

TROY TECHNICAL

NEXT-GENERATION ENERGY STORAGE WEEKLY REPORT

October 3 - October 9, 2026 | Issue 2026-W40

**Cell-level evidence, manufacturing yield,
safety and bankable supply**

10

ANALYZED ARTICLES

10

PRIORITY THEMES

Issued 2026-10-09 | English edition | fixed approved cover artwork



Next-Generation Energy Storage: the boundary moved from isolated claims to qualification evidence

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

SIGNAL 01 | ACTIVE MATERIALS

Tesla: 13.7 GWh energy storage deployment and CATL 2026 roadmap

Tesla deployed 13.7 GWh of energy storage products in Q3 2026, demonstrating continued strong growth in its grid-scale and residential solutions.

SIGNAL 02 | CELL DESIGN

Sodium-Ion Batteries: LG and Samsung SDI production vs CATL

South Korean battery giants LG Energy Solution and Samsung SDI are accelerating sodium-ion battery (SIB) production to compete with China's leading firm CATL.

SIGNAL 03 | MANUFACTURING

Silicon Anodes vs Graphite: 20% EV range boost and 2026 timeline

Silicon anodes are rapidly advancing as a next-generation EV battery technology, capable of storing approximately 10 times more charge than graphite and enabling faster charging.

SIGNAL 04 | SYSTEM VALIDATION

Tesla Powerwall: How VPPs delivered 517MW to California in 2026

On October 8, 2026, residential batteries collectively supplied 600MW to the grid, matching the output of a medium-sized power plant and demonstrating the critical role of distributed energy resources.

DECISION

Focus this week's management attention on cell-level evidence, manufacturing yield, safety and bankable supply. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: compare technologies under the same duty cycle, safety envelope and total system cost.
2. Suppliers: connect materials claims to electrode processing, yield, validation and secured capacity.
3. Executives: track cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

EVIDENCE DISCIPLINE

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

Five numbers or evidence anchors that require conditions

13.7 GW

A04

SOURCE-BOUND CONDITION

Tesla deployed 13.7 GWh of energy storage products in Q3 2026, demonstrating continued strong growth in its grid-scale and residential solutions.

92%

A10

SOURCE-BOUND CONDITION

Expected to be highly competitive in the energy storage system (ESS) market due to cost-effectiveness, longevity, safety, and excellent low-temperature performance-retaining over 92% capacity at -20°C-SIBs are a key.

10 times

A05

SOURCE-BOUND CONDITION

Silicon anodes are rapidly advancing as a next-generation EV battery technology, capable of storing approximately 10 times more charge than graphite and enabling faster charging.

600MW

A06

SOURCE-BOUND CONDITION

On October 8, 2026, residential batteries collectively supplied 600MW to the grid, matching the output of a medium-sized power plant and demonstrating the critical role of distributed energy resources.

95%

A08

SOURCE-BOUND CONDITION

This CAM is produced through an advanced recycling process that recovers up to 95% of nickel, cobalt, and manganese, and 80% of lithium from spent EV battery packs.

HOW TO USE THESE NUMBERS

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

Where the value chain moved

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

1

Active materials

P01/P06

Tesla deployed 13.7 GWh of energy storage products in Q3 2026, demonstrating continued strong growth in its grid-scale and.

2

Cell design

P02/P07

South Korean battery giants LG Energy Solution and Samsung SDI are accelerating sodium-ion battery (SIB) production to.

3

Manufacturing

P03/P08

Silicon anodes are rapidly advancing as a next-generation EV battery technology, capable of storing approximately 10 times.

4

System validation

P04/P09

On October 8, 2026, residential batteries collectively supplied 600MW to the grid, matching the output of a medium-sized.

5

Deployment & recycling

P05/P10

General Motors has commenced using recycled cathode active material (CAM) from Cirba Solutions in its production electric.

EVIDENCE REQUIRED AT EACH HANDOFF

Active materials to Cell design	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.
Cell design to Manufacturing	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.
Manufacturing to System validation	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.
System validation to Deployment & recycling	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

Priority map: maturity and next decision locus



REPRODUCIBLE POSITIONING RULE

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

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

P01

Tesla: 13.7 GWh energy storage deployment and CATL 2026 roadmap

A04 | Active materials | Scale-up

Date not stated

FACT

Tesla deployed 13.7 GWh of energy storage products in Q3 2026, demonstrating continued strong growth in its grid-scale and residential solutions. Concurrently, CATL announced it will commence mass production of its Naxtra sodium-ion batteries by year-end, following initial grid storage deliveries to Chinese customers in September 2026.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

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

P02

Sodium-Ion Batteries: LG and Samsung SDI production vs CATL

A10 | Cell design | Product adoption

Date not stated

FACT

South Korean battery giants LG Energy Solution and Samsung SDI are accelerating sodium-ion battery (SIB) production to compete with China's leading firm CATL. Both companies plan to leverage existing lithium-ion production lines to reduce new investment burdens while commercializing SIBs. Expected to be highly competitive in the energy storage system (ESS) market due to cost-effectiveness, longevity, safety, and excellent low-temperature performance-retaining over 92% capacity at -20°C-SIBs are a key focus.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | DECISION LOCUS: BUSINESS / RULES

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

P03

Silicon Anodes vs Graphite: 20% EV range boost and 2026 timeline

A05 | Manufacturing | Scale-up

Date not stated

FACT

Silicon anodes are rapidly advancing as a next-generation EV battery technology, capable of storing approximately 10 times more charge than graphite and enabling faster charging. The significant challenge of 300-400% volumetric expansion during charging has been largely overcome through silicon-graphite hybrid anodes, which now offer about 20% longer range than their graphite counterparts.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

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

P04

Tesla Powerwall: How VPPs delivered 517MW to California in 2026

A06 | System validation | Product adoption

Date not stated

FACT

On October 8, 2026, residential batteries collectively supplied 600MW to the grid, matching the output of a medium-sized power plant and demonstrating the critical role of distributed energy resources. Notably, during a California heatwave on September 9, 2026, Tesla and Sunrun orchestrated the largest residential Virtual Power Plant (VPP) event ever, delivering 580MW.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P05

GM: Integration of Cirba Solutions recycled cathode material

A08 | Deployment & recycling | Product adoption

Date not stated

FACT

General Motors has commenced using recycled cathode active material (CAM) from Cirba Solutions in its production electric vehicle (EV) batteries, marking a significant step from pilot to mainstream automotive supply chains. This CAM is produced through an advanced recycling process that recovers up to 95% of nickel, cobalt, and manganese, and 80% of lithium from spent EV battery packs.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

EDITORIAL SCORE 20/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

P06

Li-S Batteries: Tohoku University 674 Wh/kg energy density specs

A09 | Active materials | Product adoption

Date not stated

FACT

Researchers at Tohoku University have developed a novel COF-graphene interlayer that significantly boosts the performance of lithium-sulfur (Li-S) batteries. This innovative interlayer effectively suppresses the polysulfide shuttling effect, a major challenge in Li-S battery technology. Pouch cells incorporating this interlayer demonstrated a high initial energy density of approximately 674 Wh kg⁻¹ at 0.05 A g⁻¹ and maintained a reversible capacity of 1455.7 mA h g⁻¹ at 0.2 A g⁻¹.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

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

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

P07

QS PowerBlock: QuantumScape AI data center power density specs

A03 | Cell design | Research

Date not stated

FACT

QuantumScape has introduced 'QS PowerBlock,' a modular energy storage system specifically designed for AI data centers, offering 4x the power density and 5x the runtime of current industry standards. This system supports 800VDC architectures and demonstrates exceptional thermal stability exceeding 300°C, surpassing key Open Compute Project (OCP) specifications. The QS PowerBlock enhances safety and performance for demanding AI workloads, promising significant improvements in data center efficiency and reliability.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

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

P08

ProLogium: Dynamic Coordination Network electrolyte specs 2026

A01 | Manufacturing | Research

Date not stated

FACT

Taiwanese battery innovator ProLogium unveiled its groundbreaking Dynamic Coordination Network (DCN) electrolyte architecture at the Paris Motor Show 2026, introducing a "third state" lithium-ion transport mechanism beyond traditional liquid and solid electrolytes. Incorporated into the company's GEN4 technology, the Superfluidized Inorganic Electrolyte (SFIE) forms dynamic, short-range lithium-ion transport pathways through continuously changing local coordination structures.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

EDITORIAL SCORE 19/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P09

Nano One: One-PotTM technology and LFP feedstock supplier specs

A07 | System validation | Research

Date not stated

FACT

Nano One announced the successful validation of diverse feedstock suppliers for producing Lithium Iron Phosphate (LFP) cathode active material (CAM) directly from lithium carbonate, iron, and phosphoric acid, bypassing reliance on Chinese-made LFP precursors (pCAM) using its One-PotTM technology. This advancement significantly mitigates geopolitical risks in the LFP supply chain and enhances transparency at the raw material level.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

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

P10

Arkema: Incellion and Kynar binder specs for 2026 EV batteries

A02 | Deployment & recycling | Product adoption

Date not stated

FACT

French chemical giant Arkema will present advanced material solutions for electric vehicle (EV) and energy storage system (ESS) batteries at The Battery Show North America 2026. The company is offering its Incellion[®] brand acrylic binders, specifically designed for silicon-based anodes, to enable higher active material loading and significantly boost energy density.

WHY IT MATTERS

The decision relevance is cell-level evidence, manufacturing yield, safety and bankable supply. The signal should be tested at the application and operating-system level, not accepted from a headline alone.

BUSINESS READ

For operating companies, compare the reported change with current qualification, sourcing and product-roadmap assumptions. For suppliers, connect materials claims to electrode processing, yield, validation and secured capacity.

ACTION

Within 30 days, compare technologies under the same duty cycle, safety envelope and total system cost; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.

EDITORIAL SCORE 18/25 | MATURITY 4/5 | DECISION LOCUS: SYSTEM / ADOPTION

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW 0-30 DAYS	NEXT 1-12 MONTHS	LATER 1-5 YEARS
Operating companies	compare technologies under the same duty cycle, safety envelope and total system cost	Run production-like qualification with explicit acceptance and stop criteria.	Build a portfolio and architecture that can absorb technology and supplier changes.
Materials, equipment and technology suppliers	connect materials claims to electrode processing, yield, validation and secured capacity	Create shared reliability, process-window and failure-analysis data with customers.	Standardize interfaces, traceability, lifecycle support and recovery services.
Trading, investment and legal teams	Map cycle life, fast charge, safety abuse, yield, cost, sourcing and warranty.	Contract for capacity, quality, change notice, liability, alternatives and exit.	Diversify regional, technical and customer concentration risk.

ROADMAP

NOW 0-30 DAYS Evidence ledger Owner: Strategy + quality Deliverable: claim, source, condition, owner	NOW 0-30 DAYS Risk screen Owner: Procurement + legal Deliverable: unknowns, alternatives, stop	NEXT 1-12 MONTHS Joint qualification Owner: R&D + supplier Deliverable: process window and failure data
NEXT 1-12 MONTHS Commercial gate Owner: Business + finance Deliverable: unit economics and capacity	LATER 1-5 YEARS Platform strategy Owner: Executive team Deliverable: portfolio and interface roadmap	LATER 1-5 YEARS Service layer Owner: Operations + channel Deliverable: monitoring, maintenance and recovery

GO / NO-GO GATES

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

ANALYZED ARTICLES | ITEMS 01-10

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

ID	FULL ARTICLE TITLE	FULL SOURCE / VERIFIED REFERENCE URL - CLICKABLE
A01	ProLogium: Dynamic Coordination Network electrolyte specs 2026	https://markets.businessinsider.com/news/stocks/prologium-unveils-dcn-opening-a-third-state-electrolyte-universe-at-paris-motor-show-1036608719
A02	Arkema: Incellion and Kynar binder specs for 2026 EV batteries	https://www.arkema.com/usa/en/media/news/global/products/2026/20261009-arkema-at-the-battery-show-north-america/
A03	QS PowerBlock: QuantumScape AI data center power density specs	https://www.quantumscape.com/quantumscape-announces-qs-powerblock-for-in-rack-energy-storage-in-ai-data-centers/
A04	Tesla: 13.7 GWh energy storage deployment and CATL 2026 roadmap	https://www.ventureatlas.org/industry/energy-storage
A05	Silicon Anodes vs Graphite: 20% EV range boost and 2026 timeline	https://www.evinfrastructurenews.com/ev-battery/silicon-vs-graphite-anodes
A06	Tesla Powerwall: How VPPs delivered 517MW to California in 2026	https://www.basenor.com/blogs/news/home-batteries-just-sent-600mw-to-the-grid-5-numbers-that-matter
A07	Nano One: One-PotTM technology and LFP feedstock supplier specs	https://www.morningstar.com/news/business-wire/20261008423373/nano-one-provides-update-on-validated-feedstock-suppliers-for-lfp-cathode-production
A08	GM: Integration of Cirba Solutions recycled cathode material	https://www.winssolutions.org/gm-cirba-recycled-ev-battery-cathode/
A09	Li-S Batteries: Tohoku University 674 Wh/kg energy density specs	https://www.techbriefs.com/component/content/article/55984-a-cof-graphene-hybrid-opens-new-horizons-for-lithium-sulfur-batteries
A10	Sodium-Ion Batteries: LG and Samsung SDI production vs CATL	https://www.businesskorea.co.kr/news/articleView.html?idxno=278183

NextGenEnergyStorage — Selected Articles

Date: 2026-10-11

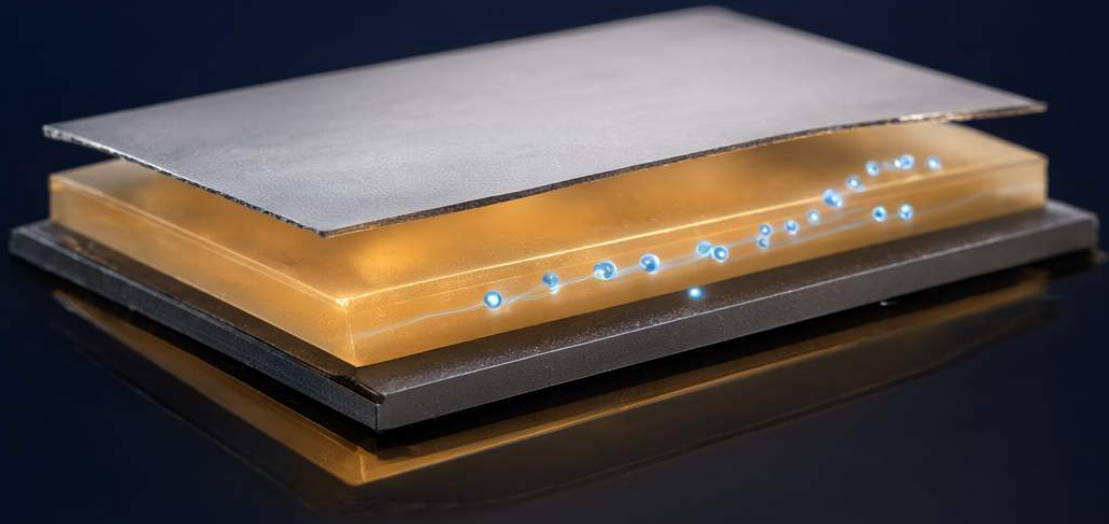
Articles: 10

Table of Contents

- #01 ProLogium: Dynamic Coordination Network electrolyte specs 2026
- #02 Arkema: Incellion and Kynar binder specs for 2026 EV batteries
- #03 QS PowerBlock: QuantumScape AI data center power density specs
- #04 Tesla: 13.7 GWh energy storage deployment and CATL 2026 roadmap
- #05 Silicon Anodes vs Graphite: 20% EV range boost and 2026 timeline
- #06 Tesla Powerwall: How VPPs delivered 517MW to California in 2026
- #07 Nano One: One-Pot™ technology and LFP feedstock supplier specs
- #08 GM: Integration of Cirba Solutions recycled cathode material
- #09 Li-S Batteries: Tohoku University 674 Wh/kg energy density specs
- #10 Sodium-Ion Batteries: LG and Samsung SDI production vs CATL

#01 ProLogium: Dynamic Coordination Network electrolyte specs 2026

Published October 08, 2026 ProLogium (GLOBE NEWSWIRE經由) Taiwan



OVERVIEW

Taiwanese battery innovator ProLogium unveiled its groundbreaking Dynamic Coordination Network (DCN) electrolyte architecture at the Paris Motor Show 2026, introducing a "third state" lithium-ion transport mechanism beyond traditional liquid and solid electrolytes. Incorporated into the company's GEN4 technology, the Superfluidized Inorganic Electrolyte (SFIE) forms dynamic, short-range lithium-ion transport pathways through continuously changing local coordination structures. With over 13 years of manufacturing expertise, including commercialized roll-to-roll ceramic separator coating, ProLogium's DCN technology promises significant enhancements in battery safety and performance.

Key Findings: ProLogium Introduces "Third State" Electrolyte with DCN Architecture, Revolutionizing Lithium-Ion Transport

ProLogium, a pioneering next-generation battery manufacturer based in Taiwan, made a global announcement at the Paris Motor Show 2026, unveiling its revolutionary Dynamic Coordination Network (DCN) electrolyte architecture. This new technology transcends the traditional dichotomy of liquid and solid electrolytes, establishing a "third state" for lithium-ion transport. The DCN electrolyte holds the potential to fundamentally enhance battery safety and performance, marking a significant milestone in the development of future electric vehicles (EVs) and energy storage systems.

Technical and Product Details: SFIE and Dynamic Coordination for Lithium-Ion Transport

- **DCN Electrolyte Architecture:** The Dynamic Coordination Network (DCN) presents an entirely novel concept for the efficient and safe movement of lithium ions within the electrolyte.
- **SFIE (Superfluidized Inorganic Electrolyte):** Integrated into ProLogium's GEN4 technology, SFIE is an amorphous and dynamic inorganic electrolyte. It exists in a "superfluidized" state, lacking a specific crystalline structure but also not possessing the complete freedom of a liquid.
- **Lithium-Ion Transport Mechanism:** Within SFIE, lithium ions migrate through continuously changing local coordination structures (transient bonds formed between lithium ions and surrounding atoms or molecules). This dynamic, short-range transport pathway avoids the resistance associated with solvation structures in traditional liquid electrolytes and the fixed lattice site constraints of solid electrolytes. The result is high ionic conductivity coupled with superior interface stability.
- **Manufacturing Expertise:** ProLogium boasts over 13 years of accumulated manufacturing expertise, having already commercialized a highly efficient roll-to-roll ceramic separator coating process. This established manufacturing foundation is crucial for the mass production of next-generation batteries incorporating the DCN electrolyte.

Background and Industry Context: Surpassing Limitations of Liquid and Solid Electrolytes

Current mainstream lithium-ion batteries utilize liquid electrolytes, which offer high ionic conductivity but suffer from safety risks due to flammability and leakage, alongside dendrite formation issues. In contrast, solid-state batteries aim to dramatically improve safety by replacing liquid with solid electrolytes, yet they still face significant challenges with low ionic conductivity and high interfacial resistance between electrodes.

ProLogium's DCN electrolyte offers a "third path" to overcome the limitations of both approaches, aiming to combine the advantages of liquids and solids while mitigating their respective drawbacks. This innovation is expected to enable batteries with exceptional safety, high energy density, fast charging capabilities, and extended lifespan.

Future Outlook: Impact on EV Market and Technology Proliferation

The DCN electrolyte architecture is poised to have a profound impact, particularly on the electric vehicle market. Batteries with enhanced safety and performance will contribute to extended EV driving ranges, reduced strain on charging infrastructure, and increased consumer confidence. ProLogium plans to accelerate the commercialization of batteries incorporating this technology and strengthen collaborations with global automotive manufacturers. This announcement represents not just a technical innovation but potentially a paradigm shift, leading the way for the next-generation battery industry.

Source: <https://markets.businessinsider.com/news/stocks/prologium-unveils-dcn-opening-a-third-state-electrolyte-universe-at-paris-motor-show-1036608719>

#02 Arkema: Incellion and Kynar binder specs for 2026 EV batteries

Published October 09, 2026 Arkema France



OVERVIEW

French chemical giant Arkema will present advanced material solutions for electric vehicle (EV) and energy storage system (ESS) batteries at The Battery Show North America 2026. The company is offering its Incellion® brand acrylic binders, specifically designed for silicon-based anodes, to enable higher active material loading and significantly boost energy density. Additionally, Arkema will showcase its Kynar® PVDF products, utilized as cathode binders and separator coatings for Lithium Iron Phosphate (LFP) batteries, contributing to higher energy density and improved durability. These solutions are engineered to support the performance enhancement and manufacturing efficiency of next-generation batteries.

Key Findings: Arkema Enhances Energy Density with Incellion® Acrylic Binders and Kynar® PVDF for EV and ESS Batteries

Arkema, a leading French chemical company, has announced its array of high-performance material solutions aimed at revolutionizing electric vehicle (EV) and energy storage system (ESS) battery manufacturing, to be showcased at The Battery Show North America 2026. Central to Arkema's presentation are its Incellion® brand acrylic binders, specifically developed for silicon-based anodes, and its Kynar® PVDF products for Lithium Iron Phosphate (LFP) batteries. These materials are engineered to maximize active material loading within battery cells, thereby significantly boosting the overall energy density of batteries.

Technical and Product Details: Binder Technologies Enabling High Active Material Loading

- **Incellion® Acrylic Binders:** Specifically designed for silicon-based anodes, these acrylic binders possess high flexibility and adhesion to withstand the significant volumetric expansion (up to 300%) that occurs in silicon during charge and discharge cycles. This ensures the structural integrity of the electrode is maintained, allowing for stable retention of high-content silicon active material, which directly contributes to a substantial increase in energy density.
- **Kynar® PVDF Products:** Used as cathode binders for Lithium Iron Phosphate (LFP) batteries and as separator coating materials. Polyvinylidene Fluoride (PVDF) offers exceptional electrochemical stability, thermal resistance, and mechanical strength. These properties contribute to higher energy density, extended lifespan, and enhanced safety of LFP batteries. In separator coatings, PVDF helps prevent short circuits and improves overall battery safety.
- **High Active Material Loading:** Both binder solutions enable a higher proportion of active material to be incorporated into the battery cell. This increases the energy storage capability of the electrode, leading to an improved energy density for the final battery cell.

Background and Industry Context: Rising Performance Requirements for Next-Generation Batteries

The rapid expansion of the EV market and the growing demand for large-scale ESS driven by renewable energy integration are imposing escalating requirements for battery performance and cost efficiency. Specifically, extended driving range necessitates higher energy density, faster charging times demand high rate capability, and improved safety and longevity are paramount. As next-generation materials like silicon anodes and LFP cathodes advance, high-performance binders and separator materials become critically important to maximize their potential and ensure stable battery manufacturing. Arkema's solutions directly address these challenges, serving as key materials to accelerate the commercialization of advanced batteries.

Future Outlook: Contributions to Battery Manufacturing Efficiency and Sustainability

Arkema's material solutions are poised to contribute not only to enhanced battery performance but also to the overall efficiency of battery manufacturing processes. For instance, by enabling higher active material loading, they can lead to reductions in solvent usage during production and lower manufacturing costs through optimized electrode thickness. Furthermore, more durable batteries contribute to extended product lifespans, enhancing resource efficiency and sustainability from a long-term perspective. Arkema plans to continue developing high-performance, sustainable battery solutions in close alignment with the industry's technological roadmap, thereby accelerating the transition to clean energy.

Source: <https://www.arkema.com/usa/en/media/news/global/products/2026/20261009-arkema-at-the-battery-show-north-america/>

#03 QS PowerBlock: QuantumScape AI data center power density specs

Published October 08, 2026 QuantumScape Corporation (NASDAQ: QS) USA



OVERVIEW

QuantumScape has introduced 'QS PowerBlock,' a modular energy storage system specifically designed for AI data centers, offering 4x the power density and 5x the runtime of current industry standards. This system supports 800VDC architectures and demonstrates exceptional thermal stability exceeding 300°C, surpassing key Open Compute Project (OCP) specifications. The QS PowerBlock enhances safety and performance for demanding AI workloads, promising significant improvements in data center efficiency and reliability.

Key Findings

QuantumScape has announced the launch of 'QS PowerBlock,' a modular energy storage system tailored for AI data centers, which promises to revolutionize power delivery for intensive computational workloads. This new system achieves a fourfold increase in power density and a fivefold extension in runtime compared to current data center industry benchmarks. Furthermore, it supports an 800VDC architecture and exhibits thermal stability beyond 300°C, addressing critical safety and performance needs for AI infrastructure.

Technical / Clinical Details

The QS PowerBlock leverages QuantumScape's solid-state battery technology, providing a superior combination of performance and safety that is challenging for traditional lithium-ion batteries. Its modular design allows for seamless integration into data center racks, offering flexibility and scalability for evolving infrastructure needs. The impressive thermal stability, exceeding 300°C, significantly mitigates the risk of thermal runaway, thereby enhancing data center safety protocols. Compliance with and surpassing key Open Compute Project (OCP) specifications ensures that QS PowerBlock not only meets but exceeds the stringent requirements of next-generation AI environments.

Background & Context

AI data centers face unprecedented demands for high-capacity, reliable power delivery due to the escalating computational requirements of AI workloads such as image recognition, natural language processing, and machine learning. Conventional UPS systems and battery solutions often fall short in delivering the required power density in limited spaces or sustaining long operational runtimes. The need for stable power supply and instantaneous response to peak loads is paramount for maximizing AI processing capabilities, making QS PowerBlock a direct and timely solution to these challenges.

Strategic Significance & Outlook

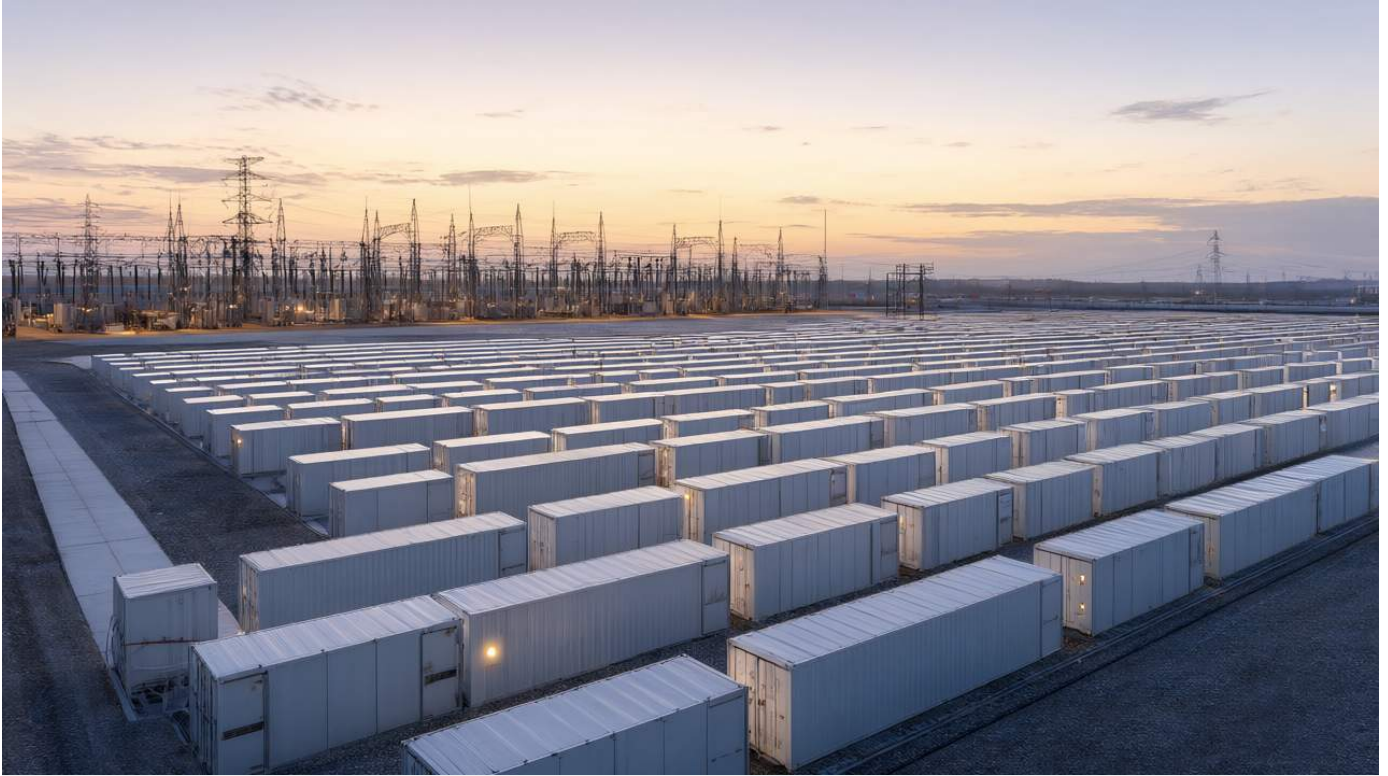
The introduction of QS PowerBlock has the potential to fundamentally transform the design and operation of AI data centers. Its enhanced power efficiency will lead to reduced operational costs, while increased density will optimize space utilization. Data center operators can anticipate benefits in both sustainability and profitability. As the AI market continues its exponential growth, the demand for high-performance, safe, and scalable energy storage solutions like QS PowerBlock is expected to surge, positioning QuantumScape as a critical enabler for the future of AI infrastructure.

Source: <https://www.quantumscape.com/quantumscape-announces-qs-powerblock-for-in-rack-energy-storage-in-ai-data-centers/>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#04 Tesla: 13.7 GWh energy storage deployment and CATL 2026 roadmap

Published October 04, 2026 Venture Atlas USA



OVERVIEW

Tesla deployed 13.7 GWh of energy storage products in Q3 2026, demonstrating continued strong growth in its grid-scale and residential solutions. Concurrently, CATL announced it will commence mass production of its Naxtra sodium-ion batteries by year-end, following initial grid storage deliveries to Chinese customers in September 2026. This dual development highlights both the escalating scale of current Li-ion deployments and the emergence of cost-effective, resource-abundant alternative battery chemistries for the global energy storage market.

Key Findings

Tesla reported a substantial deployment of 13.7 GWh of energy storage products in the third quarter of 2026, underscoring its significant role in the global energy storage market. In parallel, CATL, a leading Chinese battery manufacturer, announced its plans to initiate full-scale mass production of its 'Naxtra' sodium-ion batteries by the end of 2026. This follows CATL's initial deliveries of grid-storage-focused sodium-ion batteries to a Chinese customer in September 2026, indicating rapid commercialization of this alternative battery technology.

Technical / Clinical Details

Tesla's energy storage portfolio, including Megapack and Powerwall, primarily serves utility-scale grid stabilization, commercial and industrial applications, and residential backup power. These systems integrate advanced battery management systems to facilitate renewable energy integration and enhance grid reliability. CATL's Naxtra sodium-ion batteries offer advantages such as lower cost and greater material abundance compared to lithium-ion counterparts. Sodium-ion technology is particularly promising for large-scale grid storage and applications demanding strong low-temperature performance, positioning it as a key lithium-independent storage solution.

Background & Context

The global energy storage market is expanding rapidly, driven by the increasing deployment of renewable energy sources and the critical need for grid modernization. Established players like Tesla are meeting this demand by scaling up their supply capabilities. Simultaneously, innovators such as CATL are pursuing the development and commercialization of alternative technologies like sodium-ion batteries to address challenges such as lithium price volatility and supply chain diversification. China, in particular, has a robust demand for grid-scale energy storage, making sodium-ion batteries a strategically important development.

Strategic Significance & Outlook

Tesla's continuous large-scale deployments affirm that energy storage is becoming an indispensable component of modern electrical infrastructure, moving beyond niche applications. CATL's entry into mass production of sodium-ion batteries is expected to intensify competition within the battery industry, broaden supply chain options, and accelerate the adoption of more cost-effective energy storage solutions. These developments collectively signify a crucial step in the evolution of next-generation energy storage technologies, paving the way for a more sustainable and resilient energy future.

Source: <https://www.ventureatlas.org/industry/energy-storage>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#05 Silicon Anodes vs Graphite: 20% EV range boost and 2026 timeline

Published October 07, 2026 一般記事 USA



OVERVIEW

Silicon anodes are rapidly advancing as a next-generation EV battery technology, capable of storing approximately 10 times more charge than graphite and enabling faster charging. The significant challenge of 300-400% volumetric expansion during charging has been largely overcome through silicon-graphite hybrid anodes, which now offer about 20% longer range than their graphite counterparts. Companies like Sila Nanotechnologies and Group14 Technologies are driving mass production, with Mercedes-Benz already incorporating high-silicon anode batteries into production vehicles, accelerating market adoption.

Key Findings

Silicon anode materials are rapidly moving towards widespread commercialization as a transformative technology for electric vehicle (EV) batteries, promising significant improvements in energy density and charging speed. Compared to traditional graphite anodes, silicon possesses the capacity to store approximately ten times more charge, which is expected to extend EV driving ranges substantially and drastically reduce charging times. Currently, many EVs entering the market incorporate silicon-graphite or silicon-carbon hybrid anodes, achieving approximately 20% longer range than their pure graphite-based predecessors.

Technical / Clinical Details

The primary hurdle for silicon anodes was the dramatic volumetric expansion, typically ranging from 300-400%, that occurs during repeated charging and discharging cycles. This expansion historically led to structural degradation of the electrode and shortened cycle life, posing a significant barrier to practical application. However, advancements in material science, particularly the use of nanostructured silicon particles or silicon integrated into composite materials with graphite, have largely mitigated this expansion issue. Innovations such as porous silicon, silicon nanowires, and silicon oxides are now enabling high energy density while maintaining excellent cycle stability by accommodating volumetric changes.

Background & Context

The burgeoning EV market intensifies the pressure for battery technologies that offer longer ranges, faster charging capabilities, and lower costs to meet consumer expectations. While graphite anodes have been the standard for lithium-ion batteries for decades, their theoretical energy density limits are being approached. Silicon anodes offer a breakthrough beyond these limits and are expected to drive the next major evolution in battery technology. The substantial investments and focus on mass production by companies like Sila Nanotechnologies and Group14 Technologies underscore the high market potential of this technology.

Strategic Significance & Outlook

Mercedes-Benz's adoption of high-silicon anode batteries in its production EVs clearly indicates the technology's transition from research to commercial deployment. As silicon anode costs become more competitive and scalability is further established, more EV manufacturers are anticipated to integrate this material. This will not only enhance EV performance and accelerate consumer acceptance but also stimulate innovation across the entire battery industry. Silicon's potential extends beyond increasing lithium-ion battery energy density; it also holds promise as a critical enabler for future battery technologies, including all-solid-state batteries.

Source: <https://www.evinfrastructurenews.com/ev-battery/silicon-vs-graphite-anodes>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#06 Tesla Powerwall: How VPPs delivered 517MW to California in 2026

Published October 08, 2026 BASENOR USA



OVERVIEW

On October 8, 2026, residential batteries collectively supplied 600MW to the grid, matching the output of a medium-sized power plant and demonstrating the critical role of distributed energy resources. Notably, during a California heatwave on September 9, 2026, Tesla and Sunrun orchestrated the largest residential Virtual Power Plant (VPP) event ever, delivering 580MW. Tesla Powerwall alone contributed 517MW from approximately 110,000 customer-owned batteries, totaling 5GWh supplied to California's grid year-to-date, underscoring the VPP's burgeoning capacity to stabilize power during peak demand.

Key Findings

On October 8, 2026, home batteries across the United States collectively injected a remarkable 600MW of power into the grid, an output comparable to a medium-sized power plant. This significant event highlights the increasing viability and critical role of distributed energy resources (DERs) in bolstering grid stability, particularly in balancing the intermittent nature of renewable energy sources.

Technical / Clinical Details

A standout achievement within this context was the response to a severe California heatwave on September 9, 2026. During this period, Tesla and Sunrun collaborated to coordinate the largest residential Virtual Power Plant (VPP) event on record, successfully dispatching 580MW from residential battery systems. Tesla Powerwall units alone contributed a substantial 517MW from approximately 110,000 customer-owned batteries. This contribution brought Tesla Powerwall's cumulative supply to California's grid to an impressive 5GWh for 2026. These VPPs function by aggregating thousands of individual home batteries, allowing them to collectively discharge power to the grid during periods of high demand, thereby alleviating strain and preventing potential blackouts.

Background & Context

The proliferation of renewable energy, especially solar, has underscored the need for robust energy storage solutions to manage variability and ensure grid reliability. VPPs represent a sophisticated evolution in grid management, transforming disparate small-scale energy assets into a unified, dispatchable resource. This model contrasts sharply with traditional centralized power generation, offering enhanced flexibility and resilience. The observed performance of VPPs, particularly in high-stress scenarios like extreme heat events, validates their technical and operational efficacy as a crucial component of modern energy infrastructure.

Strategic Significance & Outlook

The success of home batteries and VPPs in providing significant grid support signals a paradigm shift in energy management. For researchers, it underscores the importance of optimizing battery control algorithms and communication protocols for seamless grid integration. Engineers will focus on scaling these systems, improving interoperability, and reducing installation complexities. Investors are presented with compelling opportunities in VPP platforms, battery manufacturing, and smart home energy solutions, as the market for these distributed resources expands. This trend is set to accelerate the transition towards a more decentralized, sustainable, and resilient energy ecosystem, empowering consumers while strengthening national energy security.

Source: <https://www.basenor.com/blogs/news/home-batteries-just-sent-600mw-to-the-grid-5-numbers-that-matter>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#07 Nano One: One-Pot™ technology and LFP feedstock supplier specs

Published October 08, 2026 Nano One Materials Corp. Canada



OVERVIEW

Nano One announced the successful validation of diverse feedstock suppliers for producing Lithium Iron Phosphate (LFP) cathode active material (CAM) directly from lithium carbonate, iron, and phosphoric acid, bypassing reliance on Chinese-made LFP precursors (pCAM) using its One-Pot™ technology. This advancement significantly mitigates geopolitical risks in the LFP supply chain and enhances transparency at the raw material level. The company has identified supply sources across Canada, the U.S., Europe, Chile, and Argentina, establishing a more resilient and sustainable supply network for battery manufacturers globally.

Key Findings

Nano One Materials Corp. has announced the successful validation of diverse feedstock suppliers for the direct production of Lithium Iron Phosphate (LFP) cathode active material (CAM) from lithium carbonate, iron, and phosphoric acid. This achievement, utilizing Nano One's proprietary One-Pot™ technology, eliminates dependency on Chinese-made LFP precursors (pCAM), significantly reducing geopolitical risks in the LFP supply chain and enhancing transparency in raw material sourcing.

Technical / Process Details

Nano One's One-Pot™ process represents a paradigm shift from conventional LFP manufacturing, which typically involves multiple steps and intermediate products. This innovative technology enables the direct synthesis of high-purity, high-performance LFP cathode material from fundamental raw materials. This direct synthesis approach circumvents the complex precursor material (pCAM) supply chain, leading to a simplified and more efficient manufacturing process. The company has identified and validated reliable feedstock sources across multiple regions, including Canada, the United States, Europe, Chile, and Argentina. This geographical diversification strengthens the overall supply chain resilience by reducing reliance on a single region.

Background & Context

The global demand for LFP batteries has surged with the rapid expansion of the electric vehicle (EV) and stationary energy storage system (ESS) markets. However, a significant reliance on China, the leading producer of LFP, has exposed the industry to geopolitical tensions and trade policy volatilities, creating supply chain vulnerabilities. Many nations and corporations are actively seeking to diversify these risks and strengthen their domestic supply chains. Nano One's efforts align perfectly with this global trend towards de-risking supply chains, offering North American and European battery manufacturers a solution to secure more stable, transparent, and sustainable LFP sources. This initiative has the potential to contribute to the overall sustainability and competitiveness of the battery industry.

Strategic Significance & Outlook

The validation of diverse LFP feedstock suppliers by Nano One accelerates the commercialization of its One-Pot™ technology and has the potential to profoundly reshape the global LFP production ecosystem. By providing supply chain transparency and geographical diversity, this technology can further catalyze the adoption of LFP batteries, ultimately contributing to cost reduction and enhanced supply stability for electric vehicles and renewable energy storage. It is anticipated that more battery manufacturers will adopt such decentralized and resilient supply chain models in the future, thereby boosting the widespread deployment of LFP battery technology globally.

Source: <https://www.morningstar.com/news/business-wire/20261008423373/nano-one-provides-update-on-validated-feedstock-suppliers-for-lfp-cathode-production>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#08 GM: Integration of Cirba Solutions recycled cathode material

Published October 06, 2026 Winssolutions USA



OVERVIEW

General Motors has commenced using recycled cathode active material (CAM) from Cirba Solutions in its production electric vehicle (EV) batteries, marking a significant step from pilot to mainstream automotive supply chains. This CAM is produced through an advanced recycling process that recovers up to 95% of nickel, cobalt, and manganese, and 80% of lithium from spent EV battery packs. This initiative establishes a crucial closed-loop EV battery supply chain, reducing reliance on virgin materials and enhancing sustainability across the EV industry.

Key Findings

General Motors (GM) has begun incorporating recycled cathode active material (CAM) manufactured by Cirba Solutions into its production electric vehicle (EV) batteries. This move represents a landmark transition for recycled battery components from the testing phase into a mainstream automotive supply chain, significantly boosting sustainability and resource efficiency in EV battery manufacturing.

Technical Details

- Cirba Solutions' recycling process efficiently recovers critical precious metals from spent EV battery packs, achieving up to 95% recovery for nickel, cobalt, and manganese, and 80% for lithium.
- These recovered metals are then repurposed for the production of new CAM, thereby reducing dependency on virgin raw materials.
- GM's adoption of recycled CAM underscores its commitment to circular economy principles and environmental stewardship in EV production.

Background & Context

The burgeoning EV market faces pressing challenges related to raw material sourcing and end-of-life battery management. Advances in recycling technology are pivotal for addressing these issues and bolstering the resilience of the battery supply chain. Historically, recycled materials have been confined to R&D or niche applications; however, GM's integration into production vehicles signifies the maturity and proven reliability of such technologies. This also aligns with global efforts to localize supply chains and reduce reliance on volatile international markets for critical minerals.

Strategic Significance & Outlook

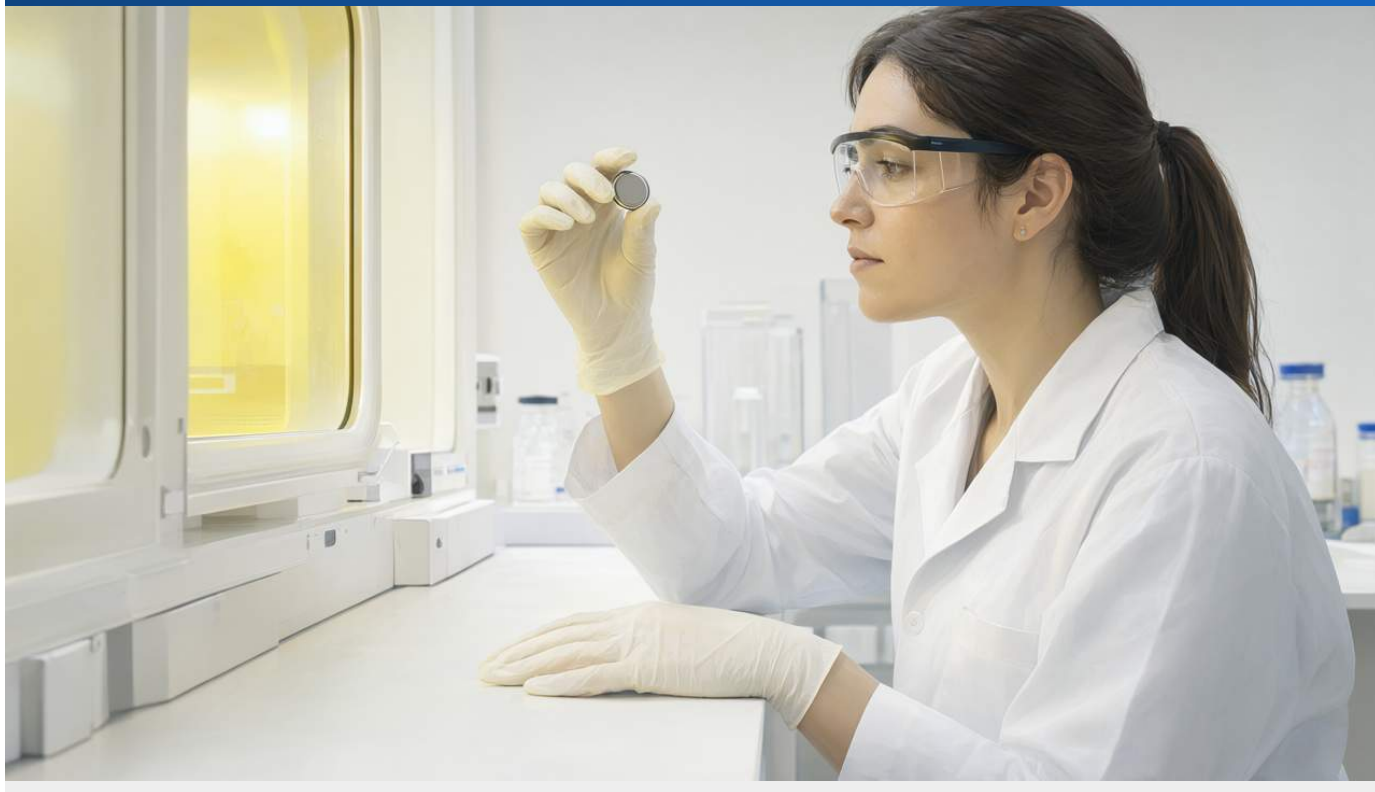
GM's decision is poised to catalyze broader adoption of recycled battery materials across the automotive sector. This could lead to substantial reductions in EV battery manufacturing costs, mitigate geopolitical supply risks, and foster a more robust circular economy. By spearheading this initiative, GM is demonstrating leadership in driving a sustainable future for electric mobility, potentially influencing industry benchmarks and regulatory frameworks worldwide.

Source: <https://www.winssolutions.org/gm-cirba-recycled-ev-battery-cathode/>

Collected: October 09, 2026 | Automated Research System (Gemini API)

#09 Li-S Batteries: Tohoku University 674 Wh/kg energy density specs

Published October 06, 2026 Tech Briefs (Battery & Electrification Technology Magazine)
Japan



OVERVIEW

Researchers at Tohoku University have developed a novel COF-graphene interlayer that significantly boosts the performance of lithium-sulfur (Li-S) batteries. This innovative interlayer effectively suppresses the polysulfide shuttling effect, a major challenge in Li-S battery technology. Pouch cells incorporating this interlayer demonstrated a high initial energy density of approximately 674 Wh kg⁻¹ at 0.05 A g⁻¹ and maintained a reversible capacity of 1455.7 mA h g⁻¹ at 0.2 A g⁻¹. Crucially, the cells exhibited exceptional long-term durability with only 0.034% capacity degradation after 1000 cycles at a high current density of 5 A g⁻¹, marking a substantial advance towards commercial Li-S battery viability.

Key Findings

Researchers at Tohoku University have made a significant breakthrough in lithium-sulfur (Li-S) battery technology by developing a novel COF-graphene interlayer. This innovation substantially enhances both the energy density and cycle stability of Li-S cells, addressing critical barriers to their commercialization.

Technical Details

Li-S batteries offer a theoretically high energy density, but their practical application has been hampered by the 'polysulfide shuttling effect.' This phenomenon involves the dissolution of polysulfide intermediates from the sulfur cathode into the electrolyte, their migration to the anode, and subsequent re-migration to the cathode, leading to rapid capacity decay and low Coulombic efficiency. The Tohoku University team successfully mitigated this issue by designing an interlayer composed of covalent organic frameworks (COFs) and graphene composites.

Specifically, Li-S pouch cells integrated with this COF-graphene interlayer achieved an impressive initial energy density of approximately 674 Wh kg^{-1} at a low current density of 0.05 A g^{-1} . This represents a significant improvement over previous Li-S battery designs. Furthermore, the cells maintained a high reversible capacity of $1455.7 \text{ mA h g}^{-1}$ at a current density of 0.2 A g^{-1} . A remarkable highlight of this research is the exceptional long-term durability demonstrated: the cells exhibited a mere 0.034% capacity degradation after 1000 cycles, even under a high current density of 5 A g^{-1} . This performance is attributed to the synergistic effects of the COF material's uniform pore structure, which effectively adsorbs polysulfides, and graphene's high electrical conductivity, which promotes efficient electrochemical reactions.

Background & Context

The burgeoning demand for electric vehicles (EVs) and grid-scale energy storage systems necessitates battery technologies with higher energy densities and lower costs than current lithium-ion solutions. Li-S batteries are highly promising candidates due to the abundance of sulfur as a cathode material and a theoretical energy density roughly five times that of conventional lithium-ion batteries. However, challenges such as polysulfide shuttling, significant volume changes during cycling, and the low intrinsic conductivity of sulfur have impeded their practical implementation. This new interlayer technology represents a crucial step in overcoming these hurdles, potentially accelerating the widespread adoption of Li-S batteries.

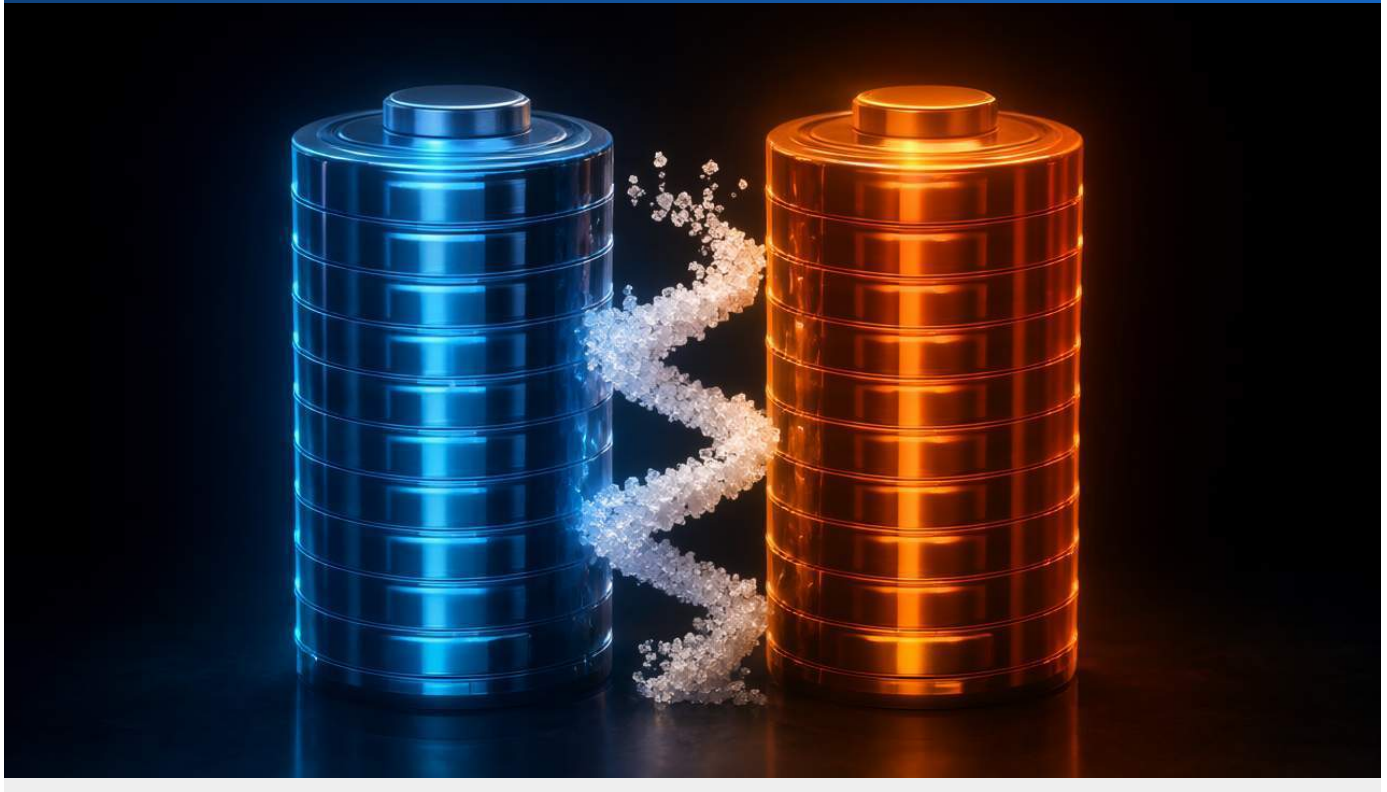
Strategic Significance & Outlook

The developed COF-graphene interlayer is a pivotal breakthrough for the commercialization of Li-S batteries. The combination of extended cycle life and high energy density offers significant advantages for increasing EV driving ranges and for large-scale renewable energy storage applications. Future efforts will likely focus on further scaling up capacity, optimizing cost, and establishing mass production techniques. This technology is poised to facilitate the realization of Li-S batteries that combine high energy density with long lifespan, opening new horizons in the field of energy storage and potentially impacting global energy transition strategies.

Source: <https://www.techbriefs.com/component/content/article/55984-a-cof-graphene-hybrid-opens-new-horizons-for-lithium-sulfur-batteries>

#10 Sodium-Ion Batteries: LG and Samsung SDI production vs CATL

Published October 02, 2026 Businesskorea South Korea



OVERVIEW

South Korean battery giants LG Energy Solution and Samsung SDI are accelerating sodium-ion battery (SIB) production to compete with China's leading firm CATL. Both companies plan to leverage existing lithium-ion production lines to reduce new investment burdens while commercializing SIBs. Expected to be highly competitive in the energy storage system (ESS) market due to cost-effectiveness, longevity, safety, and excellent low-temperature performance—retaining over 92% capacity at -20°C —SIBs are a key focus. CATL's 'TENER Sodium' boasts a lifespan exceeding 10,000 cycles at 45°C .

Key Findings: LG Energy Solution and Samsung SDI Accelerate Sodium-Ion Battery Production

Leading South Korean battery manufacturers, LG Energy Solution and Samsung SDI, are ramping up their sodium-ion battery (SIB) production strategies to counter the market dominance of China's CATL. Both companies plan to commercialize SIBs by partially retooling existing lithium-ion battery production lines, thereby mitigating the burden of new capital investments. This strategic pivot is driven by the recognition that SIBs, with their compelling price competitiveness, extended cycle life, enhanced safety, and superior low-temperature performance, will play a crucial role, especially in the energy storage system (ESS) market.

Technical and Corporate Strategy Details

Leveraging years of accumulated expertise in battery manufacturing and robust supply chains, LG Energy Solution and Samsung SDI are intensifying their entry into the SIB market. Their strategy focuses on the following technical and business advantages:

- **Retooling Existing Lines:** The ability to repurpose a portion of their current lithium-ion production lines significantly reduces the risk of new SIB investments and shortens time-to-market. This enables rapid response to the burgeoning SIB market.
- **Price Competitiveness:** Sodium is more abundant and less expensive than lithium, inherently giving SIBs a strong cost advantage. This is expected to drive adoption, particularly in cost-sensitive ESS and entry-level EV markets.
- **Superior Low-Temperature Performance:** SIBs exhibit less performance degradation in cold environments compared to lithium-ion batteries. CATL's 'TENER Sodium,' for instance, reportedly maintains over 92% capacity at -20°C, a critical feature for stable operation of ESS and EVs in cold regions.
- **Safety and Long Lifespan:** The excellent thermal stability and low risk of thermal runaway are essential requirements for grid-scale ESS. Furthermore, a long lifespan, exemplified by CATL's claim of over 10,000 cycles at 45°C for its TENER Sodium, reduces total cost of ownership and shortens the return on investment period.

These attributes position SIBs as indispensable solutions for integrating renewable energy, stabilizing grids, and enhancing the reliability of power supply.

Background and Industry Context

Amidst a global energy transition, the demand for large-scale energy storage systems is rapidly expanding. China's CATL has aggressively pursued mass production and commercialization of SIBs, securing a leading position in the global market. In this landscape, South Korean battery manufacturers must not only maintain their leadership in the lithium-ion market but also establish competitiveness in the next-generation SIB sector. The South Korean government has also set a 2030 commercialization target for SIBs, further bolstering domestic manufacturers' efforts. This intensified market competition is expected to drive further innovation and cost reductions in SIB technology, contributing to the diversification of global energy storage solutions.

Strategic Significance and Outlook

The expansion of SIB production by LG Energy Solution and Samsung SDI could significantly alter the competitive landscape of the global battery market. Particularly in the ESS market, the cost-efficiency and performance of SIBs are expected to accelerate their adoption. Both companies aim to leverage their existing customer base and advanced manufacturing capabilities to catch up with CATL's lead and establish SIBs as a new growth engine. Future focus will be on further improving energy density, scaling up production, and building global supply chains. Successful execution of these initiatives would solidify South Korean manufacturers' position as global leaders in the SIB market, contributing to a sustainable energy future.

Source: <https://www.businesskorea.co.kr/news/articleView.html?idxno=278183>

Collected: October 09, 2026 | Automated Research System (Gemini API)