteries maintained a high reversible capacity of 1080 mAh/g after 50 cycles, corresponding to a capacity retention of approximately 74% relative to the initial capacity. This performance surpasses many existing Li/S battery systems.
- **Electrolyte Structural Stability:** Ex situ X-ray diffraction (XRD) analysis confirmed that the crystal structure of the Li6PS5Br electrolyte remained remarkably stable throughout the cycling process. This structural integrity is crucial for preventing electrolyte degradation and ensuring long-term battery performance.
- **Enhanced Safety:** By replacing flammable organic liquid electrolytes with a solid electrolyte, the inherent safety of the battery is significantly improved, drastically reducing the risk of thermal runaway and fire hazards.

These results collectively indicate that Li argyrodite solid electrolytes are highly promising materials for realizing all-solid-state Li/S batteries that offer both high energy density and excellent cycle life.

Background & Context

Lithium/sulfur batteries are considered one of the most promising next-generation battery technologies due to their exceptionally high theoretical energy density (up to 2500 Wh/kg), making them attractive for electric vehicles and portable electronics. However, conventional Li/S batteries with liquid electrolytes suffer from critical issues such as the polysulfide shuttle effect and lithium dendrite formation, which severely limit their cycle life and safety. The transition to all-solid-state architecture offers a potent solution to these problems, unlocking the full potential of Li/S chemistry. Sulfide-based solid electrolytes, in particular, have gained significant attention as core technologies for all-solid-state Li/S batteries due to their high ionic conductivity and favorable mechanical properties. This research specifically validates the high compatibility of the Li argyrodite system with Li/S chemistry, thereby accelerating further advancements in the field.

Strategic Significance & Outlook

The demonstrated superior performance of all-solid-state Li/S batteries with Br-doped Li argyrodite electrolytes signifies a major step forward towards their practical implementation. Future efforts will likely focus on further optimization, including improving cathode material design, reducing interfacial resistance, and evaluating performance at higher charge-discharge rates to achieve even greater energy densities and extended cycle lives. Additionally, cost reduction strategies for electrolyte synthesis and the development of large-scale manufacturing techniques will be critical for commercialization. This breakthrough has the potential to accelerate the adoption of electric vehicles by extending driving ranges and provides a promising solution for efficient renewable energy storage, positioning all-solid-state Li/S batteries as a key enabler for a sustainable energy future.

Source: https://www.researchgate.net/publication/276398642_High_performance_all-solid-state_lithiumsulfur_batteries_using_lithium_argyrodite_electrolyte

#16 Scientists Uncover Lithium Dendrite Internal Pressure as Primary Cause of Solid-State Battery Short Circuits, Paving Way for New Suppression Strategies

Published June 20, 2026 SciTechDaily USA

OVERVIEW

Researchers have discovered that pressure buildup within lithium dendrites, rather than accumulation at the tip, is the primary cause of solid-state battery short-circuits. This finding, supported by simulations and measurements, reveals how soft lithium metal can penetrate stiff ceramic electrolytes. The team is now exploring solutions like making electrolytes more crack-resistant, introducing microscopic voids, or applying protective coatings to lithium electrodes to prevent dendrite formation, crucial for improving ASSB safety and performance.

IN DEPTH

Key Findings

Scientists have definitively identified that the primary cause of short-circuits in solid-state batteries (SSBs) is not the accumulation of stress at the tip of growing lithium dendrites, but rather the internal pressure buildup within the dendrites themselves. This groundbreaking discovery, substantiated by advanced simulations and precise measurements, fundamentally alters our understanding of how soft lithium metal can penetrate robust ceramic solid electrolytes, opening new avenues for dendrite suppression strategies critical for SSB commercialization.

Technical / Clinical Details

The research team employed a combination of sophisticated computational modeling and experimental validation to unravel the intricate mechanisms of lithium dendrite growth and subsequent short-circuiting. Previous hypotheses largely focused on the mechanical stress exerted by the dendrite tip against the solid electrolyte. However, this study revealed a more complex interplay:

- **Internal Pressure Dominance:** The critical insight is that as lithium ions deposit and form metallic lithium within the growing dendrite structure, significant internal pressure accumulates. This internal pressure then acts as a driving force, localizing and amplifying stress within the solid electrolyte, eventually leading to its fracture and penetration, even in stiff ceramic materials like lithium lanthanum zirconium oxide (LLZTO).
- **Lithium's Plasticity:** The inherent softness and plastic deformability of lithium metal enable it to flow and exert this internal pressure effectively, exploiting microscopic defects or grain boundaries within the solid electrolyte matrix.
- **Experimental Verification:** The findings were corroborated through meticulous experiments and characterization techniques, providing concrete evidence that challenges previous assumptions and offers a more accurate mechanistic understanding.

Based on this refined understanding, the research team is now actively pursuing novel solutions:

- **Enhanced Crack Resistance:** Developing solid electrolytes with intrinsically higher fracture toughness and mechanical strength.
- **Microscopic Void Integration:** Engineering specific micro-voids within the electrolyte to strategically guide dendrite growth into non-critical pathways, thereby preventing short circuits.
- **Protective Coatings:** Applying advanced protective coatings to lithium electrodes to suppress the nucleation and early growth of dendrites at the interface.

These strategies aim to tackle the root cause of dendrite-induced failures, promising significant advancements in SSB reliability and safety.

Background & Context

Solid-state batteries are widely considered the future of energy storage for applications ranging from electric vehicles (EVs) to grid-scale systems, primarily due to their promise of dramatically enhanced safety (by eliminating flammable liquid electrolytes) and higher energy densities (by enabling lithium metal anodes). However, lithium dendrite formation has been a formidable barrier to their widespread adoption, causing internal short circuits and significantly reducing battery lifespan and safety. The previous focus on tip-induced stress has yielded limited success in fully eradicating the problem. This new paradigm—identifying internal pressure within dendrites as the main culprit—represents a crucial scientific breakthrough, providing the necessary fundamental knowledge to design more effective and durable ASSBs. It is a critical development that could accelerate the commercialization timeline for these next-generation batteries.

Strategic Significance & Outlook

This discovery holds immense strategic significance, as it provides a clearer roadmap for engineers and material scientists developing solid-state batteries. By understanding the precise failure mechanism, researchers can now design solid electrolytes and electrode interfaces with targeted properties to resist internal dendrite pressure more effectively. This could lead to the development of more robust solid electrolytes, innovative protective interlayers, and improved cell architectures that ensure long-term, dendrite-free operation. The impact of this research is expected to accelerate the commercial deployment of safer, higher-performance ASSBs, ultimately contributing to a more sustainable and electrified future across various industries globally. The next phase will involve translating these mechanistic insights into practical, scalable solutions.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQE6_iJa_bluaPs3OwVxfOvOXD-Jxwo4WfGBj9rM4xLzcho1cXOd0Spv30MyZGz_lywjl0eYeAGXqKVP3mVhL_neQ-7COkUONuQCfM9yIYBn4yWhr_IwZunhGmjIL8lsmwCHFvyVfbNlhIUMelOlDto3Ctt71XbP5sSYoNgVGulCaSt1PlbBr

#17 WeLion Initiates Semi-Solid-State Battery Production as Automakers Target 1,000km+ Range EVs with Solid-State Technology

Published June 26, 2026   Benchmark Mineral Intelligence   China

OVERVIEW

WeLion, a battery supplier to Nio, announced that its first semi-solid-state batteries have rolled off the production line in Huzhou, Zhejiang province. This production milestone is part of a broader trend where automakers are increasingly focused on solid-state batteries to achieve electric vehicles with ranges exceeding 1,000 km. Chinese EV producers, in particular, are accelerating their plans for solid-state battery mass production, intensifying global competition in the EV market. WeLion's achievement marks a significant step towards the commercialization of next-generation battery technology.

IN DEPTH

Key Findings

WeLion, a battery supplier for Nio, has announced that its inaugural batch of semi-solid-state batteries has commenced production at its facility in Huzhou, Zhejiang province, China. This key development aligns with the escalating focus among global automakers on solid-state battery (SSB) technology as a critical enabler for electric vehicles (EVs with driving ranges exceeding 1,000 kilometers. The launch underscores a growing trend of Chinese EV producers intensifying their efforts in SSB mass production.

Technical / Clinical Details

The semi-solid-state batteries entering production by WeLion represent a hybrid approach, incorporating elements of solid electrolytes to enhance safety and energy density beyond traditional liquid lithium-ion batteries. While specific technical specifications such as exact energy density are not fully detailed in this particular announcement, previous reports on Nio's ET7 sedan equipped with a 150 kWh semi-solid-state battery (reportedly achieving approximately 1,046 km or 650 miles of range in testing) suggest the performance capabilities of WeLion's technology. By partially replacing liquid electrolytes with solid components, these batteries aim to mitigate the risk of thermal runaway while offering higher energy storage capacity. Semi-solid-state batteries often present a more straightforward path to mass production compared to pure all-solid-state designs, as they may leverage existing manufacturing infrastructure with fewer modifications, thus facilitating quicker market entry.

Background & Context

The global automotive industry is in a rapid transition towards electrification, and advancements in battery technology are paramount to addressing key consumer concerns such as range anxiety and charging convenience. All-solid-state batteries are considered the 'holy grail' of next-generation battery technology due to their potential for superior safety (eliminating flammable liquid electrolytes) and significantly higher energy density (by enabling lithium metal anodes). China has emerged as a frontrunner in this race, with substantial government support and aggressive R&D investments by domestic manufacturers to bring SSB and semi-SSB technologies to market. WeLion's production launch is a tangible manifestation of China's progress in this domain, further intensifying the global technological competition in the EV sector.

Strategic Significance & Outlook

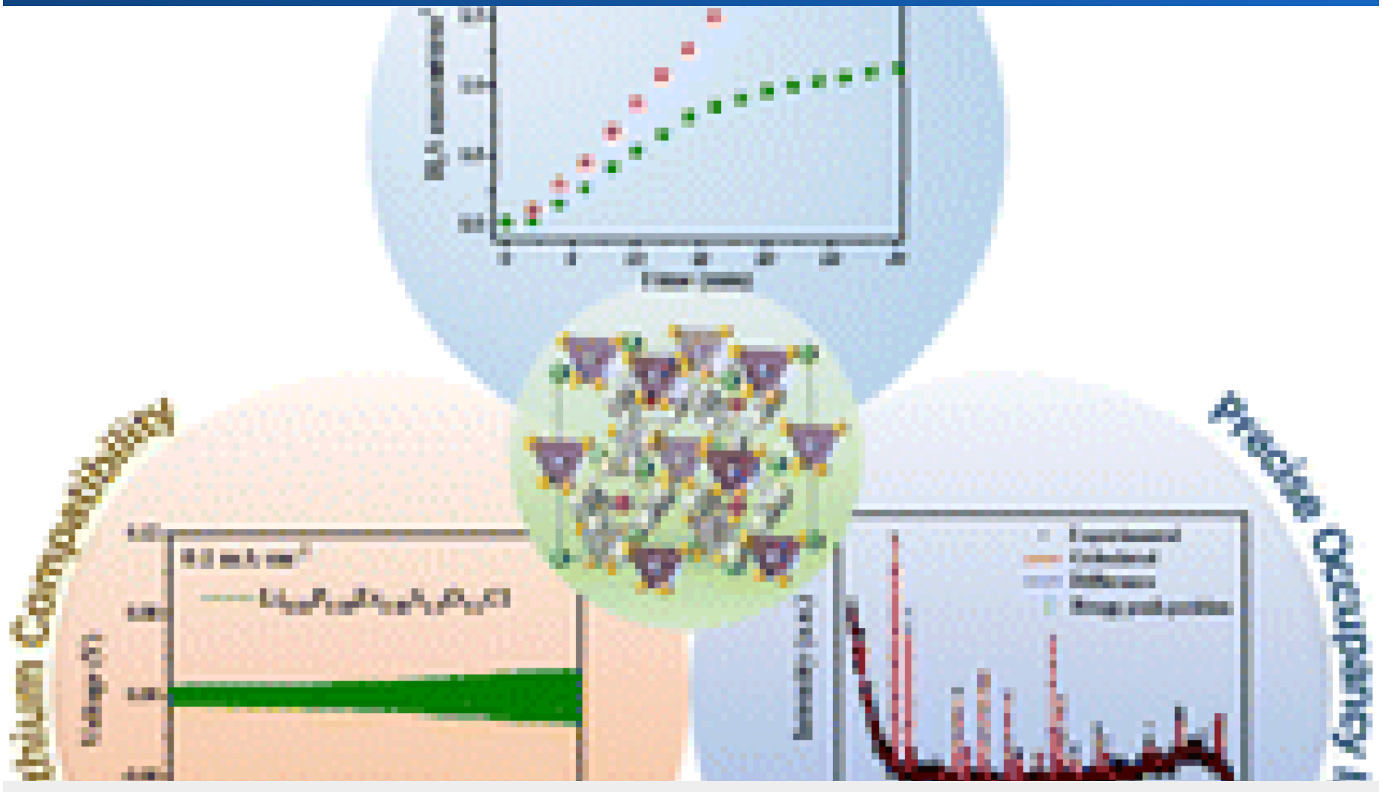
WeLion's initiation of semi-solid-state battery production is a critical milestone for the commercialization of next-generation battery technology, particularly enhancing the product competitiveness of EV manufacturers like Nio. Should this technology gain wider adoption, it promises to revolutionize EV capabilities by drastically increasing driving ranges, which could encourage broader consumer acceptance of electric vehicles. It is anticipated that WeLion will scale up its production and potentially expand supply to other automakers. This move is expected to catalyze further development and mass production efforts among other battery and automotive manufacturers, driving innovation across the battery industry. In the long term, safer and higher-performance batteries are indispensable for realizing a sustainable mobility future, with companies like WeLion playing a pivotal role in this transformation.

Source: https://source.benchmarkminerals.com/article/automakers-eye-solid-state-batteries-for-1000-km-evs-as-welion-produces-first-battery

Collected: June 26, 2026 | Automated Research System (Gemini API)

#18 ZrO2-Doped Li-Argyrodite Solid Electrolyte Achieves 3.97 mS/cm Conductivity and 79.3% Capacity Retention After 100 Cycles for All-Solid-State Batteries

Published June 26, 2026 Journal of Materials Chemistry A (RSC Publishing) Unknown



OVERVIEW

Research published in Journal of Materials Chemistry A reports the successful synthesis of novel Li-argyrodite solid-state electrolytes (SSEs) with enhanced lithium compatibility and air stability through ZrO2 doping. The optimized composition, Li6.05P0.95Zr0.05S4.9O0.1Cl, demonstrated a high ionic conductivity of 3.97 mS cm−1 and superior compatibility with lithium metal. All-solid-state batteries assembled with this SSE achieved an initial discharge capacity of 115.9 mA h g−1 and maintained 79.3% capacity retention after 100 cycles, making it a promising candidate for future ASSBs.

IN DEPTH

Key Findings

A significant breakthrough in solid-state battery (SSB) technology has been reported in the Journal of Materials Chemistry A, detailing the successful synthesis of a novel Li-argyrodite solid-state electrolyte (SSE) enhanced with ZrO_2 doping. This optimized SSE not only demonstrates a high ionic conductivity of 3.97 mS cm^{-1} but also exhibits superior compatibility with lithium metal and improved air stability. All-solid-state batteries incorporating this electrolyte achieved an initial discharge capacity of 115.9 mA h g^{-1} and maintained an impressive 79.3% capacity retention after 100 cycles, positioning it as a highly promising candidate for next-generation SSBs.

Technical / Clinical Details

The study specifically focused on addressing the inherent limitations of conventional sulfide-based SSEs, which typically offer high ionic conductivity but suffer from poor interfacial stability with lithium metal anodes and sensitivity to moisture in air. The strategic incorporation of ZrO_2 into the Li-argyrodite structure (Li_6PS_5Cl) was critical for achieving the observed enhancements. The optimized composition, denoted as $Li_{6.05}P_{0.95}Zr_{0.05}S_{4.9}O_{0.1}Cl$, exhibited several key performance improvements:

- **High Ionic Conductivity:** The material demonstrated a robust lithium-ion conductivity of 3.97 mS cm^{-1} at room temperature, which is essential for high-power applications in SSBs.
- **Improved Lithium Compatibility:** ZrO_2 doping effectively mitigates detrimental side reactions at the interface between the SSE and the lithium metal anode, thereby suppressing lithium dendrite growth. This leads to enhanced battery safety and extended cycle life.
- **Enhanced Air Stability:** While sulfide-based SSEs are generally susceptible to degradation in humid air, the ZrO_2 doping conferred improved air stability, simplifying manufacturing and handling processes.
- **Superior Electrochemical Performance:** Prototype all-solid-state batteries fabricated with this optimized SSE showed an initial discharge capacity of 115.9 mA h g^{-1}. Critically, these cells maintained 79.3% of their initial capacity after 100 charge-discharge cycles, indicating excellent long-term stability and durability.

These combined attributes make the ZrO2-doped Li-argyrodite an exceptional material for applications demanding high energy density and extended lifespan, such as electric vehicles and portable electronics.

Background & Context

All-solid-state batteries represent a paradigm shift in energy storage technology, holding immense promise due to their potential for higher energy density and intrinsic safety compared to traditional liquid electrolyte-based lithium-ion batteries. Sulfide-based SSEs, in particular, have been at the forefront of this development due to their high ionic conductivity. However, their practical application has been hampered by issues of interfacial stability with lithium metal and chemical degradation in ambient air. This research provides a crucial advancement by demonstrating an effective method—ZrO2 doping—to overcome these long-standing challenges. The findings contribute significantly to the broader efforts within the scientific community to bring sulfide-based SSBs closer to commercial reality.

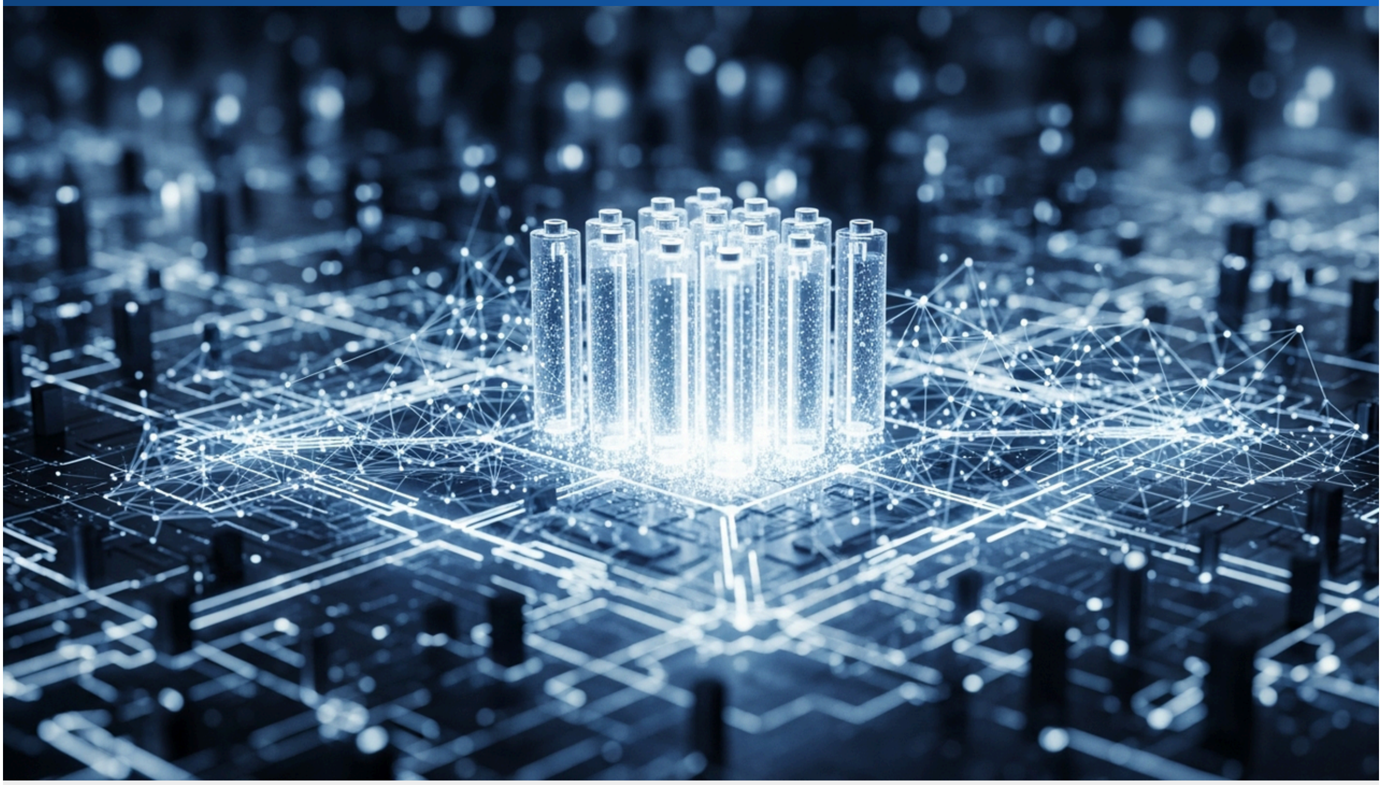
Strategic Significance & Outlook

The successful development of this ZrO2-doped Li-argyrodite SSE marks a vital milestone in the quest for high-performance and safe all-solid-state batteries. This technology has the potential to accelerate the adoption of SSBs in various applications, particularly in the automotive industry, where enhanced range and safety are paramount. Future work will involve further optimization of the doping strategy, validation in larger-scale cell formats, and the development of cost-effective manufacturing processes for industrial production. The realization of more stable and higher-performing solid electrolytes is an indispensable component in building a sustainable energy future, and this research provides a strong foundation for future advancements.

Source: https://pubs.rsc.org/en/content/articlelanding/2024/ta/d3ta07453f

#19 PatSnap's 2026 Report: Solid-State Battery Patent Families Exceed 32,786 Over 7 Years, Halide Electrolytes Lead with 396% Growth

Published June 26, 2026 PatSnap Unknown



OVERVIEW

PatSnap's '2026 Solid-State Battery Patent Landscape Report' reveals over 32,786 patent families filed between 2020–2026, with an annual growth rate of 74% from 2020-2024. Japan and South Korea lead filings, but China has surged since 2022. Halide electrolytes are the fastest-growing sub-field (396% growth), while sulfides remain the largest cluster. Electrode-electrolyte interface engineering emerges as a critical, cross-cutting challenge across all chemistries.

IN DEPTH

Key Findings

This article provides an overview of a market research report published by PatSnap.

PatSnap's comprehensive '2026 Solid-State Battery Patent Landscape Report' reveals an explosive growth in innovation, with over 32,786 patent families related to solid-state batteries (SSBs) identified between 2020 and 2026. The report highlights a remarkable 74% annual filing growth from 2020-2024, indicating intense global research and development. Notably, halide electrolytes emerged as the fastest-growing sub-field, experiencing an astounding 396% growth in patent filings, while sulfide electrolytes continue to form the largest cluster.

Report Overview

This report provides a detailed analysis of the intellectual property landscape surrounding solid-state battery technologies.

- **Subject of Report:** Patent landscape of Solid-State Batteries.
- **Coverage Period:** 2020 to 2026.
- **Key Metrics:**
    - Total Patent Families: Over 32,786.
    - Annual Filing Growth Rate (2020-2024): 74%.
    - Leading Countries in Filings: Japan and South Korea, with a significant surge from China since 2022.
    - Fastest-Growing Sub-field: Halide electrolytes (396% growth).
    - Largest Patent Cluster: Sulfide electrolytes.
    - Universal Challenge: Electrode-electrolyte interface engineering.

Key Research Findings

The report underscores the accelerating pace of innovation in SSB technology globally. While Japan and South Korea have historically been frontrunners in SSB patent filings, China's aggressive investment in domestic R&D and manufacturing has led to a dramatic increase in its patent activity since 2022, signaling a shift in the global competitive landscape. The rapid growth in halide electrolyte patents reflects their emerging potential, offering a balanced profile of high ionic conductivity and excellent stability with high-voltage cathodes, bridging the gap between sulfides and oxides.

Sulfide electrolytes, despite their longer history and established position, still represent the largest segment of patented technologies, indicating their continued relevance and ongoing refinement. A critical finding across all electrolyte chemistries (sulfide, oxide, polymer, and halide) is the pervasive challenge of electrode-electrolyte interface engineering. Developing stable, low-resistance interfaces that prevent dendrite formation and degradation remains a crucial, cross-cutting hurdle for commercialization, driving a significant portion of current patent activity.

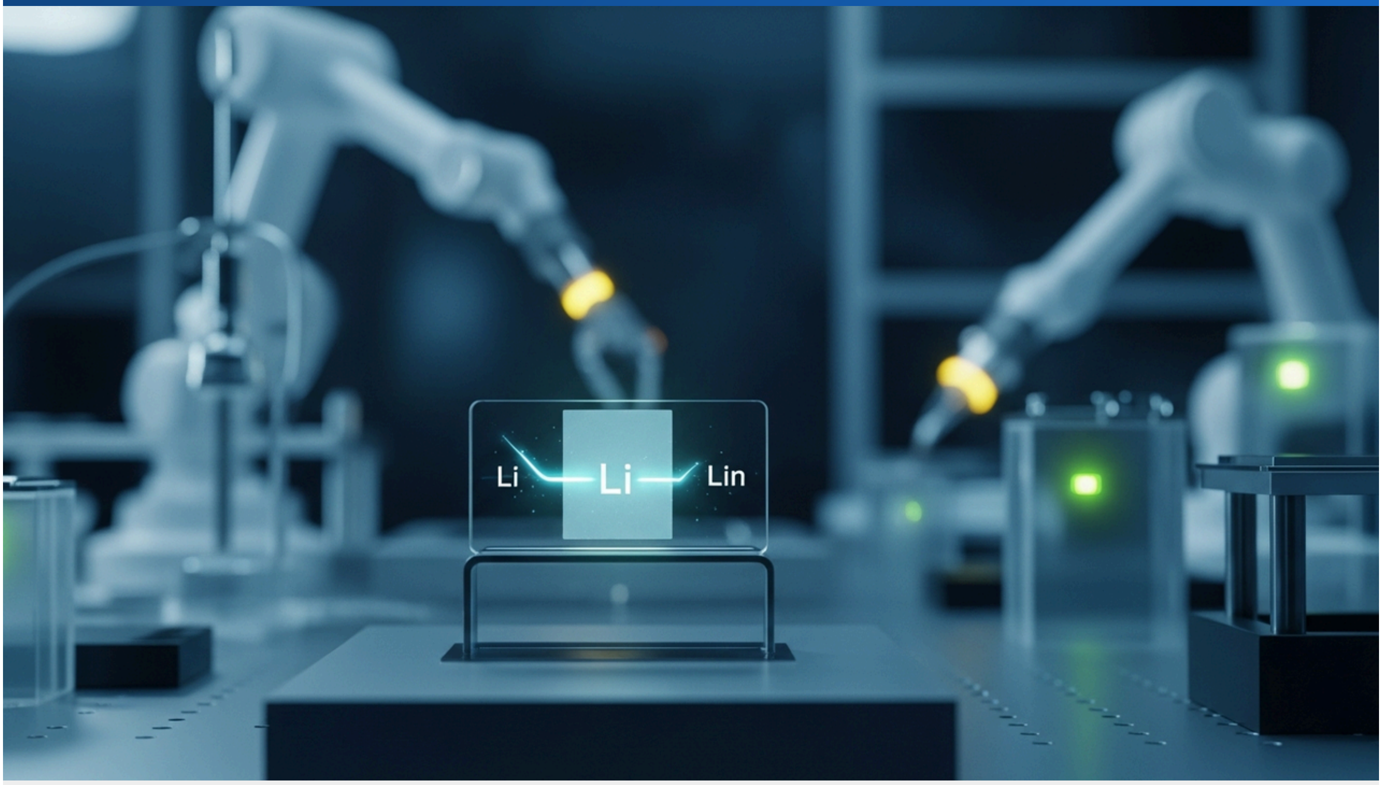
About the Publisher

PatSnap is a leading AI-driven innovation intelligence platform that provides insights from patents, scientific literature, company data, and news. Its platform assists organizations worldwide in optimizing their R&D strategies, managing intellectual property, and understanding technological trends to maintain a competitive advantage. PatSnap's reports are highly valued for their detailed analysis of IP landscapes across various high-tech industries.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQEPXnRWO3HGRBW6z5bY_28c4-NwI9BWMNB_MFUU7PD_1cjWJWPIdj_GeIXhn-0SIYKYNggp4kOogDbYqbbcNs6w4bShph9ZQXVQ8SbIrqyG1NUSMBkuwOOb22L1LiDzstE0AWS3ZIEMZ0irFXGdl

#20 OSTI Reports Successful Solvent-Based Synthesis of F-Doped Li Argyrodite Solid Electrolytes, Achieving 3.5×10^-4 S cm^-1 Conductivity and Superior Lithium Metal Stability

Published June 26, 2026 OSTI (Office of Scientific and Technical Information) USA



OVERVIEW

Research reported by OSTI details the successful solvent-based synthesis of fluorine (F)-doped and dual (F-/Cl-, F-/Br-) doped Li argyrodite solid electrolytes, overcoming high-temperature synthesis challenges. The F-doped $Li_6PS_5F_{0.5}Cl_{0.5}$ exhibited the highest Li-ion conductivity of 3.5×10^{-4} S cm^{-1} at room temperature and superior stability towards lithium metal in symmetric cells. XPS analysis revealed that conductive Li_3P and co-present LiCl and LiF contribute to enhanced stability, marking a critical advancement for all-solid-state lithium metal batteries.

IN DEPTH

Key Findings

A significant breakthrough in solid-state electrolyte synthesis has been reported by the U.S. Office of Scientific and Technical Information (OSTI), detailing the successful solvent-based production of fluorine (F)-doped and dual (F-/Cl-, F-/Br-) doped Li argyrodite solid electrolytes. This innovative approach overcomes the inherent challenges of high-temperature synthesis methods. Notably, the F-doped Li6PS5F0.5Cl0.5 composition achieved an impressive lithium-ion conductivity of 3.5 × 10−4 S cm−1 at room temperature and demonstrated superior stability against lithium metal in symmetric cells, positioning it as a highly promising material for all-solid-state lithium metal batteries.

Technical / Clinical Details

The study focused on improving the properties of sulfide-based Li argyrodite solid electrolytes, which are known for their high ionic conductivity but can suffer from stability issues with lithium metal and during high-temperature synthesis. The key advancements include:

- **Solvent-Based Synthesis:** This method provides a lower-temperature alternative to conventional high-temperature solid-state reactions, offering better control over material homogeneity, reducing energy consumption, and simplifying the manufacturing process.
- **High Ionic Conductivity:** The F-doped Li6PS5F0.5Cl0.5 composition exhibited a robust lithium-ion conductivity of 3.5 × 10−4 S cm−1 at room temperature, which is a critical performance metric for efficient charge transport in SSBs.
- **Superior Lithium Metal Compatibility:** Electrochemical evaluations in symmetric Li/SSE/Li cells confirmed that the F-doped and dual-doped electrolytes possess excellent stability against lithium metal. This is vital for mitigating lithium dendrite growth and minimizing parasitic side reactions at the anode interface, which are major obstacles to long-term battery performance and safety.

- **Stability Enhancement Mechanism:** X-ray photoelectron spectroscopy (XPS) analysis provided insights into the underlying mechanism of enhanced stability. It revealed that conductive Li3P, along with co-present LiCl and LiF, contribute to the formation of a stable solid electrolyte interphase (SEI) layer between the electrolyte and lithium metal, which is crucial for overall cell longevity.

These combined properties make these doped argyrodite electrolytes highly attractive for high-power and long-lifetime all-solid-state lithium metal batteries.

Background & Context

All-solid-state lithium metal batteries are considered the ultimate next-generation energy storage solution due to their potential for significantly higher energy densities and intrinsic safety compared to conventional liquid-electrolyte lithium-ion batteries. However, major barriers to their commercialization have been the poor interfacial stability between the lithium metal anode and the solid electrolyte, particularly the growth of lithium dendrites, and the need for solid electrolytes with sufficient ionic conductivity. Sulfide-based solid electrolytes have garnered significant attention due to their high ionic conductivity, but their synthesis and stability still require improvement. The solvent-based synthesis and strategic doping demonstrated in this research represent a crucial step towards overcoming these challenges and accelerating the practical application of all-solid-state lithium metal batteries.

Strategic Significance & Outlook

The successful synthesis of these F-doped Li argyrodite solid electrolytes marks a substantial advancement towards the commercialization of all-solid-state lithium metal batteries. Future work will likely involve integrating these materials into full cells (including cathode materials), conducting further long-term cycling stability tests, and optimizing cost-effective manufacturing processes for large-scale production. This technology has the potential to accelerate the adoption of next-generation batteries in a wide range of applications, including extending the driving range of electric vehicles and enhancing the battery life of portable electronic devices. The development of stable and high-performing solid electrolytes is an indispensable component in building a sustainable energy future.

#21 Dalian Institute of Chemical Physics Develops PVDF-Based Gel Composite Electrolyte Achieving Over 84% Capacity Retention After 350 Cycles for Solid-State Batteries

Published June 22, 2026 Electrek China

OVERVIEW

Researchers at the Dalian Institute of Chemical Physics, Chinese Academy of Sciences, have developed a new PVDF-based gel composite electrolyte for solid-state batteries, significantly enhancing ionic conductivity and durability. The battery incorporating this innovation retained over 84% of its capacity after 350 cycles. This breakthrough addresses challenges associated with hard and brittle sulfide-based electrolytes, which hinder bonding and conductivity in large-scale production, accelerating the commercialization of solid-state battery technology.

IN DEPTH

Key Findings

Researchers at the Dalian Institute of Chemical Physics, Chinese Academy of Sciences, have achieved a significant breakthrough in solid-state battery (SSB) technology by developing a novel polyvinylidene fluoride (PVDF)-based gel composite electrolyte. This innovation substantially improves both ionic conductivity and durability, with a battery incorporating the new electrolyte demonstrating excellent performance by retaining over 84% of its capacity after 350 cycles. This advancement is poised to address critical manufacturing challenges, such as poor interfacial contact and reduced conductivity, commonly associated with rigid and brittle sulfide-based electrolytes in large-scale production.

Technical / Clinical Details

The newly developed gel composite electrolyte primarily leverages a PVDF polymer matrix, strategically designed to overcome the limitations of existing solid electrolytes. While sulfide-based solid electrolytes boast high ionic conductivity, their inherent hardness and brittleness make it challenging to form stable, low-resistance interfaces with electrodes, posing a significant bottleneck for mass production. Furthermore, their rigidity makes them susceptible to mechanical stress and cracking during battery operation. The PVDF-based gel composite electrolyte offers a multifaceted solution:

- **Hybrid Electrolyte Architecture:** By combining a polymer matrix with components that facilitate ion transport, the electrolyte achieves a gel-like consistency, offering both high ionic conductivity and mechanical flexibility.
- **Improved Interfacial Contact:** The pliable nature of the gel composite allows for intimate contact with electrode surfaces, drastically reducing interfacial resistance compared to rigid solid-solid interfaces. This ensures efficient lithium-ion transport and lower internal battery resistance, enhancing power delivery.
- **Exceptional Durability and Cycle Life:** The prototype battery featuring this electrolyte maintained over 84% of its initial capacity after 350 charge-discharge cycles. This demonstrates robust long-term stability and durability, which are crucial for practical applications.

- **Addressing Sulfide Electrolyte Limitations:** The flexible gel composite effectively bypasses manufacturing difficulties such as the high-pressure pressing required for rigid sulfide electrolytes, and mitigates interfacial degradation issues that typically plague solid-solid interfaces during prolonged cycling.

This technology holds immense potential for reducing the manufacturing cost and enhancing the overall performance of all-solid-state batteries.

Background & Context

All-solid-state batteries are at the forefront of global research and development, envisioned as the key technology for electric vehicles (EVs) and next-generation electronic devices due to their promise of higher energy density and superior safety. However, the path to commercialization has been hindered by several challenges, including high interfacial resistance between the solid electrolyte and electrodes, manufacturing costs, and scalability. Sulfide-based solid electrolytes have attracted considerable attention for their high ionic conductivity, but their physical properties (hardness, brittleness) have impeded their transition to mass production. China's strategic drive for global leadership in battery technology makes this breakthrough particularly significant, as it enhances domestic technological capabilities and strengthens international competitiveness.

Strategic Significance & Outlook

The PVDF-based gel composite electrolyte presents a highly promising approach for the commercialization of solid-state batteries. Future research will focus on evaluating its long-term stability over even more cycles, testing compatibility with various cathode materials, and demonstrating performance in larger-format cells. Optimizing manufacturing processes and reducing costs will also be critical for widespread adoption. If successfully scaled, this technology could significantly extend EV range, accelerate charging times, and drastically reduce fire risks, thereby playing a pivotal role in accelerating the transition to a sustainable energy society.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQFiRQ01y1ftamMJ6DFDCNFNAOM72-cQzm-

VYnqD9TNQFkFe3jhIlxAzn_KBM8OOd2svJzinHL5wAX99kBvlaM6O26EmdOhHgLbv8sXbZQ4Kqhvl4qTTe8RKKTyJi
5arpz7_LVubrvUfB--3E=

#22 EU Horizon Europe Program Launches Integrated Support for Next-Gen Lithium-Based Battery Production and Development: From TRL 4-5 Prototypes to Mass Production Demonstration

Published June 26, 2026   European Commission (Funding & Tenders Portal)   EU

OVERVIEW

The Horizon Europe program has unveiled a new initiative to scale up next-generation lithium-based batteries (including semi and all-solid-state, Gen5) from cell prototypes (TRL 4-5) to demonstration of scalable production and module/pack integration. This program encompasses pilot production, process automation, system integration, advanced cell design, and supply chain development to maintain Europe's leadership in battery innovation for mobility. It aims to strengthen the competitiveness and sustainability of Europe's battery technology in the mobility sector.

IN DEPTH

Key Findings

The European Commission, under its Horizon Europe program, has announced a significant funding scheme to support integrated production and product development for next-generation lithium-based batteries, including semi-solid and all-solid-state (Generation 5) technologies. This initiative aims to elevate these advanced battery cells from TRL (Technology Readiness Level) 4-5 prototypes to demonstrated scalable production and full module/pack integration, reinforcing Europe's leadership in battery innovation for mobility applications.

Technical / Clinical Details

This Horizon Europe topic is designed to bolster Europe's entire battery value chain and contribute to sustainable mobility solutions. Specifically, it will fund projects in the following critical areas:

- **TRL Advancement:** Projects will focus on transitioning next-generation battery cell technologies from TRL 4-5 (laboratory-validated prototypes) to TRL 6-7 (demonstrated system prototypes in relevant environments).
- **Scalable Production Demonstration:** Support will be provided for the development of pilot production lines and the establishment of highly efficient, cost-effective manufacturing processes. This includes the integration of automation technologies and robust quality control systems.
- **Module and Pack Integration:** The initiative extends beyond individual cell technologies to cover the development and demonstration of technologies for modularizing cells and integrating them into vehicle-ready battery packs. This encompasses the integration of advanced Battery Management Systems (BMS).
- **Advanced Cell Design:** Emphasis will be placed on innovative cell designs that enhance key performance indicators such as energy density, safety, charging speed, and cycle life.
- **Supply Chain Development:** The program aims to support the establishment of a robust, localized battery supply chain within Europe, from raw material sourcing to recycling, reducing reliance on external markets.

The program fosters public-private partnerships, bringing together expertise from research institutions, universities, and industry to accelerate technological innovation.

Background & Context

The European Union is committed to its Green Deal goals of climate neutrality by 2050, with electromobility being a central pillar. Developing autonomous capabilities in battery technology and production is paramount for achieving these objectives and enhancing Europe's industrial competitiveness, especially as global demand for high-performance and safe batteries continues to soar. With significant advancements from Asian counterparts, large-scale funding programs like Horizon Europe are crucial for Europe to maintain its position at the forefront of battery innovation and secure strategic technological advantage. Investments in next-generation batteries, particularly semi-solid and all-solid-state (Gen5), are indispensable for shaping the future of mobility and energy systems.

Strategic Significance & Outlook

This Horizon Europe funding program is set to significantly accelerate the commercialization of next-generation battery technologies in Europe. The focus on TRL advancement and scalable production will facilitate rapid market entry of research outcomes, thereby strengthening Europe's industrial competitiveness. Over the coming years, innovative battery technologies developed through this program are expected to improve electric vehicle performance, alleviate charging infrastructure challenges, and ultimately drive the transition towards a more sustainable transportation system. Furthermore, strengthening the supply chain will contribute to Europe's economic security and technological sovereignty, playing a critical role in global energy transition efforts.

Source: https://vertexaisearch.cloud.google.com/grounding-api-redirect/AUZIYQGAj0EsAe7yAIhmQkAIWWeHVHACLErcsiB8KOaAzClEsyKTuGPfsGM4QQ6PQJojbZuIFhyt7mJ8j7C
SNqeQ9Nu6jeA7k9_-CYreNTemzWJDw_w2GrjkkDcOzjtmLCE-9XioCcusRJxmrYWiJLKnHJuNSpJkK90=

#23 U.S. Department of Energy Commits $3 Billion to Domestic Battery Manufacturing and Recycling Grants Program to Fortify North American Supply Chain

Published June 26, 2026 U.S. Department of Energy USA

OVERVIEW

The U.S. Department of Energy (DOE) is allocating $3 billion through its Battery Manufacturing and Recycling Grants Program to establish a viable domestic manufacturing and recycling capability for a North American battery supply chain. These grants support demonstration projects, construction of commercial-scale facilities, and retrofitting existing facilities. Annually appropriated with $600 million from fiscal years 2022 through 2026 under the Bipartisan Infrastructure Law, this initiative is crucial for bolstering U.S. battery industry independence and competitiveness.

IN DEPTH

Key Findings

The U.S. Department of Energy (DOE) has committed a substantial $3 billion through its Battery Manufacturing and Recycling Grants Program to establish a robust domestic manufacturing and recycling capability for a North American battery supply chain. This comprehensive program aims to bolster U.S. independence and competitiveness in the battery sector by supporting demonstration projects, the construction of commercial-scale facilities, and the retrofitting or retooling of existing facilities across the country.

Technical / Clinical Details

The grant program strategically targets investments across the entire battery lifecycle, with a focus on several key technical and infrastructural aspects:

- **Manufacturing Capacity Expansion:** Support for building or expanding facilities that produce battery cells, modules, and packs for both current lithium-ion technologies and next-generation battery chemistries (e.g., solid-state batteries). This aims to position the U.S. as a leading producer of advanced battery products.
- **Recycling Infrastructure Development:** Funding for the development and deployment of recycling facilities capable of efficiently recovering valuable materials such as lithium, nickel, cobalt, and manganese from end-of-life batteries. This promotes a sustainable circular economy and enhances the stability of raw material supply chains.
- **Domestic Supply Chain Fortification:** Efforts to strengthen the domestic production capacity for intermediate materials, components, and equipment necessary for battery manufacturing, thereby increasing the resilience of the entire supply chain and mitigating geopolitical risks.
- **Innovation Support:** Indirect support for research and development projects focused on manufacturing process innovations, new material development, and enhancements in battery performance and safety.

The funding, provided under the Bipartisan Infrastructure Law (IIJA), allocates $600 million annually from fiscal years 2022 through 2026. This sustained investment facilitates long-term industrial planning and infrastructure development.

Background & Context

The United States faces burgeoning demand for batteries driven by the rapid expansion of the electric vehicle (EV) market and the imperative of transitioning to renewable energy sources. Historically, the battery supply chain has been heavily reliant on foreign nations, particularly China. This external dependence has created vulnerabilities in the supply chain, raised economic security concerns, and potentially hampered climate change mitigation efforts. The DOE's grant program directly addresses these challenges, forming a pivotal component of a national effort to establish U.S. global leadership in battery technology and manufacturing. Establishing domestic battery production and recycling capabilities is expected to create millions of jobs, accelerate the clean energy economy, and ultimately benefit consumers by offering more secure and sustainable energy solutions.

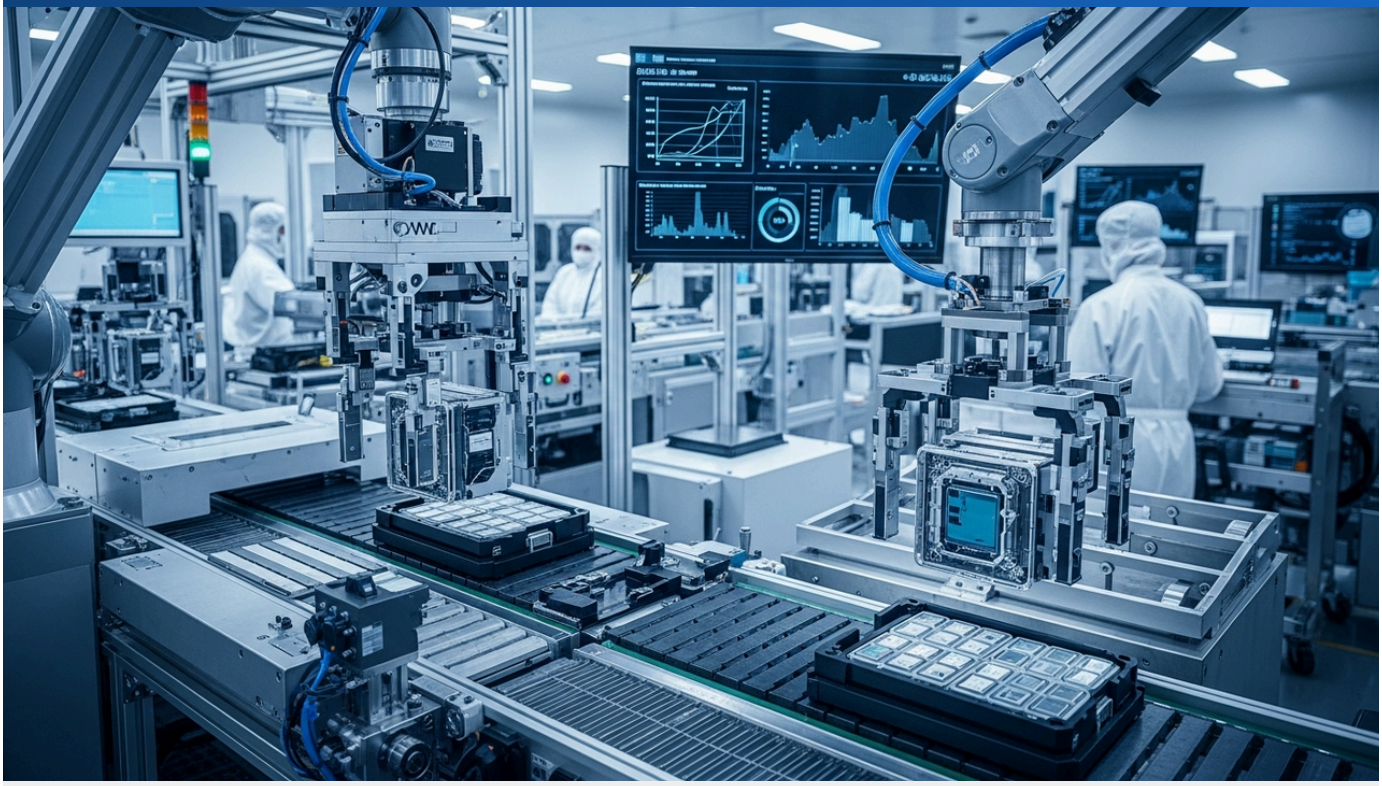
Strategic Significance & Outlook

This $3 billion DOE grant program will play a crucial role in shaping the future of the U.S. battery industry. Over the next few years, numerous projects leveraging this funding are expected to advance the construction and expansion of domestic battery manufacturing and recycling facilities, contributing significantly to job creation and economic growth. As next-generation technologies like all-solid-state batteries transition to commercialization, the establishment of a robust domestic supply chain will be a critical foundation for their rapid adoption in the U.S. market. The program is an integral part of a long-term investment strategy to position the U.S. as a global leader in the clean energy industrial sector, ensuring a more sustainable and energy-secure future.

Source: https://www.energy.gov/cmei/manufacturing/battery-manufacturing-and-recycling-grants

#24 Toyota Achieves Stable Yields and Enhanced Cell Consistency in Solid-State Battery Pilot Line for EVs

Published June 25, 2026 Nikkei Asia Japan



OVERVIEW

Toyota has announced significant progress in its solid-state battery pilot production line, reporting stable yields and improved cell consistency for its next-generation EV models. The company plans a phased commercialization, targeting initial deployment in high-performance niche vehicles before broader market integration. This milestone stems from extensive R&D focusing on sulfide-based solid electrolytes and advanced manufacturing techniques, marking a crucial step towards scalable solid-state battery production.

IN DEPTH

Key Findings

Toyota Motor Corporation has announced a pivotal advancement in its solid-state battery pilot production line, reporting the achievement of stable yields and enhanced cell consistency for its next-generation electric vehicle (EV) models. This milestone represents a significant step towards the mass production of all-solid-state batteries, culminating extensive research and development efforts particularly focused on sulfide-based solid electrolytes and advanced manufacturing techniques. The company plans a phased commercialization strategy, with initial deployment targeting high-performance niche vehicles before broader market integration.

Technical and Manufacturing Details

The progress stems primarily from the successful implementation of sulfide-based solid electrolytes and sophisticated processing techniques for their efficient manufacturing. Sulfide solid electrolytes are recognized for their high ionic conductivity and inherent flexibility, offering superior energy density and safety advantages. Toyota has overcome complex technical challenges in electrolyte layer formation, electrode interface optimization, and overall cell assembly, leading to the consistent production of high-quality cells. This significant reduction in cell-to-cell variability paves the way for building reliable and high-performance battery packs.

Background and Industry Context

The current EV market urgently demands extended range, faster charging, and improved safety profiles. All-solid-state batteries, which eliminate flammable liquid electrolytes, are seen as a transformative technology beyond the limits of traditional lithium-ion batteries, promising both reduced fire risk and substantially higher energy density. Toyota has consistently invested heavily in solid-state battery R&D, and this achievement in pilot production underscores its emerging technological leadership. The initial market penetration is expected in high-performance segments like sports cars and premium EVs, where the early adoption of higher-cost, cutting-edge technology is more feasible.

Strategic Significance and Outlook

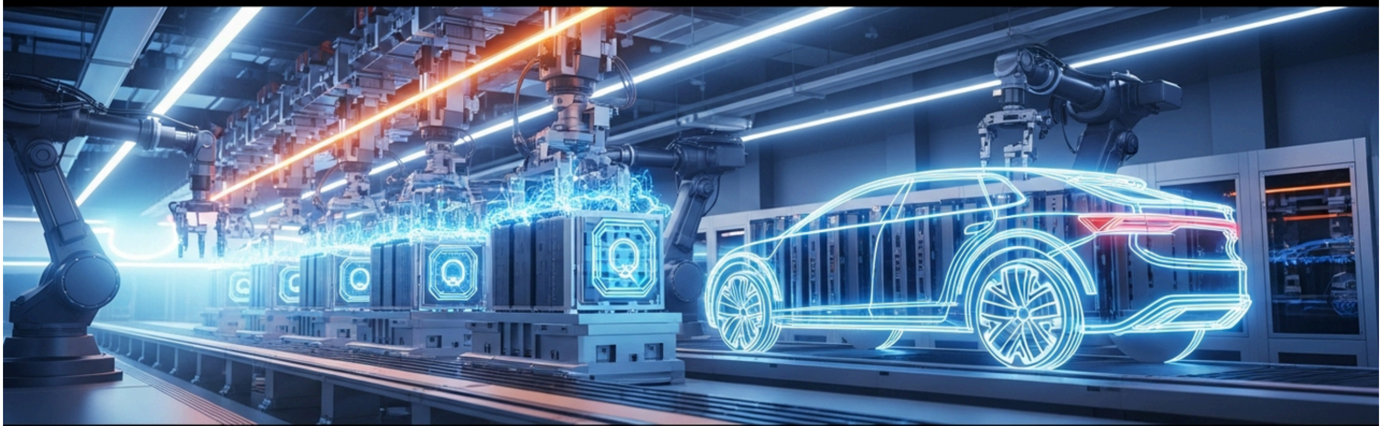
Building on this pilot line success, Toyota is set to accelerate its roadmap towards full commercialization of solid-state batteries. The immediate next steps involve validating the technology and optimizing cost structures through deployments in niche markets. Subsequently, the company intends to gradually scale up battery production to enable wider application across the broader EV market. Should this technology achieve widespread adoption, it is poised to dramatically elevate EV performance and safety benchmarks, making a profound contribution to the realization of sustainable mobility.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#25 QuantumScape Secures $300M Series F Funding to Accelerate Solid-State Battery Production Scale-Up

Published June 24, 2026 TechCrunch USA



OVERVIEW

QuantumScape, a leader in solid-state battery technology, has successfully closed a $300 million Series F funding round, backed by a consortium of new and existing institutional investors. This capital infusion is designated for expediting the scale-up of its QS-0 pre-production facility and funding the development of its larger QS-1 commercial production line, in collaboration with Volkswagen. The company aims to deliver B-samples to OEM partners by late 2026, marking a critical step towards commercialization.

IN DEPTH

Key Findings

QuantumScape, a frontrunner in solid-state battery technology, has successfully closed a Series F funding round, securing an additional $300 million. This significant capital injection, led by a consortium of existing and new institutional investors, is strategically earmarked to accelerate the scale-up of its QS-0 pre-production facility and to finance the development of its larger QS-1 commercial production line, a critical initiative in partnership with Volkswagen.

Funding Allocation and Production Strategy

The $300 million will primarily be directed towards enhancing production infrastructure and advancing technology scaling. The QS-0 facility focuses on optimizing pre-production processes and quality control, while the QS-1 line is designed for commercial-scale manufacturing tailored for the automotive industry. QuantumScape's proprietary ceramic solid-electrolyte technology aims to deliver high energy density, superior safety, and rapid charging capabilities. This funding surge is expected to enable the company to meet its target of delivering B-samples to OEM partners by late 2026, a crucial validation phase before full-scale production.

Background and Industry Context

The burgeoning electric vehicle (EV) market is driving an urgent demand for safer, higher-performance battery technologies. Solid-state battery developers like QuantumScape are at the forefront of this shift, offering solutions that promise to overcome the limitations of conventional liquid lithium-ion batteries, particularly concerning range, charging speed, and thermal stability. The robust partnership with Volkswagen is instrumental in facilitating the rapid integration of this advanced technology into automotive platforms and accelerating its path to mass market adoption. This funding round is a strategic move to overcome manufacturing scalability challenges and expedite market entry.

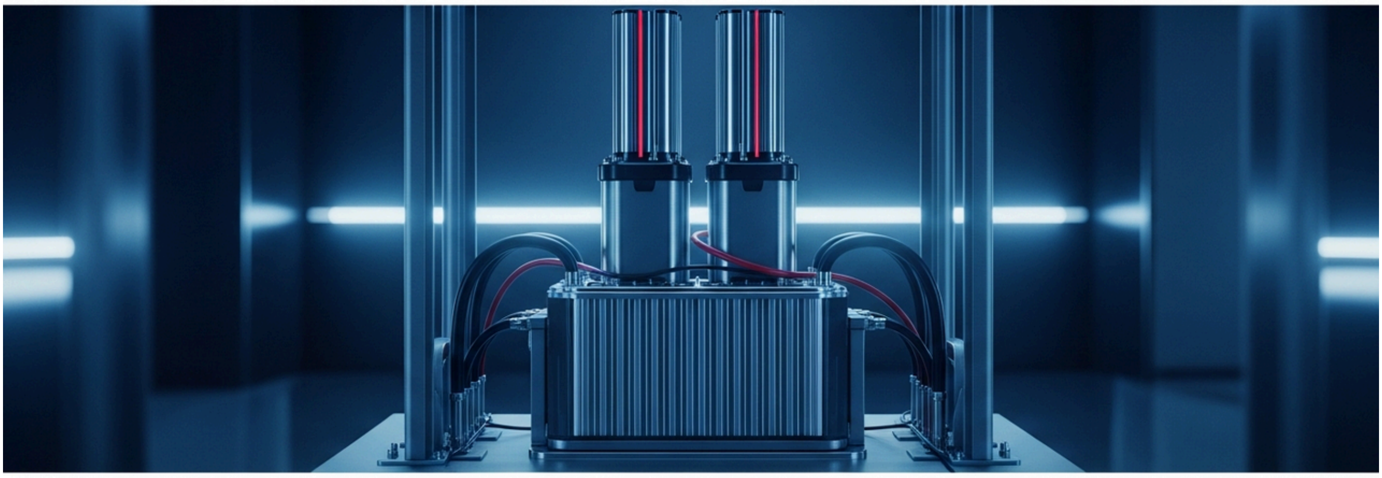
Strategic Significance and Outlook

This latest funding round strengthens QuantumScape's foundation for establishing a dominant position in the solid-state battery market. The expansion of both QS-0 and QS-1 facilities is aimed at demonstrating the reliability and reproducibility of its technology, paving a clear path to commercial production. The delivery of B-samples to OEM partners represents a final evaluation phase before mass deployment; successful validation would bring the widespread adoption of solid-state batteries in high-performance EVs significantly closer. Such an advancement could lead to a transformative leap in EV performance, making them more attractive to a broader consumer base and accelerating the global transition to electric mobility.

Source: #

#26 Samsung SDI Unveils All-Solid-State Battery Prototype with Over 950 Wh/L Energy Density

Published June 23, 2026 The Korea Economic Daily South Korea



OVERVIEW

Samsung SDI has unveiled a new all-solid-state battery prototype, demonstrating a significant energy density exceeding 950 Wh/L and enhanced cycle life. This prototype integrates a proprietary oxide solid electrolyte and a silver-carbon composite anode, effectively mitigating lithium dendrite formation and interfacial resistance. The company plans to initiate pilot production for strategic partners by 2027, accelerating the path to high-performance, safer EV batteries.

IN DEPTH

Key Findings

Samsung SDI has unveiled a groundbreaking all-solid-state battery prototype, showcasing a remarkable energy density exceeding 950 Wh/L, coupled with significantly improved cycle life characteristics. This advancement signals a pivotal leap forward in battery performance for electric vehicles (EVs) and other energy storage applications. The company has articulated its intention to commence pilot production with strategic partners by 2027, thereby accelerating its trajectory towards commercialization.

Technical Details

The novel prototype features Samsung SDI's proprietary oxide solid electrolyte combined with a silver-carbon composite anode, specifically engineered to suppress the formation of lithium dendrites—a common challenge in lithium metal batteries. Oxide solid electrolytes are highly regarded for their inherent safety and stability, while the silver-carbon composite anode effectively reduces interfacial resistance and inhibits dendrite growth during charge-discharge cycles, thereby enhancing battery lifespan and reliability. This synergistic combination enables the achievement of both high energy density and extended cycle life.

Background and Industry Context

All-solid-state batteries are the focus of an intense global race, recognized as the next-generation battery technology capable of surmounting the safety risks (fire hazards) associated with liquid electrolytes in current lithium-ion batteries, as well as their limitations in energy density and cycle life. Samsung SDI has consistently been at the forefront of battery innovation, and this prototype announcement reaffirms its technological leadership, especially by achieving a world-class energy density. The effective mitigation of dendrite formation and interfacial resistance, two major hurdles for solid-state battery commercialization, is a particularly significant aspect of this breakthrough.

Strategic Significance and Outlook

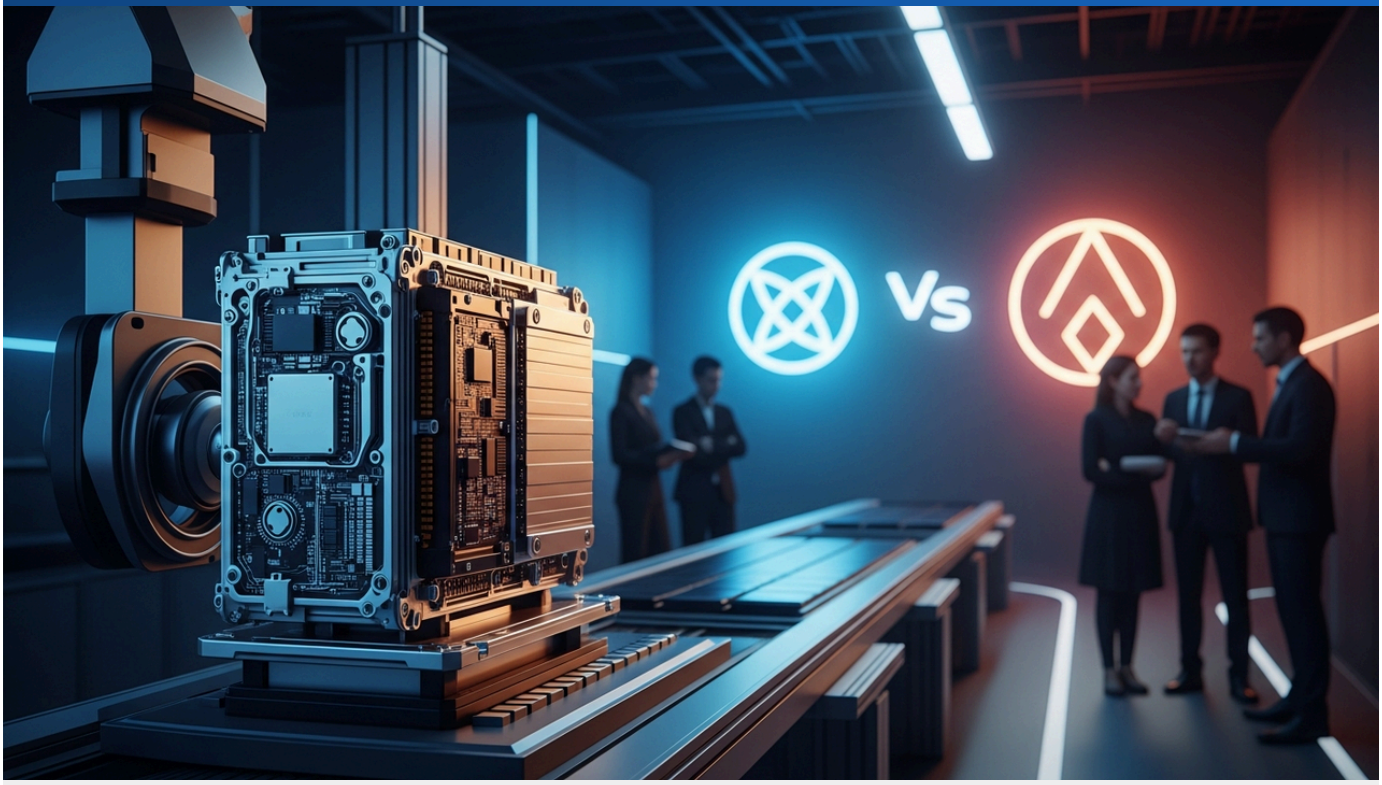
Samsung SDI's groundbreaking achievement strongly suggests that the commercialization of all-solid-state batteries is rapidly approaching. The planned pilot production commencement in 2027 represents a critical step towards mass manufacturing, with final validation and integration to be pursued through collaborations with automotive manufacturers and other industrial partners. The introduction of this technology into EVs could dramatically extend driving ranges, reduce charging frequency, and enhance safety compared to current batteries, thereby further accelerating EV adoption. Moreover, it holds substantial promise for broader applications, including renewable energy storage systems.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#27 ProLogium Forges Strategic Partnership with European Automaker for Solid-State Battery Module Supply

Published June 22, 2026 Business Wire Taiwan



OVERVIEW

Taiwanese solid-state battery developer ProLogium announced a strategic partnership with a major European automaker for the supply of its proprietary solid-state battery modules. The collaboration will integrate ProLogium's MAB (Multi-Axis BiPolar+) solid-state battery technology into future EV platforms, with initial validation samples expected this year. This agreement signifies a significant step towards accelerating the commercialization of solid-state batteries in the European electric vehicle market.

IN DEPTH

Key Findings

ProLogium, an innovative Taiwanese solid-state battery developer, has announced a new strategic partnership with a major European automotive manufacturer (name undisclosed) for the supply of its proprietary solid-state battery modules. This collaboration entails co-development efforts to integrate ProLogium's MAB (Multi-Axis BiPolar+) solid-state battery technology into future electric vehicle (EV) platforms. Initial samples are anticipated for validation later this year, marking a critical step toward accelerating the commercialization of solid-state batteries in the European market.

Technology and Partnership Details

ProLogium's MAB technology features a unique bipolar design that distinguishes it from conventional battery structures, offering higher energy density, enhanced safety, and optimized thermal management capabilities. This modular approach provides flexibility in EV design, contributing to more compact and lighter battery packs. Under this partnership, joint engineering efforts will focus on adapting ProLogium's advanced solid-state battery modules for the European automaker's next-generation EVs. This ensures seamless integration of the technology into vehicles and compliance with stringent European automotive standards.

Background and Industry Context

The global automotive industry is rapidly accelerating its shift towards electrification, with battery technology at the core of EV performance and adoption. Solid-state batteries are widely anticipated as the ultimate solution to address current lithium-ion battery limitations concerning range, charging speed, and safety. Europe, driven by tightening environmental regulations and a rapidly expanding EV market, is particularly proactive in adopting advanced battery technologies. ProLogium's partnership with a leading European automaker is strategically vital for establishing an Asian company's presence in the European market and strengthening the supply chain for next-generation EV development.

Strategic Significance and Outlook

This partnership represents a crucial opportunity for ProLogium to accelerate the practical application and market penetration of its technology. The success of co-development and initial sample validation with a European automaker will underscore the reliability and performance of the MAB solid-state battery technology, potentially leading to larger-scale production contracts. This collaboration is expected to provide European EV consumers with safer, higher-performance, and longer-range vehicles. In the long term, this alliance is poised to contribute to cost reduction and production efficiency improvements for solid-state batteries, further driving the transformation of the entire EV market.

Source: #

#28 Novel Halide Solid Electrolyte Achieves Record 25 mS/cm Ionic Conductivity at Room Temperature

Published June 21, 2026 Nature Energy Global

OVERVIEW

Researchers have published a landmark study in Nature Energy on a novel halide solid electrolyte, exhibiting an unprecedented ionic conductivity of 25 mS/cm at room temperature. This material also demonstrates excellent chemical stability with lithium metal anodes and cathodes, directly addressing critical limitations in existing solid-state battery materials. This breakthrough could enable the development of high-performance, long-cycle-life all-solid-state batteries, significantly advancing EV and energy storage technologies.

IN DEPTH

Key Findings

A team of researchers from an international consortium of universities has published groundbreaking findings in *Nature Energy*, detailing a novel halide solid electrolyte composition that exhibits an unprecedented ionic conductivity of 25 mS/cm at room temperature. This exceptional conductivity significantly surpasses that of current state-of-the-art solid electrolytes, signaling a major leap forward for the practical implementation of all-solid-state batteries.

Technical and Research Details

The developed halide solid electrolyte possesses a unique crystal structure conducive to efficient lithium-ion transport, making such high room-temperature conductivity a rare achievement. Furthermore, the material has demonstrated excellent chemical stability when interfaced with both lithium metal anodes and cathodes. This stability is crucial for suppressing detrimental side reactions and degradation at the electrode-electrolyte interface, which in turn enhances the battery's long-term cycle life and overall safety. Traditionally, halide solid electrolytes have lagged behind sulfide-based counterparts in conductivity, making this discovery a significant overcoming of these prior limitations.

Background and Industry Context

All-solid-state batteries are lauded as the 'holy grail' of next-generation battery technology due to their potential for superior safety, higher energy density, and longer lifespan. However, their commercialization has been hampered by key barriers, particularly low ionic conductivity in solid electrolytes, high interfacial resistance with electrodes, and elevated manufacturing costs. This discovery of a high-performance halide solid electrolyte directly addresses the conductivity challenge, offering a new material paradigm for solid-state battery design. This opens avenues for a wide range of applications, including high-performance EVs, portable electronics, and grid-scale energy storage.

Strategic Significance and Outlook

This research breakthrough sets a new direction for all-solid-state battery R&D and is expected to stimulate further innovation in materials science and electrochemistry. The immediate priorities involve further optimization of this high-conductivity halide solid electrolyte and the development of scalable manufacturing processes. In the long term, all-solid-state batteries incorporating this material are anticipated to significantly outperform current lithium-ion batteries, dramatically extending electric vehicle ranges and providing safer energy storage solutions, thereby making a substantial contribution to a sustainable society.

Source: #

#29 Solid Power Confirms Gen2 Solid-State Cell Production for BMW and Ford Automotive Qualification

Published June 20, 2026 GlobeNewswire USA

OVERVIEW

Solid Power has provided an update on its Gen2 all-solid-state battery cell development, confirming consistent production from its pilot line for ongoing automotive qualification testing with BMW and Ford. Internal tests demonstrate improved performance, including enhanced power output and thermal stability, critical for meeting stringent automotive safety standards. The company remains on track for commercialization in the late 2020s, paving the way for safer, higher-performing electric vehicles.

IN DEPTH

Key Findings

Solid Power, a developer of all-solid-state batteries, has provided a significant update on the progress of its Gen2 all-solid-state battery cells. The company has confirmed that its pilot production line is consistently producing cells for ongoing automotive qualification testing with its strategic partners, BMW and Ford. This development marks a crucial milestone in Solid Power's roadmap towards the commercialization of next-generation EV batteries, promising enhanced performance and safety.

Technical and Testing Details

Solid Power's Gen2 cells are based on sulfide-based solid electrolytes, which are expected to offer superior safety and energy density compared to traditional liquid lithium-ion batteries. The company highlighted successful internal testing, which demonstrated substantial improvements in the Gen2 cell's performance metrics. Specifically, enhanced power output and superior thermal stability—maintaining stability even under demanding conditions—were verified. These improvements are critical for meeting the stringent safety and durability standards imposed by the automotive industry, thereby building confidence for future integration into electric vehicles. The collaborative qualification testing with BMW and Ford is designed to validate real-world automotive performance.

Background and Industry Context

All-solid-state batteries are garnering significant attention from automotive manufacturers and battery developers globally as a key technology to accelerate the adoption of electric vehicles. Solid Power has been an early pioneer in solid-state battery technology, seeking to commercialize its innovations through partnerships with leading automakers. This latest report signifies that these partnerships are yielding concrete results, with the technology transitioning from laboratory development to pre-production scaling. The automotive industry broadly anticipates that solid-state batteries will deliver extended driving ranges, faster charging capabilities, and critically, enhanced safety.

Strategic Significance and Outlook

Solid Power emphasizes that the commercialization of its Gen2 cells remains on track for the late 2020s. Successful completion of the qualification testing with BMW and Ford will open the door for broader adoption across various automotive platforms. When introduced into the EV market, this technology will offer consumers safer and more reliable vehicles, while enabling automakers to establish a competitive edge. The company plans to leverage this pilot production experience to further expand manufacturing capacity and optimize costs, aiming to accelerate the mass production and widespread adoption of all-solid-state batteries.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#30 CATL Pours Over $2 Billion into Semi-Solid Battery Production Expansion, Targeting 2028 Operation

Published June 19, 2026 Reuters China

OVERVIEW

Chinese battery behemoth CATL announced substantial new investments exceeding $2 billion to significantly expand its production capacity for semi-solid-state batteries. This strategic expansion aims to meet surging demand from major EV manufacturers, particularly for high-end electric vehicles requiring superior energy density and safety. The new production lines are projected to be operational by early 2028, poised to bolster CATL's market dominance in the advanced battery sector.

IN DEPTH

Key Findings

CATL, the world's largest battery manufacturer based in China, has announced a significant new investment totaling over $2 billion for the expansion of its semi-solid-state battery production capacity. This strategic capital injection is aimed at addressing the escalating demand from major electric vehicle (EV) manufacturers, particularly for high-end EVs that require enhanced energy density and safety beyond the capabilities of traditional lithium-ion batteries. CATL anticipates these new production lines will commence operations by early 2028, substantially boosting its market share in the advanced battery sector.

Investment and Production Strategy

The investment of over $2 billion will be primarily allocated to expanding existing manufacturing facilities and constructing new lines specifically dedicated to the mass production of semi-solid-state batteries. Semi-solid batteries utilize electrolytes that are a hybrid between liquid and solid, optimizing the balance between safety and energy density. CATL plans to leverage its proprietary technologies to streamline the production processes and scale up manufacturing, thereby solidifying its position in the global supply chain. The target operational date of early 2028 reflects the company's commitment to rapidly respond to the fast-evolving demands of the EV market.

Background and Industry Context

In the global push towards electrification, battery technology remains a core determinant of EV competitiveness. As demands for longer driving ranges intensify, higher energy density batteries are crucial, but safety considerations are equally paramount. Semi-solid-state batteries are gaining traction among many automakers as a viable interim solution towards full solid-state technology. As the world's leading EV battery supplier, CATL's substantial investment in this area is designed to maintain its technological leadership and market dominance.

Strategic Significance and Outlook

This massive investment by CATL is expected to further intensify competition within the global battery industry, particularly in the semi-solid-state segment. Following the operational launch of its new production lines in early 2028, CATL is poised to bolster supplies to major EV manufacturers and expand its presence in the high-performance EV market. This will contribute to improving EV performance and cost efficiency, offering consumers more attractive and safer options. In the long term, the progress in semi-solid-state battery technology is anticipated to clarify the pathway towards the eventual widespread adoption of full solid-state batteries.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#31 Nio and WeLion Collaborate on 1,100km+ Range Hybrid Semi-Solid Battery for ET7 Refresh

Published June 18, 2026 Electrek China

OVERVIEW

Nio and battery partner WeLion are reportedly co-developing an upgraded hybrid solid-liquid electrolyte battery pack for the Nio ET7 sedan, targeting a CLTC range exceeding 1,100 km. This new battery is expected to enhance charging speeds and cold-weather performance through a refined semi-solid electrolyte and advanced packaging. The collaboration highlights a strategic industry effort to bridge the technological gap towards full solid-state solutions, offering a substantial performance upgrade for next-generation EVs.

IN DEPTH

Key Findings

Chinese EV manufacturer Nio and its battery partner WeLion are reportedly collaborating on the development of an upgraded hybrid solid-liquid electrolyte battery pack for a refreshed version of the Nio ET7 sedan. This new battery aims to achieve an impressive driving range of over 1,100 km under the China Light-Duty Vehicle Test Cycle (CLTC) standard. Significantly, the battery is expected to deliver enhanced charging speeds and superior cold-weather performance compared to current-generation EV batteries, primarily leveraging refined semi-solid electrolyte and advanced packaging technologies.

Technical and Development Details

This hybrid solid-liquid electrolyte battery combines the advantages of both liquid and solid electrolytes to achieve a balance of high energy density and excellent safety. WeLion specializes in advanced semi-solid electrolyte technology, which is crucial for improving the battery's stability and efficiency. Furthermore, advanced packaging techniques are employed to optimize the overall thermal management of the battery pack, contributing to reduced heat generation during charging and mitigating performance degradation in low-temperature environments. The target range of over 1,100 km (CLTC) positions this battery among the top performers in the current market, significantly enhancing the practicality of EVs for consumers.

Background and Industry Context

As competition intensifies in the EV market, driving range and charging performance remain paramount factors influencing consumer choices. Current lithium-ion batteries are nearing their performance plateau, while a transition to all-solid-state batteries is considered a long-term goal. The collaboration between Nio and WeLion clearly demonstrates the critical role that semi-solid batteries play as a 'bridge technology' until full solid-state batteries become commercially viable. Nio has already innovated with its Battery-as-a-Service (BaaS) model, and this high-performance battery will further strengthen its service offerings.

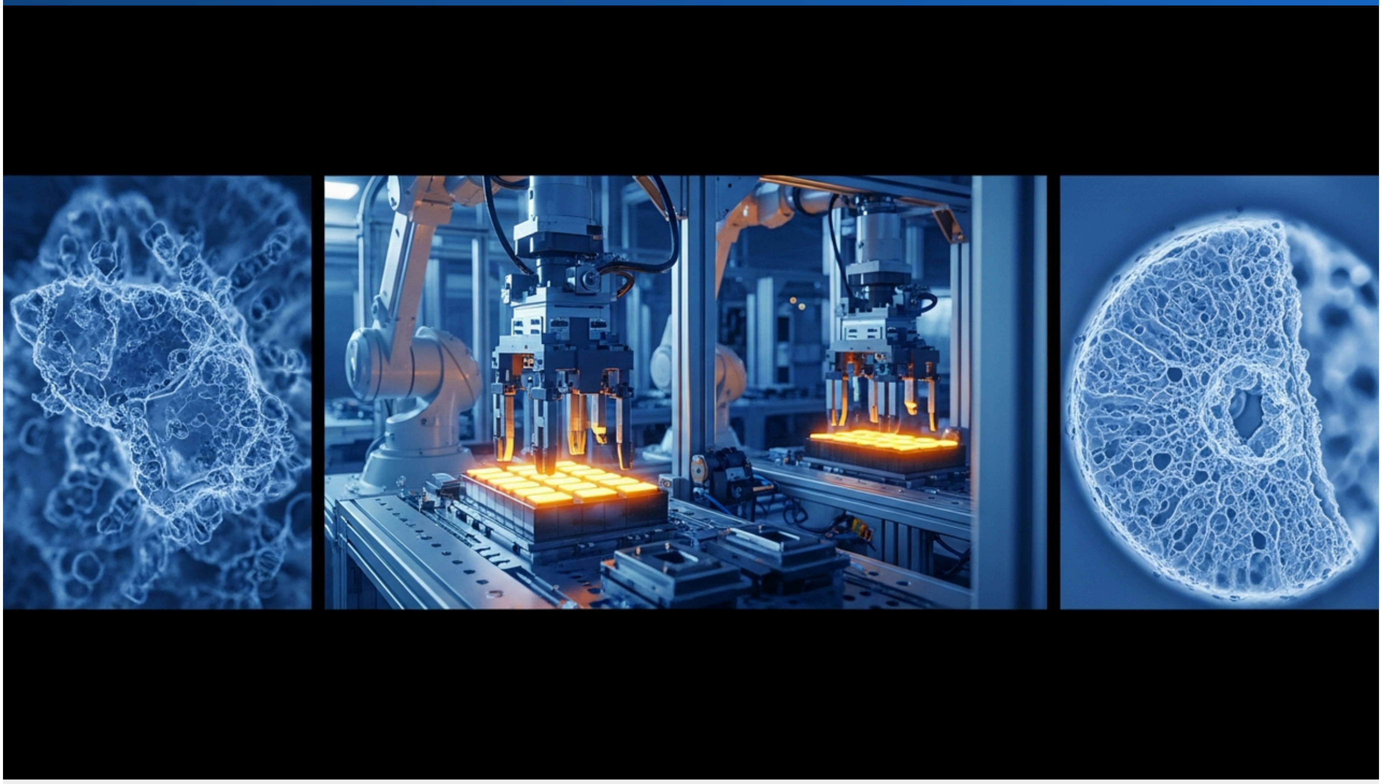
Strategic Significance and Outlook

The integration of this advanced battery into the refreshed Nio ET7 sedan is expected to significantly boost Nio's competitiveness and solidify its position in the high-end EV market. Improvements in charging speed and cold-weather performance will particularly enhance convenience for EV users in colder regions, thereby promoting broader EV adoption. In the long term, the development experience gained from this hybrid solid-liquid electrolyte battery is anticipated to provide invaluable insights for the future development and mass production of full solid-state batteries. This initiative underscores China's burgeoning leadership in EV and battery technology on a global scale.

Source: #

#32 U.S. DOE Awards $150 Million Grant to Solid-State Battery Manufacturing Consortium

Published June 26, 2026 U.S. Department of Energy (DOE) USA



OVERVIEW

The U.S. Department of Energy (DOE) has awarded a $150 million grant to a newly established consortium of universities, national laboratories, and industrial partners, aimed at accelerating domestic solid-state battery manufacturing. The funding will bolster research into scalable production processes, supply chain development, and advanced characterization for both sulfide and oxide-based solid electrolytes. This initiative is designed to fortify U.S. leadership in next-generation battery technology, critical for energy independence and EV adoption.

IN DEPTH

Key Findings

The U.S. Department of Energy (DOE) has announced a significant award of $150 million in grants to a newly formed consortium comprising universities, national laboratories, and industrial partners. This substantial funding is aimed at accelerating domestic manufacturing capabilities for solid-state batteries, representing a critical step to bolster the supply chain and establish the United States as a global leader in this next-generation battery technology.

Grant Utilization and Technical Focus

The $150 million grant will target several pivotal areas within solid-state battery manufacturing. Specifically, it will support research and development into scalable production processes for both sulfide and oxide-based solid electrolytes, the establishment of robust domestic supply chains, and the advancement of sophisticated characterization techniques. These technical focuses are essential for overcoming challenges related to performance enhancement, cost reduction, and mass production of solid-state batteries. The consortium aims to accelerate the transition of research findings into practical applications, from fundamental research to applied development and pilot production.

Background and Policy Context

The U.S. government is increasingly investing in clean energy technologies, particularly battery innovations, driven by objectives related to energy security, climate change mitigation, and bolstering economic competitiveness. Solid-state batteries hold immense promise, offering potentially higher energy density, superior safety, and longer lifespans compared to current lithium-ion batteries. They are anticipated for wide-ranging applications across electric vehicles (EVs), renewable energy storage, and national defense. The DOE's grant is part of a broader national strategy to foster 'Made in America' battery production and innovation, aiming to establish an independent supply chain less reliant on foreign nations.

Strategic Significance and Outlook

This $150 million grant from the DOE is poised to provide a substantial boost to the solid-state battery R&D ecosystem within the U.S. By pooling diverse expertise and resources across the consortium, technical breakthroughs are expected to accelerate, leading to reduced production costs and improved performance. In the future, this investment is anticipated to revolutionize the U.S. EV industry and energy storage sector, proving indispensable in establishing U.S. competitiveness in the global arena. Long-term, this technology is expected to contribute significantly to both achieving climate change targets and fostering economic growth.

Source: #

#33 Anode-Free Solid-State Battery Achieves Over 500 Stable Cycles with Novel Interfacial Layer

Published June 25, 2026 Advanced Energy Materials Global

OVERVIEW

A research team has published groundbreaking findings in Advanced Energy Materials, demonstrating over 500 stable cycles with minimal capacity fade in anode-free solid-state batteries at high current densities. The innovation relies on a novel interfacial layer design between the lithium metal current collector and the solid electrolyte, which effectively suppresses dendrite formation and boosts Coulombic efficiency. This breakthrough promises simplified battery manufacturing and higher energy density, accelerating next-generation battery development.

IN DEPTH

Key Findings

A research team has published groundbreaking findings in *Advanced Energy Materials*, showcasing a significant breakthrough in anode-free solid-state battery technology. The study demonstrates over 500 stable charge-discharge cycles with minimal capacity fade, even at high current densities. This pivotal advancement stems from a novel interfacial layer design introduced between the lithium metal current collector and the solid electrolyte, which holds the potential to maximize battery energy density while simplifying the manufacturing process of all-solid-state batteries.

Technical and Research Details

Anode-free batteries represent the ultimate configuration for achieving ultra-high energy density, but their primary challenge has been the formation of lithium dendrites (tree-like structures) on the lithium metal anode surface during cycling, leading to short circuits and capacity degradation. The novel interfacial layer developed in this research effectively promotes uniform lithium deposition and dissolution, thereby suppressing dendrite formation. This leads to a substantial improvement in Coulombic efficiency (the ratio of discharged to charged capacity) and dramatically extends the battery's cycle life. Specifically, overcoming the long-standing instability issues of previous anode-free batteries and achieving over 500 stable cycles marks a significant step towards practical application.

Background and Industry Context

All-solid-state batteries are highly anticipated as a next-generation technology to surpass the limitations of existing lithium-ion batteries in applications such as electric vehicles (EVs), portable electronics, and stationary energy storage. Anode-free designs, by eliminating the need for anode host materials, theoretically maximize battery energy density to the highest levels, simultaneously contributing to cost reduction and simplified manufacturing processes. However, the dendrite problem has been a persistent challenge. This breakthrough offers a practical solution to this formidable barrier, opening new possibilities for enhancing the range and safety of EVs.

Strategic Significance and Outlook

This research outcome significantly propels the commercialization of anode-free solid-state batteries forward. The novel interfacial layer technology enhances battery design flexibility and establishes a crucial foundation for realizing future high-energy-density batteries. Further research and development will be necessary to validate the scalability of this technology and its long-term reliability under various operating conditions. If successful, it could enable lighter and more compact battery packs, substantially extending the range of electric vehicles and contributing to the widespread adoption of more sustainable and safer energy storage solutions.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#34 Japanese Chemical Firm Develops and Pilots High-Purity Precursor for Sulfide Solid Electrolytes

Published Published June 24, 2026   日本経済産業新聞   Japan

OVERVIEW

A major Japanese chemical company has successfully developed and commenced pilot-scale production of a novel high-purity precursor material crucial for sulfide-based solid electrolytes. Engineered to minimize impurities that degrade ionic conductivity and stability, this innovation promises to enhance the consistency and performance of solid-state battery manufacturing. This strategic move aims to fortify the supply chain for next-generation solid-state battery components and accelerate their widespread commercialization.

IN DEPTH

Background and Industry Context

Solid-state batteries are poised to revolutionize energy storage, offering substantial advantages over conventional liquid lithium-ion batteries, including inherently lower fire risk, higher energy density, and extended cycle life. These characteristics make them highly anticipated for critical applications such as electric vehicles (EVs) and large-scale renewable energy storage systems. However, pervasive challenges like high manufacturing costs and inconsistencies in solid electrolyte quality have significantly hampered their path to mass production. Japan's chemical industry holds a global leadership position in developing high-performance materials, and this specific advancement in precursor materials is deemed indispensable for fortifying the entire solid-state battery supply chain and accelerating its commercialization.

Key Innovation and Technical Details

A leading Japanese chemical firm has announced the successful development and subsequent pilot-scale production of a novel high-purity precursor material specifically engineered for sulfide-based solid electrolytes—a critical component of next-generation solid-state batteries. This innovative material is designed to significantly enhance the consistency of electrolyte manufacturing processes and effectively mitigate impurities known to impair ionic conductivity and overall electrochemical stability.

Achieving superior quality, the precursor material leverages a proprietary chemical synthesis route combined with advanced purification techniques. This approach successfully minimizes trace impurities that detrimentally affect the performance of sulfide solid electrolytes. The result is an enhanced uniformity of the final solid electrolyte layer and a reduction in interfacial resistance at the electrode-electrolyte interface, directly contributing to improved overall performance and reliability of solid-state batteries. The initiation of pilot production marks a crucial transition from laboratory-scale research to a commercial-demonstration phase, with rigorous quality control and optimized production efficiency as paramount objectives.

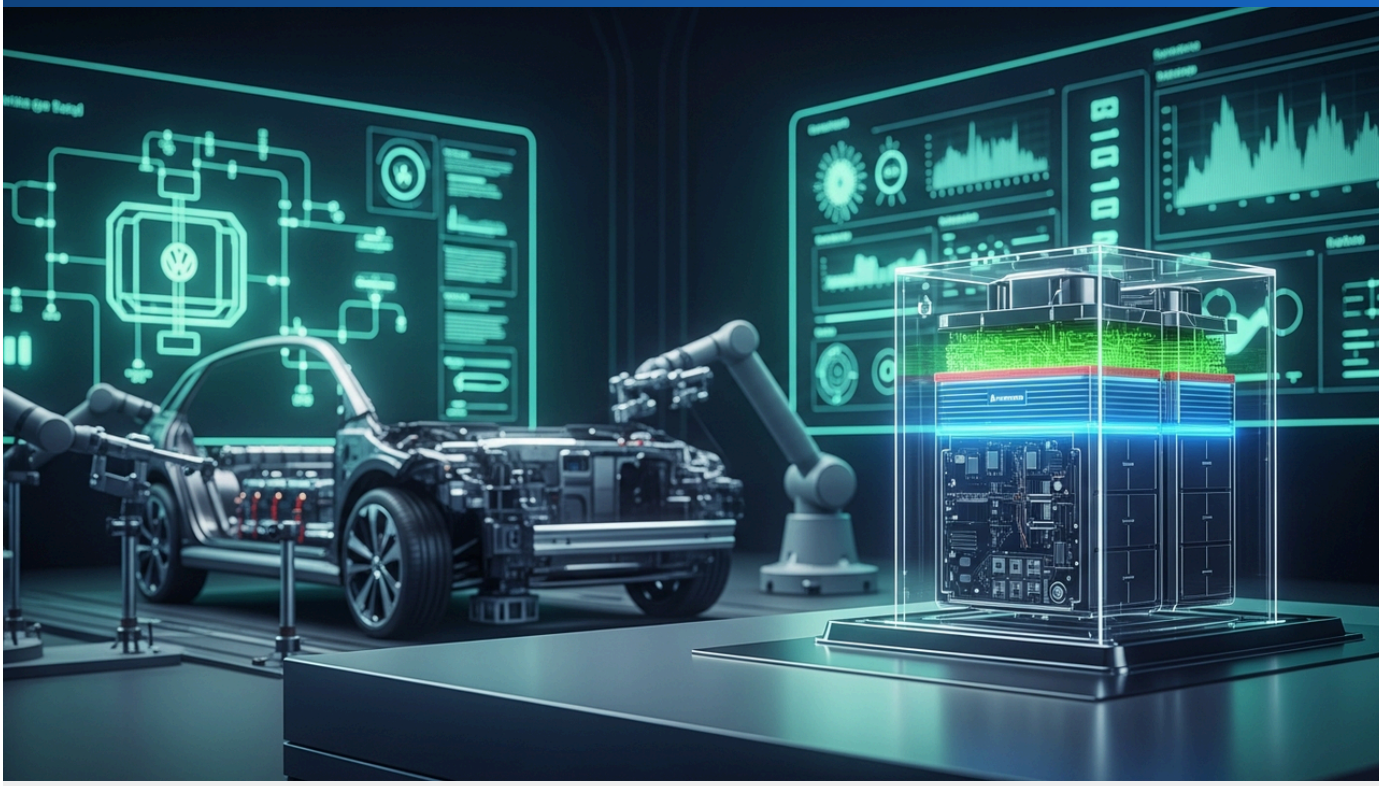
Strategic Significance and Outlook

This development and pilot production of a high-purity precursor material constitute a critical strategic maneuver for the Japanese battery materials industry, aiming to sustain and enhance its competitive edge within the rapidly evolving solid-state battery market. The company's future plans include scaling up production and commencing supply to both domestic and international solid-state battery manufacturers. This accelerated availability of high-quality materials is expected to bring the mass production of solid-state batteries closer to reality, ultimately contributing to extended EV range, superior safety, and reduced system costs. Over the long term, this advanced material technology holds the potential to solidify a dominant position for Japanese companies in the global solid-state battery ecosystem.

Source: #

#35 Volkswagen Accelerates Solid-State Battery Integration, Initiates QuantumScape A-Sample Testing

Published June 23, 2026 Handelsblatt Germany



OVERVIEW

Volkswagen has reaffirmed its commitment to solid-state battery technology by announcing an acceleration of its joint venture with QuantumScape. The automaker confirmed plans for extensive testing of QuantumScape's A-sample cells within its proprietary test rigs to validate their performance and safety for future series production. This strategic initiative underscores Volkswagen's electrification roadmap to integrate cutting-edge battery technology into its upcoming EV lineup, aiming for enhanced vehicle performance and safety.

IN DEPTH

Key Findings

Volkswagen, a leading German automotive manufacturer, has reiterated its steadfast commitment to solid-state battery technology by announcing an acceleration of its joint venture activities with QuantumScape. This development includes confirmed plans to commence extensive testing of QuantumScape's A-sample cells within Volkswagen's proprietary test rigs. The objective is to rigorously validate their performance and safety, paving the way for potential series production in the future.

Joint Development and Testing Strategy

The joint venture between Volkswagen and QuantumScape represents a strategic partnership aimed at bringing solid-state battery technology to practical application. QuantumScape's A-sample cells are early-stage prototypes, and Volkswagen's evaluation of these cells against its stringent internal standards is critical for assessing the technology's maturity and suitability for automotive use. Testing will focus on a wide range of performance indicators, including energy density, cycle life, rapid charging capability, and, crucially, safety. This collaborative endeavor seeks to clear the path for solid-state batteries to become a mainstream technology in electric vehicles (EVs).

Background and Industry Context

As the automotive industry worldwide accelerates its transition to electric vehicles, advancements in battery technology are pivotal for determining EV competitiveness and market acceptance. Volkswagen, as a global automotive leader, prioritizes securing high-performance and safe battery technology within its extensive electrification roadmap. Solid-state batteries offer significant advantages over conventional liquid lithium-ion batteries, such as lower fire risk and higher energy density. Thus, Volkswagen's substantial investment and accelerated development in this technology are a natural progression, positioning the company for technological leadership in the future EV market.

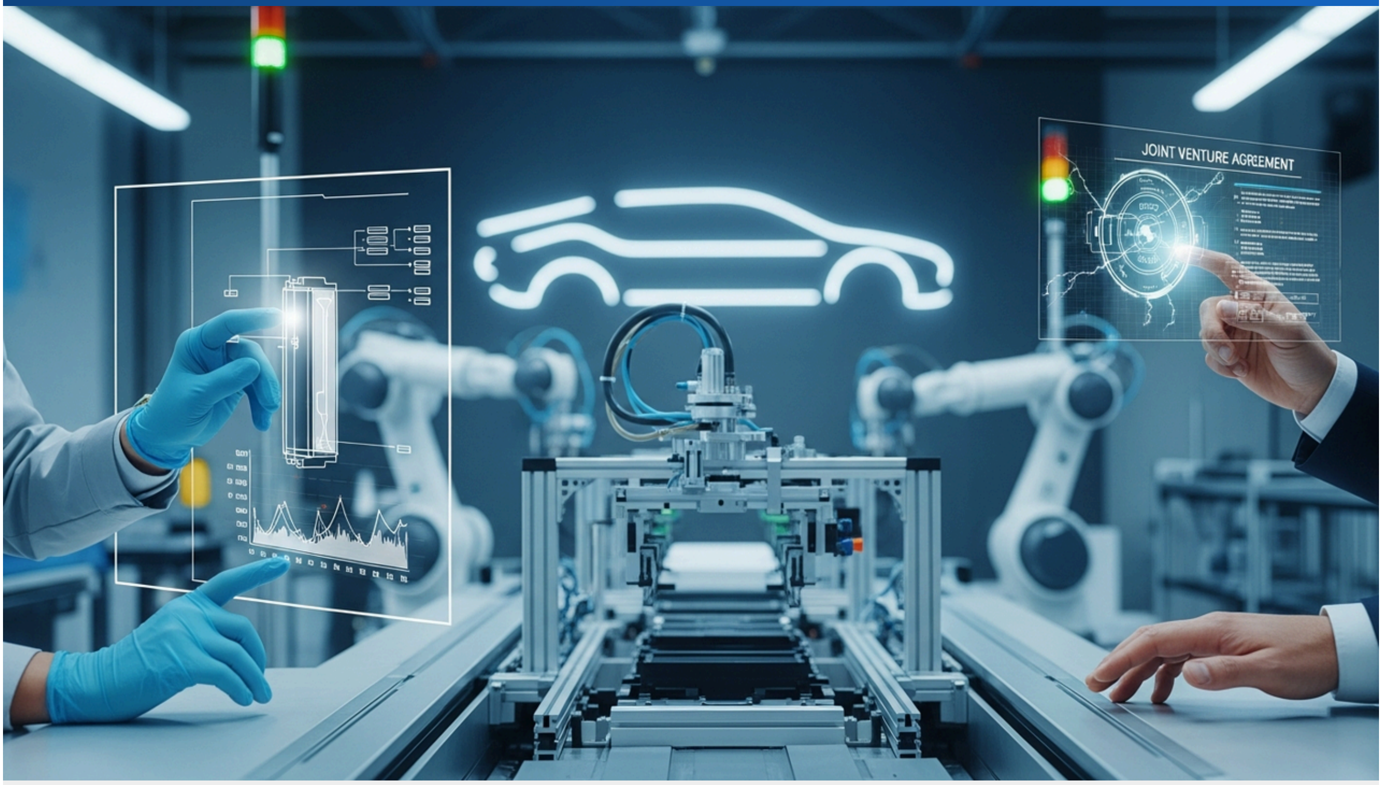
Strategic Significance and Outlook

Successful testing of QuantumScape's A-sample cells will enable Volkswagen to advance to B-sample development and ultimately integrate solid-state batteries into its EV lineup. This accelerated collaboration has the potential to hasten Volkswagen's timeline for introducing high-performance, long-range EVs to the market. When solid-state batteries reach mass production, consumers will benefit from safer and more efficient EVs, while the automotive industry as a whole will make significant strides towards decarbonization and sustainable mobility. This partnership exemplifies how evolving battery technology is shaping the future of the automotive industry.

Source: #

#36 Factorial Energy Secures Pilot Manufacturing Contract with Tier 1 Auto Supplier for Semi-Solid Batteries

Published June 22, 2026   PR Newswire   USA



OVERVIEW

Factorial Energy, a developer of semi-solid-state battery technology, has secured a new pilot manufacturing contract with a Tier 1 automotive supplier for its proprietary cells. This agreement will facilitate the scaling of Factorial's production processes, enabling larger volume deliveries for further testing and integration into automotive platforms. The company's innovative polymer-in-solid electrolyte aims to deliver enhanced safety and energy density beyond conventional lithium-ion batteries, accelerating their market readiness.

IN DEPTH

Key Findings

Factorial Energy, a pioneering developer of semi-solid-state battery technology, has announced the signing of a pilot manufacturing contract with a leading Tier 1 automotive supplier for its proprietary semi-solid battery cells. This significant agreement will enable Factorial to substantially scale up its production processes and deliver larger quantities of battery cells for extensive testing and integration into automotive platforms. This marks a major acceleration in the commercialization of the company's innovative polymer-in-solid electrolyte technology.

Technology and Contract Details

Factorial Energy's semi-solid batteries feature a polymer-in-solid electrolyte that combines the advantages of both liquid and solid electrolytes. This technology aims to significantly reduce the risk of thermal runaway and enhance safety, while simultaneously achieving high energy density compared to conventional liquid lithium-ion batteries. This pilot manufacturing contract demonstrates that Factorial's technology is mature enough to meet the stringent demands of the automotive industry and is ready for real-world product application. The collaboration with a Tier 1 supplier will facilitate the sharing of expertise in battery cell design, manufacturing, and integration into automotive systems, streamlining the development process.

Background and Industry Context

With the rapid growth of the electric vehicle (EV) market, battery performance, safety, and cost have become the most critical competitive factors for automakers. While all-solid-state batteries are considered the ultimate goal, their mass production still faces challenges. Consequently, semi-solid batteries are attracting significant attention as a practical and high-performance alternative, bridging the gap between current lithium-ion batteries and future all-solid-state solutions. Factorial Energy has been actively pursuing partnerships with major automakers and suppliers in this semi-solid battery technology space to accelerate market entry.

Strategic Significance and Outlook

The signing of this pilot manufacturing contract represents a crucial milestone for Factorial Energy in bringing its semi-solid battery technology to market. The increased production volume will allow automakers to conduct extensive testing and evaluation in actual vehicles, accelerating decision-making for eventual integration into commercial vehicles. As a result, consumers are expected to benefit from safer, longer-range EVs, further promoting EV adoption. In the long term, Factorial Energy has the potential to establish itself as a key supplier in the semi-solid battery market, contributing significantly to the evolution of battery technology.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#37 Major Chinese Battery Manufacturer Files Extensive Patents for Solid-State Battery Technologies

Published June 21, 2026   IP Watchdog   China

OVERVIEW

A prominent Chinese battery manufacturer has filed a significant number of new patents related to all-solid-state battery technology, signaling an intensified intellectual property race. The patents encompass novel sulfide and oxide electrolyte compositions, advanced electrode interfaces, and scalable manufacturing processes like roll-to-roll production. This broad patenting strategy indicates aggressive investment in next-generation battery solutions, aiming to secure a dominant position in the evolving market.

IN DEPTH

Key Findings

A major Chinese battery manufacturer (identity not disclosed in the original summary) has reportedly filed a flurry of new patents related to all-solid-state battery technology. These patents cover a wide array of aspects crucial for solid-state battery development, including novel sulfide and oxide electrolyte compositions, improved electrode interfaces, and scalable manufacturing processes such as roll-to-roll production. This extensive patenting activity signals an intensifying intellectual property race in the next-generation battery space and highlights Chinese firms' ambition to establish leadership in this critical sector.

Technical Focus and Patent Strategy

The filed patents focus on technologies directly addressing key challenges in all-solid-state batteries: enhancing ionic conductivity, reducing interfacial resistance, and lowering manufacturing costs. Specifically, high-performance sulfide-based solid electrolytes are suitable for high-power applications, while stable oxide-based solid electrolytes can be applied across a broad range of uses. Furthermore, patents related to roll-to-roll production processes are indispensable for enabling mass production and improving cost competitiveness. This comprehensive patent strategy aims to protect innovations not just in single technologies but across materials, design, and the entire manufacturing process.

Background and Industry Context

The global automotive industry and energy storage sector are urgently demanding high-performance and safe battery technologies, driven by the transition to electric vehicles (EVs) and the expanding adoption of renewable energy. All-solid-state batteries are anticipated as the ultimate solution to surpass the limitations of conventional liquid lithium-ion batteries, leading to fierce research and development competition worldwide. China, being the largest market for EV and battery production, is actively investing in solid-state battery technology development, supported by strong government backing. This surge in patent filings reflects the strong determination of Chinese companies to establish technological dominance in this global race.

Strategic Significance and Outlook

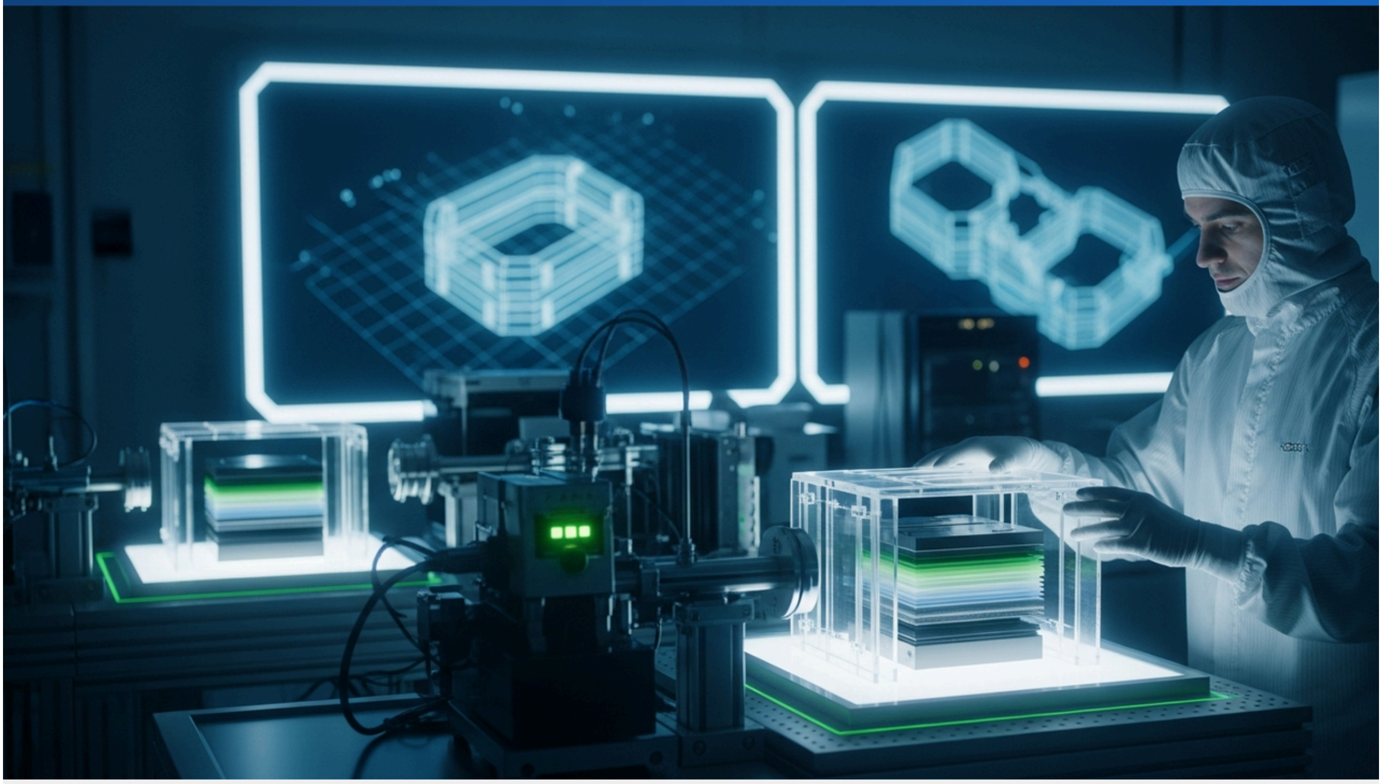
The strengthening of this Chinese battery manufacturer's patent portfolio will significantly influence the competitive landscape in the global solid-state battery market. If these patents are granted, the company will gain a strong competitive advantage in product development and market deployment, potentially increasing opportunities for technology licensing and joint development. In the future, the commercialization of these technologies is expected to introduce higher-performing, safer, and more affordable all-solid-state batteries to the market, accelerating EV adoption and enhancing the efficiency of energy storage systems. This move underscores China's consolidation as an innovation hub for next-generation battery technology.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#38 EU Horizon Europe Funds Major Project for Advanced Bipolar Solid-State Battery Architectures

Published Published June 20, 2026　欧州委員会プレスリリース　Europe



OVERVIEW

The European Union's Horizon Europe program has awarded substantial funding to a new international research project focused on advancing bipolar solid-state battery (SSB) architectures. This multi-partner initiative aims to overcome manufacturing hurdles and demonstrate high-performance, compact SSB packs with improved thermal management and modularity. Targeting diverse applications including electric vehicles and stationary storage, this project seeks to bolster Europe's position in advanced battery technology.

IN DEPTH

EU Strategic Investment in Advanced Battery Technology

The European Union, through its leading research and innovation funding program, Horizon Europe, has announced significant financial support for a new international research project dedicated to advancing bipolar solid-state battery architectures. This strategic investment underscores Europe's commitment to accelerating the adoption of electric mobility and renewable energy, which are crucial for climate change mitigation and enhancing energy self-sufficiency. High-performance battery technology is deemed essential for these goals, with solid-state batteries holding particular promise. The funding represents a concerted effort by Europe to close the gap with, and ultimately lead, other regions, especially Asia, in advanced battery technology. By strengthening domestic R&D and manufacturing capabilities, the EU aims to foster a more resilient supply chain and greater economic independence.

Advancing Bipolar Solid-State Battery Architectures

This multi-partner initiative, involving prominent European research institutions and industrial firms, aims to address and overcome critical manufacturing challenges associated with solid-state batteries. The project's ultimate objective is to demonstrate high-performance, compact solid-state battery packs featuring enhanced thermal management and modularity, suitable for various applications including electric vehicles (EVs) and stationary energy storage systems.

The research will specifically target key technological barriers in the design and manufacturing of bipolar solid-state batteries. A bipolar configuration, which involves stacking cells in series, not only boosts battery pack voltage and energy density but also simplifies the overall pack structure and offers significant potential for optimized thermal management. The project will concentrate on developing novel solid electrolyte materials, improving performance at the crucial electrode-electrolyte interface, and establishing scalable manufacturing processes. This comprehensive approach seeks to achieve more efficient, safer, and more compact solid-state battery packs compared to conventional battery technologies.

Outlook and Global Impact

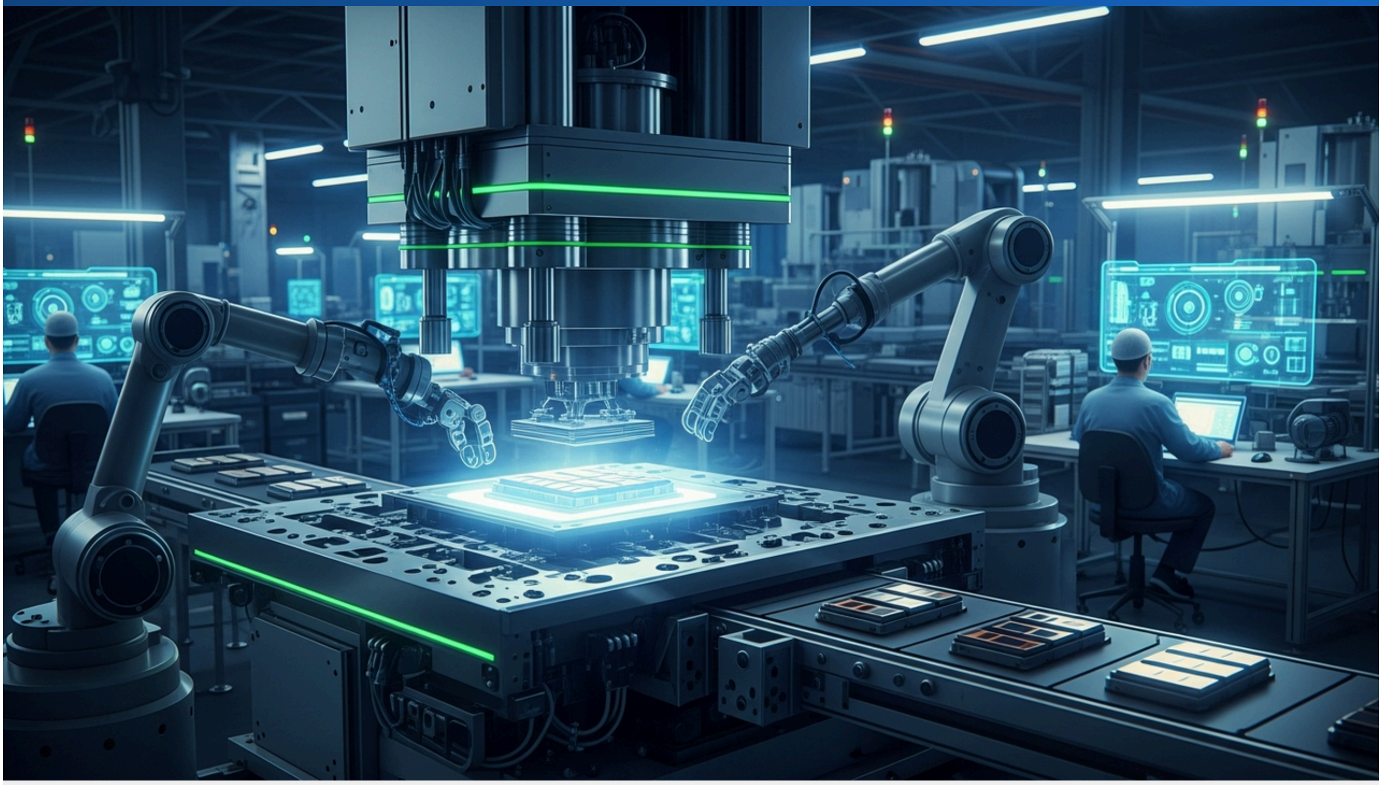
This Horizon Europe-supported project holds significant potential to accelerate the commercialization of bipolar solid-state battery technology. The innovations developed through this initiative are expected to contribute to extended EV ranges, faster charging times, and improved safety, while also bringing advancements to grid-scale energy storage solutions. If successful, Europe is positioned to enhance its autonomy in battery technology and emerge as a stronger player in the global electrification race. In the long term, this technology is anticipated to be a crucial enabler for both a sustainable energy transition and robust economic growth.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#39 Cold Pressing Techniques Advance Solid-State Battery Production, Significantly Reducing Cost and Energy

Published June 19, 2026   Journal of The Electrochemical Society   Global



OVERVIEW

A new study in the Journal of The Electrochemical Society details significant advancements in cold pressing techniques for all-solid-state battery cell fabrication. Optimized cold pressing demonstrably reduces manufacturing costs and energy consumption compared to traditional sintering methods for ceramic solid electrolytes, while maintaining superior interfacial contact and ionic conductivity. This breakthrough is critical for achieving scalable, high-volume production of next-generation solid-state batteries.

IN DEPTH

Key Findings

A recent study published in the *Journal of The Electrochemical Society* reveals significant advancements in cold pressing techniques for the fabrication of all-solid-state battery cells. The research demonstrates that an optimized cold pressing method can substantially reduce both manufacturing costs and energy consumption for forming ceramic solid electrolytes, particularly when compared to conventional high-temperature sintering processes. Critically, this technique maintains excellent interfacial contact between electrodes and electrolytes, along with high ionic conductivity, marking a major step towards the mass production of all-solid-state batteries.

Technical and Research Details

Cold pressing involves forming materials under pressure at room or relatively low temperatures. Traditionally, ceramic solid electrolytes often required sintering at temperatures exceeding 1000°C to achieve a dense structure, which significantly contributed to manufacturing costs and energy consumption. In this study, researchers successfully formed solid electrolyte layers with performance comparable to or superior to sintered counterparts, solely through optimized cold pressing. This was achieved by carefully controlling particle size distribution, selecting appropriate binders, and precisely managing pressurization conditions. This method could eliminate or drastically simplify the sintering step, potentially reducing manufacturing energy consumption by tens of percent.

Background and Industry Context

All-solid-state batteries are drawing global attention as a next-generation battery technology essential for extending electric vehicle (EV) ranges, shortening charging times, and enhancing safety. However, their high cost and complex manufacturing processes have been significant barriers to commercialization. The production of solid electrolytes, in particular, dictates the overall performance and price of the battery. This advancement in cold pressing technology offers a practical solution to the industry's long-standing challenges of simplifying manufacturing processes and reducing costs. This is crucial for accelerating the mass production and widespread adoption of all-solid-state batteries in the EV market.

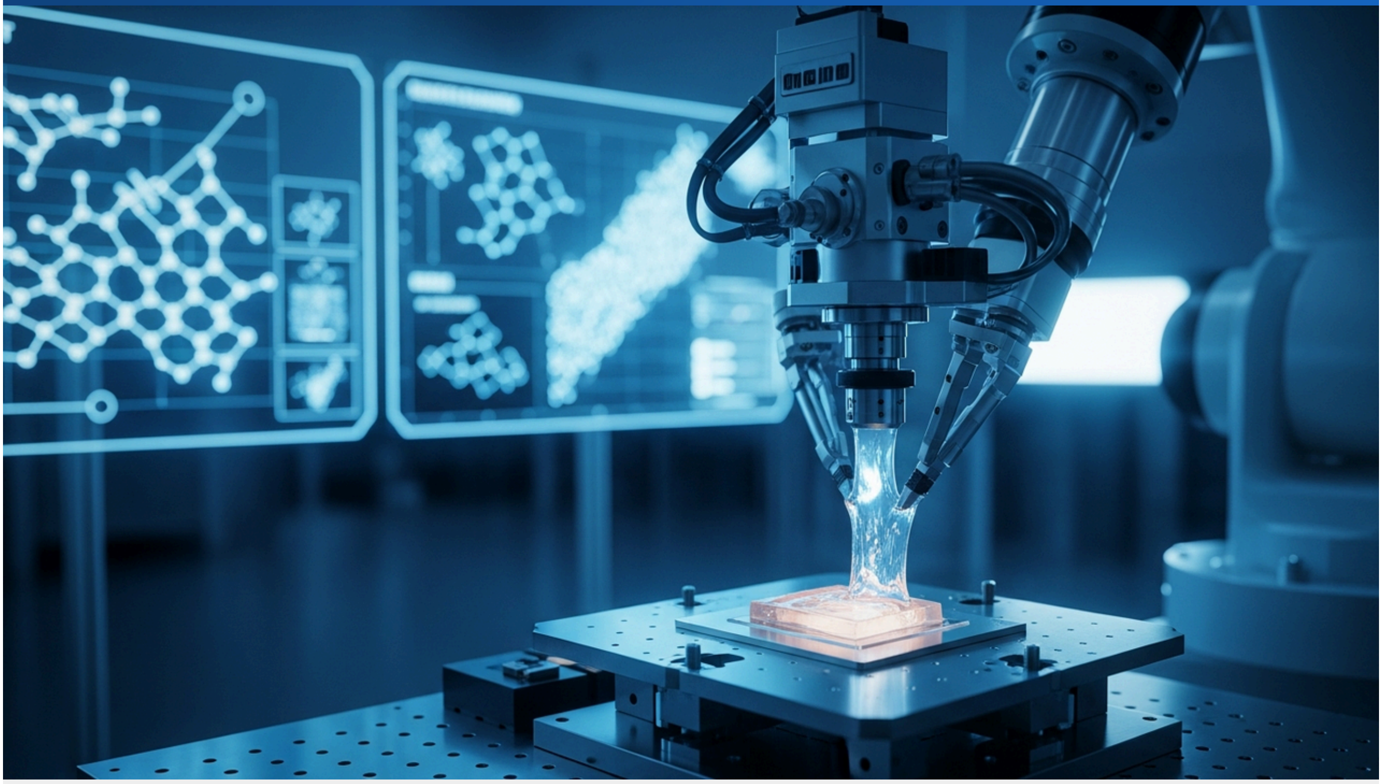
Strategic Significance and Outlook

The progress in cold pressing technology has the potential to bring about a paradigm shift in solid-state battery production. Substantial reductions in manufacturing costs and energy consumption are key factors for all-solid-state batteries to become cost-competitive with existing lithium-ion batteries. Future efforts will focus on further optimizing this technique, applying it to different solid electrolyte materials, and validating its scalability for large-volume production. If widely adopted, this innovative manufacturing method could make all-solid-state batteries more affordable and accessible to the market, thereby significantly contributing to the realization of a sustainable energy society.

Source: #

#40 Toppan Develops High-Precision Coating Technology for Thin-Film Solid Electrolytes

Published Published June 18, 2026 凸版印刷ホールディングスプレスリリース Japan



OVERVIEW

Toppan Holdings has developed a novel high-precision coating technology for the uniform, ultra-thin deposition of solid electrolytes, a critical component in next-generation all-solid-state batteries. This innovation promises to significantly reduce internal resistance and enhance battery performance, paving the way for mass production through strategic licensing to battery manufacturers.

IN DEPTH

Background

All-solid-state batteries are widely recognized as the crucial next-generation energy storage solution beyond conventional lithium-ion technologies, offering significant advancements in range, charging speed, and critically, enhanced safety for applications like electric vehicles (EVs). However, their journey to commercialization has been hampered by formidable manufacturing hurdles. Key among these are the challenges in consistently forming uniform solid electrolyte layers and ensuring optimal interfacial contact with electrodes. The high complexity and associated costs of these manufacturing processes have historically created significant barriers to achieving mass production. Overcoming these fundamental processing challenges, particularly by companies with robust expertise in materials and manufacturing technologies like Toppan, is essential to unlocking the full potential of the solid-state battery supply chain and meeting the industry's demand for integrated innovation, spanning from fundamental material science to advanced industrial processes.

Technology Breakthrough

Addressing these challenges, Toppan Holdings has unveiled a novel high-precision coating technology specifically engineered for the uniform deposition of thin-film solid electrolytes. This innovation is critical for all-solid-state battery performance, promising to significantly elevate the quality and consistency of crucial battery components. By enabling the creation of substantially thinner electrolyte layers, the technology effectively reduces internal resistance, a key factor in battery efficiency. Unlike conventional coating methods, which often lead to detrimental thickness variations and defects that compromise performance and yield, Toppan’s proprietary approach integrates advanced precision control mechanisms with sophisticated material design. This synergy allows for the stable and highly uniform formation of ultra-thin films—on the order of tens of micrometers. Such precise control over electrolyte thickness not only ensures efficient ionic conduction pathways but also directly contributes to a drastic reduction in the battery's overall internal resistance, thereby paving the way for higher power output and enhanced energy density in all-solid-state battery designs.

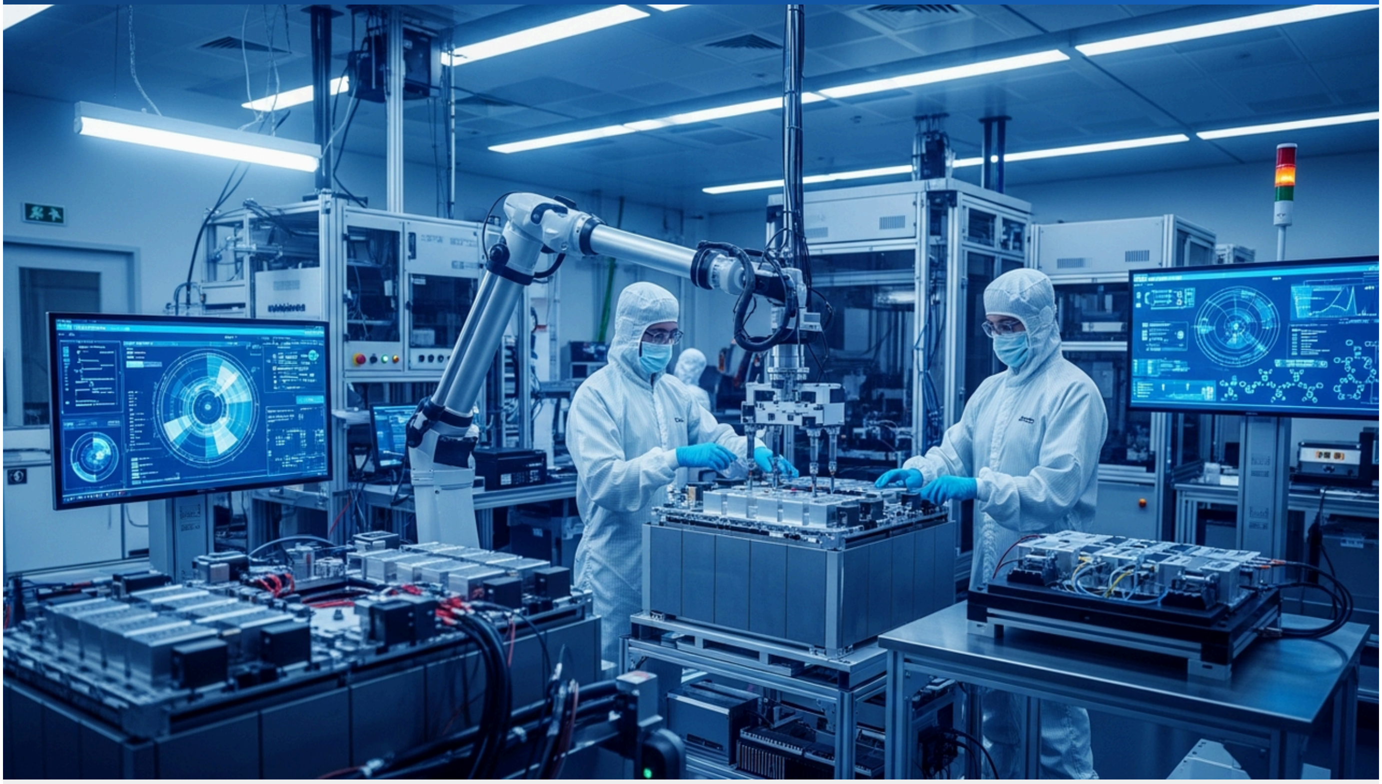
Industry Impact and Outlook

This high-precision coating technology is poised to profoundly transform the manufacturing landscape for all-solid-state batteries. For battery manufacturers, its adoption is expected to yield substantial improvements in product performance, significantly enhanced manufacturing yields, and critically, reduced production costs. Toppan plans to strategically disseminate this technology globally through licensing agreements with various battery manufacturers. This concerted effort will markedly accelerate the mass production of all-solid-state batteries, thereby expanding their applicability across a diverse range of critical sectors, including electric vehicles, advanced wearable devices, and burgeoning IoT equipment. Looking further ahead, this technology is anticipated to establish itself as a foundational standard in next-generation battery development, playing a pivotal role in advancing sustainable energy solutions worldwide.

Source: #

#41 SES AI Expands U.S. R&D Facility to Accelerate Hybrid Lithium Metal Battery Development

Published June 25, 2026 Bloomberg USA



OVERVIEW

SES AI, a developer of hybrid lithium metal batteries, has announced a significant expansion of its research and development facility in the United States. This expansion will accelerate the development and scaling of its proprietary hybrid electrolyte technology, which combines solid and liquid components to achieve high energy density while maintaining safety. The company is actively collaborating with General Motors and Hyundai on automotive integration, aiming to bring its advanced battery solutions to market faster.

IN DEPTH

Key Findings

SES AI, a pioneering developer of hybrid lithium metal batteries, has announced a substantial expansion of its research and development facility in the United States. This strategic move aims to accelerate the development and scaling of its proprietary hybrid electrolyte technology, which combines both solid and liquid electrolyte components to achieve both high energy density and superior safety. SES AI is actively collaborating with major automotive manufacturers such as General Motors (GM) and Hyundai to integrate this technology into the automotive market.

Technical Details and Expansion Plans

The hybrid lithium metal battery developed by SES AI features a 'hybrid electrolyte' that merges the advantages of liquid components (high ionic conductivity) with those of solid components (enhanced safety, dendrite suppression). This technology allows for significantly higher energy density compared to existing lithium-ion batteries while mitigating the fire risks associated with liquid electrolytes. The R&D facility expansion will bolster research areas such as materials science, cell design, and process optimization through new equipment and increased staffing. The specific aim is to enhance the prototyping and evaluation capabilities for large-capacity cells, thereby accelerating the development of automotive-grade batteries.

Background and Industry Context

With the expanding electric vehicle (EV) market, battery performance and safety have become critical differentiators for automakers. While all-solid-state batteries are considered the ultimate goal, their commercialization is still projected to be some time away. In this context, hybrid lithium metal batteries, like those from SES AI, are drawing attention as a practical solution that can significantly outperform current lithium-ion batteries, serving as a 'bridge' to full solid-state technology. Partnerships with global automotive giants like GM and Hyundai underscore the potential of SES AI's technology and the high expectations from the automotive industry.

Strategic Significance and Outlook

The expansion of its U.S. R&D facility is a crucial step for SES AI to establish leadership in the hybrid lithium metal battery market. Accelerated development and scaling will advance joint projects with GM and Hyundai, increasing the likelihood of early integration of practical, high-performance batteries into EVs. This is expected to substantially extend EV driving ranges, reduce reliance on charging infrastructure, and enhance the overall appeal of EVs to consumers. In the long term, SES AI's technology is poised to contribute significantly to the realization of sustainable mobility and innovation in the energy storage sector.

Source: #

Collected: June 26, 2026 | Automated Research System (Gemini API)

#42 Murata Manufacturing Enhances All-Solid-State Microbattery Energy Density and Cycle Life for Wearables

Published June 24, 2026 EE Times Japan Japan

OVERVIEW

Murata Manufacturing has updated its progress in all-solid-state microbattery technology, targeting small electronic devices and wearables. The company reported improvements in energy density and cycle life for its ceramic-based microbatteries, which utilize oxide solid electrolytes. Murata aims to expand its market presence in compact, high-reliability power sources, capitalizing on the increasing demand for IoT devices and other miniature electronics.

IN DEPTH

Key Findings

Murata Manufacturing has reported significant progress in its all-solid-state microbattery technology, specifically targeting small electronic devices and wearables. The company highlighted substantial improvements in both energy density and cycle life for its ceramic-based microbatteries, which leverage proprietary oxide solid electrolytes. This achievement positions Murata to expand its market presence in compact, high-reliability power sources, capitalizing on the escalating demand driven by the proliferation of IoT devices and other miniature electronics.

Technical Details and Performance Improvement

Murata Manufacturing's all-solid-state microbatteries fundamentally resolve safety issues (such as liquid leakage and fire risk) associated with liquid electrolytes by utilizing ceramic-based oxide solid electrolytes. The recent improvements were achieved through optimizing material compositions and refining manufacturing processes. Specifically, enhancements in electrode materials and a reduction in interfacial resistance with the solid electrolyte have led to an increase in energy density—the storage capacity per unit volume. Concurrently, the cycle life characteristics have been bolstered, ensuring consistent performance over numerous charge-discharge cycles. This means wearable devices and small IoT sensors can operate for longer durations, requiring less frequent battery replacement.

Background and Industry Context

The explosive growth of IoT (Internet of Things) devices and the widespread adoption of wearable products like smartwatches and hearables have led to a surge in demand for compact, thin, and highly reliable power sources. For devices worn on the body, all-solid-state batteries offer a significant safety advantage due to the absence of liquid leakage or thermal risks. Murata Manufacturing, leveraging its expertise in ceramic electronic components, has been at the forefront of product development in this microbattery market. These latest advancements further strengthen the company's leadership in this niche but rapidly growing sector.

Strategic Significance and Outlook

The progress in Murata Manufacturing's all-solid-state microbattery technology is expected to significantly enhance the design freedom for future small electronic devices. Improved energy density and cycle life directly translate to enhanced functionality, extended operating times, and ultimately greater convenience for consumers of wearable devices. The company plans to further evolve this technology, targeting adoption in a broad range of applications including IoT modules, medical implants, and environmental sensors. In the long term, all-solid-state microbatteries are anticipated to become a standard power source for various smart devices, serving as a critical component supporting the digitalization and advanced functionality of society.

Source: #