

TROY TECHNICAL

NEXT-GENERATION ENERGY STORAGE WEEKLY REPORT

October 1 - October 2, 2026 | Issue 2026-W39

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

10

ANALYZED ARTICLES

10

PRIORITY THEMES

Issued 2026-10-02 | 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

LG Energy Solution: Na-Ion battery production lines in 2026

LG Energy Solution has set up sodium-ion battery production lines in Nanjing, China, and Ochang, South Korea, initiating preparations for commercialization.

SIGNAL 02 | CELL DESIGN

Dongguang: Iron phosphate black mass 60,000 ton capacity plan

Dongguang, Hebei, China, has approved a \$4.35 million (31.8 million RMB) iron phosphate black mass regeneration project.

SIGNAL 03 | MANUFACTURING

GM LMR Batteries: Mass production roadmap for 400+ mile range

General Motors (GM) announced the world's first mass production of prismatic Lithium Manganese Rich (LMR) battery cells at its Ultium Cells plant in Spring Hill, Tennessee, a joint venture with LG Energy Solution.

SIGNAL 04 | SYSTEM VALIDATION

Sodium-Ion batteries: South Korea's 220Wh/kg 2030 roadmap

The South Korean government has unveiled a new 'Battery Industry Technology Roadmap,' urging domestic manufacturers to pivot towards sodium-ion battery development.

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

60 GW

A01

SOURCE-BOUND CONDITION

Concurrently, China's CATL secured the world's largest sodium-ion battery supply contract with ESS company Hyperstrong, committing 60 GWh over three years.

\$4.35
million

A04

SOURCE-BOUND CONDITION

Dongguang, Hebei, China, has approved a \$4.35 million (31.8 million RMB) iron phosphate black mass regeneration project.

33%

A10

SOURCE-BOUND CONDITION

This new LMR technology offers 33% higher energy density at the cell level compared to Lithium Iron Phosphate (LFP) chemistries, while maintaining comparable costs.

160W

A05

SOURCE-BOUND CONDITION

The roadmap targets commercialization of sodium-ion batteries with an energy density of 160Wh/kg by 2027, escalating to 220Wh/kg by 2030, prioritizing applications in energy storage systems (ESS) and low-cost electric.

58%

A02

SOURCE-BOUND CONDITION

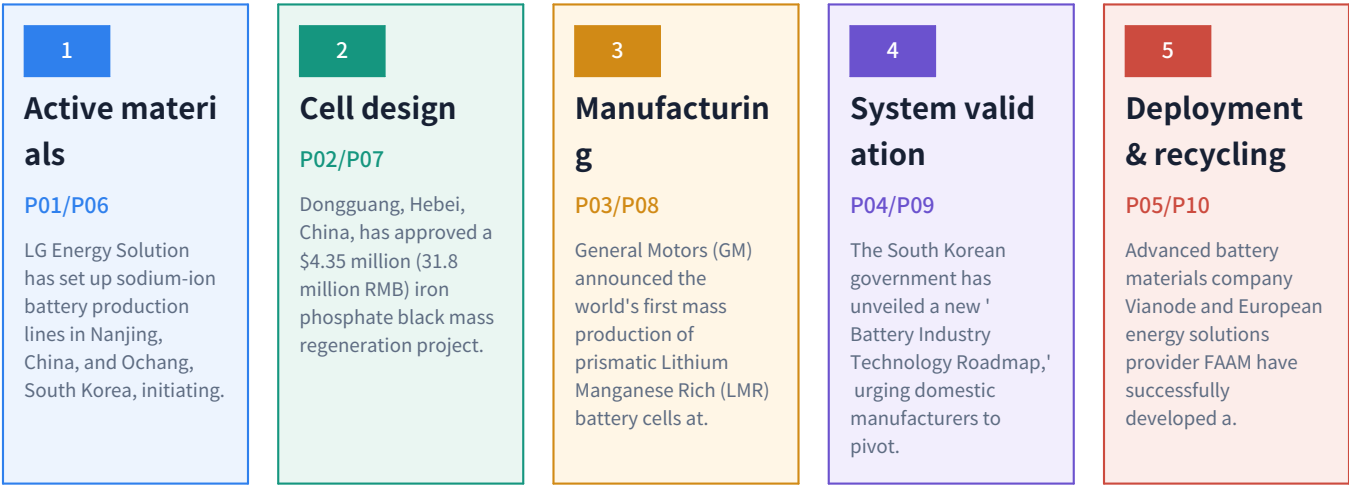
This innovation led to a 58% increase in sulfur-specific capacity, achieving over 1,700 Wh/kg specific energy at the electrode level.

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.



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

LG Energy Solution: Na-Ion battery production lines in 2026

A01 | Active materials | Product adoption

Date not stated

FACT

LG Energy Solution has set up sodium-ion battery production lines in Nanjing, China, and Ochang, South Korea, initiating preparations for commercialization. Concurrently, China's CATL secured the world's largest sodium-ion battery supply contract with ESS company Hyperstrong, committing 60 GWh over three years. CATL's "TENER Sodium" ESS product boasts over 10,000 charge-discharge cycles at 45°C and maintains over 92% capacity at -20°C, highlighting its market superiority.

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

P02

Dongguang: Iron phosphate black mass 60,000 ton capacity plan

A04 | Cell design | Scale-up

Date not stated

FACT

Dongguang, Hebei, China, has approved a \$4.35 million (31.8 million RMB) iron phosphate black mass regeneration project. This initiative will add 60,000 tons per year of iron phosphate black mass processing capacity to an existing plant, yielding 58,252 tons of iron phosphate powder and 6,911 tons of sodium chloride byproduct. The project underscores China's strategic focus on strengthening the LFP battery supply chain and advancing circular economy principles.

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 5/5 | DECISION LOCUS: BUSINESS / RULES

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

P03

GM LMR Batteries: Mass production roadmap for 400+ mile range

A10 | Manufacturing | Scale-up

Date not stated

FACT

General Motors (GM) announced the world's first mass production of prismatic Lithium Manganese Rich (LMR) battery cells at its Ultium Cells plant in Spring Hill, Tennessee, a joint venture with LG Energy Solution. This new LMR technology offers 33% higher energy density at the cell level compared to Lithium Iron Phosphate (LFP) chemistries, while maintaining comparable costs. GM plans to deploy these batteries in future EV trucks and full-size SUVs, aiming for driving ranges exceeding 400 miles.

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

Sodium-Ion batteries: South Korea's 220Wh/kg 2030 roadmap

A05 | System validation | Research

Date not stated

FACT

The South Korean government has unveiled a new 'Battery Industry Technology Roadmap,' urging domestic manufacturers to pivot towards sodium-ion battery development. The roadmap targets commercialization of sodium-ion batteries with an energy density of 160Wh/kg by 2027, escalating to 220Wh/kg by 2030, prioritizing applications in energy storage systems (ESS) and low-cost electric vehicles (EVs).

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 21/25 | MATURITY 1/5 | DECISION LOCUS: SYSTEM / ADOPTION

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

P05

Vianode & FAAM: Graphite anode recycling from production scrap

A08 | Deployment & recycling | Product adoption

Date not stated

FACT

Advanced battery materials company Vianode and European energy solutions provider FAAM have successfully developed a groundbreaking process to recycle graphite from battery production scrap into high-performance anode material. This collaboration leverages Vianode's synthetic graphite expertise and FAAM's manufacturing know-how to ensure recovered graphite maintains the purity, consistency, and electrochemical performance required for lithium-ion batteries.

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: TECH / PROCESS

P06

KAIST Li-Sulfur Battery: Bendable nanowire cathode specs for 2026

A09 | Active materials | Product adoption

Date not stated

FACT

A KAIST-led research team has developed an S/NCSe@CC nanowire cathode architecture for flexible lithium-sulfur batteries that maintains high performance even when bent or wrapped around curved structures. This novel cathode achieves an impressive discharge capacity of 1,544 mAh/g at a mild 0.1C rate, approaching its theoretical limit.

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

Lithium-Sulfur batteries: Specs for 1,700 Wh/kg energy density

A02 | Cell design | Product adoption

Date not stated

FACT

New research published in Nature Energy reports a significant breakthrough in lithium-sulfur (Li-S) battery technology, increasing operating voltage from 2.05V to 2.54V by extracting three electrons per sulfur atom instead of two. This innovation led to a 58% increase in sulfur-specific capacity, achieving over 1,700 Wh/kg specific energy at the electrode 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 P07.

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

P08

NFPA 855 & UL 9540A: Li-ion battery fire safety specs for 2026

A06 | Manufacturing | Research

Date not stated

FACT

From a facilities management perspective, the article highlights the critical importance of managing fire risks associated with integrating lithium-ion batteries into built environments. As evidenced by multiple fire incidents in New York City in 2024, proper installation, charging practices, and regulatory compliance are essential.

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

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

P09

Li-S Energy: Pegasus drone flight range and battery specs

A03 | System validation | Research

Date not stated

FACT

Li-S Energy, a lithium-sulfur (Li-S) battery developer, announced a successful test flight of its 'Pegasus' drone, powered by their Li-S batteries, achieving nearly two hours of flight time and over 75 kilometers of range. Utilizing proprietary nanomaterials like Boron Nitride Nanotubes and Li-Nanomesh, Li-S Energy's batteries deliver approximately twice the energy density of conventional lithium-ion cells.

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: SYSTEM / ADOPTION

P10

Black Mass Recovery: 93% recycling rate at \$0.11/kg cost specs

A07 | Deployment & recycling | Research

Date not stated

FACT

A novel recycling process demonstrated highly efficient black mass recovery rates of 93.28% from electric vehicle (EV) battery modules and 75.77% from smartphone cells. This innovative custom separation line, combining shredders, air classifiers, and vibrating screens, achieved a direct processing cost of just \$0.11 per kilogram of EV battery input.

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 19/25 | MATURITY 1/5 | 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	LG Energy Solution: Na-Ion battery production lines in 2026	https://www.businesskorea.co.kr/news/articleView.html?idxno=278183
A02	Lithium-Sulfur batteries: Specs for 1,700 Wh/kg energy density	https://energynews.biz/lithium-sulfur-battery-disulfur-dichloride-cycle-li-fe/
A03	Li-S Energy: Pegasus drone flight range and battery specs	https://finance.biggo.com/news/404a6d83-7b88-403e-9129-a157aabfdee0
A04	Dongguang: Iron phosphate black mass 60,000 ton capacity plan	https://news.metal.com/en/newscontent/104139945-dongguang-hebei-approves-318m-iron-phosphate-black-mass-regeneration-project
A05	Sodium-Ion batteries: South Korea's 220Wh/kg 2030 roadmap	https://www.ess-news.com/2026/09/29/south-korea-marks-major-shift-to-sodium-ion-batteries-to-regain-market/
A06	NFPA 855 & UL 9540A: Li-ion battery fire safety specs for 2026	https://www.facilitiesnet.com/firesafety/article/Lithium-Ion-Battery-Safety-Considerations-in-the-Built-Environment--21125
A07	Black Mass Recovery: 93% recycling rate at \$0.11/kg cost specs	https://bioengineer.org/recyclings-hidden-workhorse-how-black-mass-separation-could-make-battery-reuse-pay/
A08	Vianode & FAAM: Graphite anode recycling from production scrap	https://www.tradingview.com/news/reuters.com,2026-09-29:newsml_Zaw7IrylW:0-zawya-vianode-faam-achieve-breakthrough-in-battery-graphite-recycling/
A09	KAIST Li-Sulfur Battery: Bendable nanowire cathode specs for 2026	https://bioengineer.org/bendable-battery-breakthrough-nanowire-cathode-lets-lithium-sulfur-cells-wrap-around-drone-legs/
A10	GM LMR Batteries: Mass production roadmap for 400+ mile range	https://electrek.co/2026/09/29/gms-new-ev-battery-tech-cut-costs-without-sacrificing-range/

NextGenEnergyStorage — Selected Articles

Date: 2026-10-04

Articles: 10

Table of Contents

- #01 LG Energy Solution: Na-Ion battery production lines in 2026
- #02 Lithium-Sulfur batteries: Specs for 1,700 Wh/kg energy density
- #03 Li-S Energy: Pegasus drone flight range and battery specs
- #04 Dongguang: Iron phosphate black mass 60,000 ton capacity plan
- #05 Sodium-Ion batteries: South Korea's 220Wh/kg 2030 roadmap
- #06 NFPA 855 & UL 9540A: Li-ion battery fire safety specs for 2026
- #07 Black Mass Recovery: 93% recycling rate at \$0.11/kg cost specs
- #08 Vianode & FAAM: Graphite anode recycling from production scrap
- #09 KAIST Li-Sulfur Battery: Bendable nanowire cathode specs for 2026
- #10 GM LMR Batteries: Mass production roadmap for 400+ mile range

#01 LG Energy Solution: Na-Ion battery production lines in 2026

Published October 02, 2026 Businesskorea South Korea



OVERVIEW

LG Energy Solution has set up sodium-ion battery production lines in Nanjing, China, and Ochang, South Korea, initiating preparations for commercialization. Concurrently, China's CATL secured the world's largest sodium-ion battery supply contract with ESS company Hyperstrong, committing 60 GWh over three years. CATL's "TENER Sodium" ESS product boasts over 10,000 charge-discharge cycles at 45°C and maintains over 92% capacity at -20°C, highlighting its market superiority. These developments underscore major battery manufacturers' significant investment and deployment in sodium-ion batteries as a key next-generation energy storage solution.

Key Findings

LG Energy Solution has taken a significant step towards the commercialization of sodium-ion battery (Na-ion battery) technology by establishing production lines in Nanjing, China, and Ochang, South Korea. Concurrently, Chinese battery giant CATL has signed the world's largest sodium-ion battery supply agreement with energy storage system (ESS) company Hyperstrong, committing to deliver a total of 60 GWh of Na-ion batteries over the next three years. This contract clearly indicates the surging demand and supply in the sodium-ion battery market.

Technical Details

LG Energy Solution is leveraging its established manufacturing infrastructure to build efficient production capabilities for sodium-ion batteries. Meanwhile, CATL's next-generation ESS product, "TENER Sodium," stands out for its exceptional performance. It achieves over 10,000 charge-discharge cycles at a high temperature of 45°C, offering long-term reliability and durability. Furthermore, it maintains over 92% capacity even in extreme cold conditions of -20°C, ensuring stable operation across a wide range of climates. These performance metrics suggest that sodium-ion batteries could rival or even surpass lithium-ion batteries in grid-scale storage and demanding environmental applications.

Background & Context

While lithium-ion batteries continue to lead the battery market, the soaring prices and supply instability of key raw materials like lithium, cobalt, and nickel are accelerating investments in alternative technologies. Sodium-ion batteries, which use abundant and inexpensive sodium as their primary material, are emerging as a cost-effective solution to these challenges. The push by major Chinese and Korean manufacturers towards large-scale production and supply agreements signifies that sodium-ion batteries are no longer just a research-phase technology but are ready to play a significant role in the global energy storage and electric vehicle markets. This shift indicates an era of intensifying competition and diverse solutions entering the next-generation battery market.

Strategic Significance & Outlook

The moves by LG Energy Solution and CATL are poised to significantly boost the global market presence of sodium-ion batteries. Particularly, CATL's 60 GWh supply agreement with Hyperstrong corroborates that sodium-ion batteries are already recognized as an established technology in the large-scale ESS market. In the future, further technological innovation and cost reductions in sodium-ion batteries are expected to accelerate their adoption across a broader range of applications, including electric vehicles, residential energy storage, and large-scale grid storage. This will promote the creation of a more sustainable and diversified energy storage ecosystem, less reliant on lithium-ion batteries.

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

Collected: October 02, 2026 | Automated Research System (Gemini API)

#02 Lithium-Sulfur batteries: Specs for 1,700 Wh/kg energy density

Published October 01, 2026 EnergyNews.biz Unknown



OVERVIEW

New research published in Nature Energy reports a significant breakthrough in lithium-sulfur (Li-S) battery technology, increasing operating voltage from 2.05V to 2.54V by extracting three electrons per sulfur atom instead of two. This innovation led to a 58% increase in sulfur-specific capacity, achieving over 1,700 Wh/kg specific energy at the electrode level. The battery retained 78% capacity after 100 cycles, effectively solving long-standing issues of low voltage, slow redox kinetics, and polysulfide shuttling in Li-S batteries.

Key Findings

A groundbreaking study published in Nature Energy has demonstrated a significant improvement in lithium-sulfur (Li-S) battery performance. This new approach successfully elevated the operating voltage from the conventional 2.05V to 2.54V and enabled the extraction of three electrons per sulfur atom, rather than the previous two. This innovation resulted in a 58% increase in sulfur-specific capacity, achieving an astonishing specific energy density exceeding 1,700 Wh/kg at the electrode level. This advancement represents a major leap towards the practical application of lithium-sulfur batteries.

Technical Details

Researchers optimized new electrolyte and electrode designs to overcome key challenges in Li-S batteries: low voltage, slow redox reaction kinetics, and the polysulfide shuttling effect. Specifically, they controlled the sulfur redox reaction pathway through particular chemical modifications, allowing for greater electron transfer. This improvement fundamentally enhanced the battery's energy storage capacity, breaking through intrinsic performance limits faced by conventional Li-S batteries. In terms of durability, the battery demonstrated robust performance, retaining 78% of its initial capacity after 100 cycles, suggesting practical stability for real-world applications.

Background & Context

Lithium-sulfur batteries have long been anticipated as a next-generation battery due to their theoretically high energy density (approximately five times that of lithium-ion batteries) and the use of abundant, inexpensive sulfur as a cathode material. However, practical implementation has been severely hindered by issues such as low voltage, short cycle life, and capacity degradation and self-discharge caused by the dissolution and migration of polysulfides in the electrolyte (the shuttling effect). The findings from this research present a breakthrough solution to these long-standing challenges, potentially accelerating the commercialization of Li-S batteries significantly.

Strategic Significance & Outlook

This research significantly expands the potential of lithium-sulfur batteries as a next-generation power source for high-energy-density applications, particularly in electric vehicles, aircraft, and drones. The reported specific energy density of over 1,700 Wh/kg vastly surpasses existing lithium-ion batteries. If realized commercially, it is expected to dramatically extend the range of electric vehicles and accelerate the development of electric aircraft. Moving forward, extending cycle life further and verifying scalability will be crucial, with the establishment of mass production techniques becoming the next key focus.

Source: <https://energynews.biz/lithium-sulfur-battery-disulfur-dichloride-cycle-life/>

Collected: October 02, 2026 | Automated Research System (Gemini API)

#03 Li-S Energy: Pegasus drone flight range and battery specs

Published September 30, 2026 BigGo Finance Australia



OVERVIEW

Li-S Energy, a lithium-sulfur (Li-S) battery developer, announced a successful test flight of its 'Pegasus' drone, powered by their Li-S batteries, achieving nearly two hours of flight time and over 75 kilometers of range. Utilizing proprietary nanomaterials like Boron Nitride Nanotubes and Li-Nanomesh, Li-S Energy's batteries deliver approximately twice the energy density of conventional lithium-ion cells. This breakthrough represents a significant step towards practical application of Li-S batteries in aviation and drone sectors, potentially reshaping the industry landscape.

Key Findings

Li-S Energy, a pioneer in lithium-sulfur (Li-S) battery development, announced a significant breakthrough with the successful test flight of its 'Pegasus' drone, powered by the company's proprietary Li-S batteries. During the test, the drone achieved an impressive flight duration of approximately two hours and a cruising range exceeding 75 kilometers, powerfully demonstrating the practical viability of lithium-sulfur batteries in aviation and drone applications.

Technical Details

Li-S Energy's technical superiority stems from its unique nanomaterial approach. Specifically, the company integrates innovative materials such as Boron Nitride Nanotubes (BNNT) and Li-Nanomesh into its Li-S battery design. Boron Nitride Nanotubes enhance the stability of the sulfur cathode and suppress the polysulfide shuttling effect. Meanwhile, Li-Nanomesh inhibits dendrite formation on the lithium metal anode, thereby improving battery safety and cycle life. The synergistic effect of these nanomaterials enables Li-S Energy's batteries to achieve approximately twice the energy density of currently available lithium-ion batteries. This high energy density significantly extends the flight time and range of drones, allowing for more diverse mission execution.

Background & Context

The evolution of drone technology heavily relies on the emergence of higher-performance, lighter batteries. Conventional lithium-ion batteries have reached energy density limits, hindering longer flights and extended missions. Lithium-sulfur batteries, theoretically offering far superior energy density compared to lithium-ion, are thus widely anticipated as the next-generation power source in the aerospace sector, particularly for drones and electric vertical takeoff and landing (eVTOL) aircraft. Li-S Energy's success signifies that Li-S batteries are moving beyond laboratory results, proving their advantages in real-world operational environments, thereby broadening the potential of the entire drone market.

Strategic Significance & Outlook

The successful test flight of Li-S Energy's 'Pegasus' drone unequivocally demonstrates the feasibility of lithium-sulfur battery technology for aviation applications. This breakthrough will accelerate applications in diverse fields such as logistics drones, surveillance and inspection drones, and potentially future passenger electric aircraft. Moving forward, Li-S Energy is expected to further enhance energy density, extend cycle life, and reduce costs for mass production, solidifying its position as a power source for next-generation aircraft. This will significantly accelerate the electrification and sustainability transition of the entire aviation industry.

Source: <https://finance.biggo.com/news/404a6d83-7b88-403e-9129-a157aabfdee0>

Collected: October 02, 2026 | Automated Research System (Gemini API)

#04 Dongguang: Iron phosphate black mass 60,000 ton capacity plan

Published September 29, 2026 Metal.com China



OVERVIEW

Dongguang, Hebei, China, has approved a \$4.35 million (31.8 million RMB) iron phosphate black mass regeneration project. This initiative will add 60,000 tons per year of iron phosphate black mass processing capacity to an existing plant, yielding 58,252 tons of iron phosphate powder and 6,911 tons of sodium chloride byproduct. The project underscores China's strategic focus on strengthening the LFP battery supply chain and advancing circular economy principles.

Key Findings

Authorities in Dongguang, Hebei Province, China, have officially approved a significant iron phosphate black mass regeneration project, with a total investment of 31.8 million RMB (approximately \$4.35 million USD). This strategic development aims to enhance the region's battery recycling capabilities by adding an annual processing capacity of 60,000 tons of iron phosphate (LFP) black mass, which will yield 58,252 tons of high-purity iron phosphate powder and 6,911 tons of sodium chloride byproduct. The project represents a substantial step towards reinforcing the LFP battery supply chain and promoting a circular economy within China's rapidly expanding electric vehicle and energy storage sectors.

Technical / Clinical Details

The approved project involves the dismantling of an existing alkaline refining line within the factory and the installation of new, advanced equipment, including impurity removal reactors, filter presses, and storage tanks. The black mass regeneration process specifically targets the recovery of active materials from spent lithium iron phosphate batteries. The alkaline refining step is crucial for efficiently removing organic substances and other impurities from the black mass, preparing it for subsequent purification stages. Impurity removal reactors are designed to selectively separate unwanted elements under specific reaction conditions, while filter presses perform efficient solid-liquid separation, enhancing the purity of the final iron phosphate powder. This meticulous process ensures that the recovered iron phosphate meets the stringent quality requirements for use as a cathode material in new LFP batteries, thereby closing the loop in the material lifecycle.

Background & Context

Lithium iron phosphate (LFP) batteries have gained significant traction in electric vehicles, particularly in entry-level models, and in stationary energy storage applications due to their inherent safety, longer cycle life, and lower cost compared to other lithium-ion chemistries. As LFP battery production and deployment continue to surge, the challenge of managing end-of-life batteries and recovering their valuable components has become increasingly critical. China, a global leader in LFP battery manufacturing, is strategically investing in recycling infrastructure to ensure self-sufficiency and sustainability within its battery material supply chain. Regenerating materials from black mass not only reduces reliance on primary mining, which can be environmentally intensive and resource-constrained, but also mitigates the risks associated with volatile raw material prices, contributing to national resource security.

Strategic Significance & Outlook

The operationalization of this 60,000-ton per year LFP black mass regeneration project is expected to significantly contribute to the stable supply of iron phosphate, bolstering the competitiveness of China's domestic battery industry. This capacity will play a vital role in the regional battery recycling ecosystem, setting a precedent for similar initiatives. For investors and engineers, this project serves as a tangible example of the scaling and technological advancements in the battery recycling sector, highlighting opportunities in sustainable materials processing and circular economy solutions. Furthermore, such regeneration efforts will enhance the overall sustainability of the LFP battery lifecycle and may pave the way for broader application of recycling technologies across various battery chemistries, contributing to global efforts for a more sustainable energy future.

Source: <https://news.metal.com/en/newscontent/104139945-dongguang-hebei-approves-318m-iron-phosphate-black-mass-regeneration-project>

#05 Sodium-Ion batteries: South Korea's 220Wh/kg 2030 roadmap

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OVERVIEW

The South Korean government has unveiled a new 'Battery Industry Technology Roadmap,' urging domestic manufacturers to pivot towards sodium-ion battery development. The roadmap targets commercialization of sodium-ion batteries with an energy density of 160Wh/kg by 2027, escalating to 220Wh/kg by 2030, prioritizing applications in energy storage systems (ESS) and low-cost electric vehicles (EVs). Major players like LG Energy Solution, Samsung SDI, and SK On are participating, aiming to regain market leadership through material development and collaborative efforts in non-competitive areas.

Key Findings

The South Korean government has launched an ambitious 'Battery Industry Technology Roadmap' aimed at bolstering the competitiveness and reclaiming market share for its domestic battery sector. A central tenet of this roadmap is to strategically steer battery manufacturers towards the development and adoption of next-generation sodium-ion battery technology. Specifically, the government has set aggressive commercialization targets: achieving an energy density of 160Wh/kg by 2027, and further escalating to 220Wh/kg by 2030, with a primary focus on applications in energy storage systems (ESS) and low-cost electric vehicles (EVs).

Technical / Clinical Details

Sodium-ion batteries offer significant potential in markets where cost-competitiveness is paramount, such as ESS and entry-level EVs, largely due to their lower raw material costs and independence from limited lithium resources. This roadmap is notable not only for emphasizing cost reduction but also for setting explicit energy density improvement targets. The 220Wh/kg goal for 2030 represents a substantial performance leap compared to early sodium-ion chemistries, enabling deployment in a wider range of applications. Achieving this ambitious target will necessitate breakthroughs in innovative material development for cathodes, anodes, and electrolytes, alongside optimized manufacturing processes.

Background & Context

In recent years, the global battery market has seen Chinese companies establish a strong lead in lithium iron phosphate (LFP) battery technology, driving price competition that has challenged Korean manufacturers. In response, the South Korean government has designated sodium-ion batteries as a strategic national technology, aiming to preempt a market paradigm shift and re-establish a competitive advantage in the battery industry. Leading domestic battery firms, including LG Energy Solution, Samsung SDI, and SK On, are already heavily invested in sodium-ion R&D. The new government roadmap will provide robust support for these efforts, fostering inter-company collaboration in non-competitive areas like materials development.

Strategic Significance & Outlook

This bold policy shift by the South Korean government is expected to have a profound impact on the global sodium-ion battery market's development. The combination of clear technological targets and strong industrial support positions Korean companies to establish leadership in sodium-ion technology, opening new growth opportunities in the ESS and EV sectors. Should the energy density targets for 2030 be met, sodium-ion batteries could become a major technology that complements, and potentially even replaces, lithium-ion batteries in certain market segments. This strategic move is anticipated to contribute significantly to the diversification and stabilization of battery supply chains, accelerating the transition to a more sustainable energy future.

Source: <https://www.ess-news.com/2026/09/29/south-korea-marks-major-shift-to-sodium-ion-batteries-to-regain-market/>

Collected: October 02, 2026 | Automated Research System (Gemini API)

#06 NFPA 855 & UL 9540A: Li-ion battery fire safety specs for 2026

Published September 27, 2026 Facilitiesnet USA



OVERVIEW

From a facilities management perspective, the article highlights the critical importance of managing fire risks associated with integrating lithium-ion batteries into built environments. As evidenced by multiple fire incidents in New York City in 2024, proper installation, charging practices, and regulatory compliance are essential. NFPA 855 (Standard for the Installation of Energy Storage Systems) and UL 9540A (Test Method for Evaluating Thermal Runaway Fire Propagation in Large-Scale Battery Energy Storage Systems) are cited as key guidelines for safe BESS deployment. Adherence to these standards enables facility operators to prevent fires and minimize potential damage.

Key Findings: Managing Lithium-Ion Battery Fire Risks in Built Environments: NFPA 855 and UL 9540A are Key

Facilities management professionals emphasize the urgent importance of managing fire risks associated with the integration of lithium-ion battery systems into built environments. Particularly, multiple battery fire incidents in New York City in 2024 underscored the necessity of proper installation practices, strict charging protocols, and rigorous adherence to relevant building codes and fire regulations. NFPA 855 (Standard for the Installation of Energy Storage Systems) and UL 9540A (Test Method for Evaluating Thermal Runaway Fire Propagation in Large-Scale Battery Energy Storage Systems) are positioned as primary technical guidelines and regulatory frameworks for safe Battery Energy Storage System (BESS) deployment. Compliance with these standards enables facility operators to prevent fire occurrences and minimize potential damage in the event of an incident.

Technical Details: Multi-Layered Approach for Thermal Runaway Prevention and Spread Mitigation

Lithium-ion battery fires originate from thermal runaway, an uncontrolled self-heating reaction within a cell that cascades to adjacent cells. Ensuring BESS safety in built environments requires a multi-layered approach:

- **Proper Design and Installation:** NFPA 855 specifies detailed requirements for BESS location, separation distances, ventilation, fire suppression equipment, and fire barriers. Examples include restrictions on residential installations and requirements for dedicated fire-rated compartments for large-scale systems in commercial facilities.
- **UL 9540A Testing:** This test method evaluates how quickly and extensively thermal runaway spreads at individual battery cell, module, and rack levels. This data is crucial for system designers to select appropriate fire suppression strategies (e.g., gaseous agents, water mist, cooling systems) and determine fire compartment sizing.
- **Management of Charging Practices:** Overcharging and improper charging are leading causes of thermal runaway. Strict application of smart BMS (Battery Management Systems) and charging protocols is essential to maintain optimal State of Charge (SoC) and temperature.

- **Early Detection Systems:** A combination of smoke, heat, and gas detectors enables early detection of anomalies and prompts swift response.

Background & Context: BESS Proliferation in Urban Areas and Evolving Safety Regulations

The integration of BESS in urban areas, commercial facilities, and residential settings is accelerating due to renewable energy integration, EV adoption, and enhanced grid resilience. However, battery fires pose a serious threat to public safety and property, with incidents in densely populated cities like New York prompting regulators to establish new safety standards and strictly enforce existing ones. NFPA 855 and UL 9540A were developed to address these challenges, serving as international benchmarks for ensuring safe BESS deployment.

Strategic Significance & Outlook: Strict Safety Standards Enhance BESS Market Trust and Drive Sustainable Growth

Compliance with stringent safety standards such as NFPA 855 and UL 9540A is indispensable for the safe integration of lithium-ion batteries into built environments. This will build public trust and improve acceptance in the insurance market. In the future, these standards are expected to evolve further to accommodate new battery technologies and installation scenarios. By effectively applying these standards, facilities managers can ensure BESS remains a reliable tool for supporting the transition to clean energy, contributing to the sustainability and resilience of urban energy infrastructure.

Source: <https://www.facilitiesnet.com/firesafety/article/Lithium-Ion-Battery-Safety-Considerations-in-the-Built-Environment--21125>

#07 Black Mass Recovery: 93% recycling rate at \$0.11/kg cost specs

Published October 02, 2026 Bioengineer.org USA



OVERVIEW

A novel recycling process demonstrated highly efficient black mass recovery rates of 93.28% from electric vehicle (EV) battery modules and 75.77% from smartphone cells. This innovative custom separation line, combining shredders, air classifiers, and vibrating screens, achieved a direct processing cost of just \$0.11 per kilogram of EV battery input. The recovered black mass, rich in valuable metals like lithium, nickel, and cobalt, can be reused to secure a sustainable supply of battery materials, transforming recycling into an economically attractive proposition.

Key Findings: Closed-Loop Battery Recycling Achieves Over 93% Black Mass Recovery at a Groundbreaking Cost of \$0.11/kg

A new recycling process has demonstrated an astonishing efficiency in recovering black mass from electric vehicle (EV) battery modules, achieving a rate of 93.28%. This innovative custom separation line, integrating shredders, air classifiers, and vibrating screens, also achieved a 75.77% recovery rate from smartphone cells. Particularly noteworthy is the groundbreaking direct processing cost of just \$0.11 per kilogram of EV battery input. The recovered black mass, rich in valuable metals such as lithium, nickel, cobalt, and manganese, holds the potential to secure a sustainable supply of battery materials through reuse, thereby making battery recycling an economically attractive proposition.

Technical Details: Efficient Physical Separation via Shredders, Air Classifiers, and Vibrating Screens

This innovative separation line primarily focuses on physical separation technologies. The process consists of the following key steps:

- **Shredding:** End-of-life battery modules or cells are physically crushed to separate battery materials from metal and plastic casings.
- **Air Classification:** The shredded materials are classified by air flow based on density and shape. This efficiently separates lighter electrode materials (black mass) from heavier metal fragments (e.g., copper, aluminum).
- **Vibrating Screen:** Further separation occurs based on particle size, enhancing the purity of the black mass.

This sequence of physical separation processes yields high-purity black mass, which improves the efficiency of subsequent hydrometallurgical processes for metal extraction. The high recovery rate of 93.28% from EV battery modules strongly suggests industrial practicality and economic viability. The chemical composition of the recovered black mass, including 12.3% lithium, 32.5% nickel, and 13.8% cobalt, indicates a rich source of high-value battery metals, making it a valuable feedstock for new battery manufacturing.

Background & Context: The Importance and Economic Challenges of Closed-Loop Recycling

The rapid growth of the electric vehicle (EV) market has led to an explosive increase in demand for battery materials (especially lithium, nickel, and cobalt). Concurrently, the rise in end-of-life batteries and the need to secure sustainable sources for these valuable resources have become global challenges. Closed-loop recycling is a central solution to these issues, reducing reliance on virgin mineral extraction and minimizing environmental impact. However, the complexity and cost of recycling processes have historically hindered large-scale adoption. Highly efficient and low-cost separation technologies like the one announced are crucial for transforming battery recycling into an economically viable business model.

Strategic Significance & Outlook: Realizing a Sustainable Battery Ecosystem and Enhancing Market Competitiveness

The groundbreaking direct processing cost of \$0.11 per kilogram of EV battery input and a black mass recovery rate exceeding 90% will significantly impact the battery recycling industry. If widely adopted, this technology will stabilize the supply of recycled materials and contribute to reducing overall battery manufacturing costs. This provides battery manufacturers with opportunities to mitigate raw material supply risks and enhance competitiveness. Ultimately, such technological innovation is expected to play a central role in realizing a more sustainable and circular battery ecosystem, accelerating the transition to clean energy.

Source: <https://bioengineer.org/recyclings-hidden-workhorse-how-black-mass-separation-could-make-battery-reuse-pay/>

#08 Vianode & FAAM: Graphite anode recycling from production scrap

Published September 29, 2026 ZAWYA / TradingView Norway/イタリア (Vianode/FAAM拠点国)



OVERVIEW

Advanced battery materials company Vianode and European energy solutions provider FAAM have successfully developed a groundbreaking process to recycle graphite from battery production scrap into high-performance anode material. This collaboration leverages Vianode's synthetic graphite expertise and FAAM's manufacturing know-how to ensure recovered graphite maintains the purity, consistency, and electrochemical performance required for lithium-ion batteries. Testing confirmed the recycled graphite performs comparably to virgin material, and efforts are underway to scale the process for industrial deployment, significantly boosting battery supply chain sustainability.

Key Findings

Vianode, a company specializing in advanced battery materials based in Norway, and FAAM, a leading European energy solutions provider from Italy, have achieved a significant breakthrough in battery recycling. They successfully developed a technology to efficiently recover high-performance graphite for anode materials from lithium-ion battery production scrap. This collaborative project has demonstrated that recycled graphite can achieve electrochemical performance equivalent to virgin materials, marking a substantial step forward for the sustainability of the battery supply chain.

Technical & Clinical Details

- **Synergistic Development:** The success stems from combining Vianode's proprietary synthetic graphite technology, which enables precise manufacturing of graphite with specific structural and performance characteristics, with FAAM's extensive battery manufacturing expertise. FAAM's knowledge was critical for scrap material characterization, integrating the recycling process, and evaluating the performance of the regenerated graphite in actual battery cells. This synergy addressed key challenges in ensuring the performance, purity, and consistency of recycled graphite.
- **High-Performance Validation:** Rigorous electrochemical testing confirmed that the re-generated graphite anode material meets the high-performance criteria required for lithium-ion batteries. Specifically, the recycled material demonstrated comparable or equivalent results to virgin graphite in terms of cycle stability, capacity retention, and rate capability. This validates the feasibility of directly utilizing recycled graphite in practical battery applications.
- **Scalability for Industrial Deployment:** The technology has been designed with industrial scale-up in mind, with ongoing efforts focused on further optimizing and expanding the process. The overarching goal is to establish a circular economy for graphite anode materials in battery manufacturing, thereby reducing dependence on new raw material extraction.

Background & Industry Context

As the demand for lithium-ion batteries surges, graphite remains an indispensable anode material, primarily sourced from new natural or synthetic production. However, concerns are mounting regarding the environmental impact of raw material extraction and the stability of supply chains. Against this backdrop, efficient material recovery from battery production scrap and end-of-life batteries has become an urgent priority for realizing a circular economy and building a sustainable battery industry. Recycling high-volume materials like graphite is crucial for improving resource efficiency and reducing costs.

Strategic Significance & Outlook

This breakthrough by Vianode and FAAM holds significant potential to dramatically improve resource efficiency in battery manufacturing. Industrial deployment of this recycling technology would substantially reduce the environmental footprint and enhance the cost competitiveness within the graphite anode material supply chain. This is a critical step not only for the development of next-generation battery technologies but also for establishing sustainable production cycles for existing lithium-ion batteries. Future applications are expected to extend to broader battery material recycling, contributing to the creation of a more robust and environmentally friendly battery ecosystem.

Source: https://www.tradingview.com/news/reuters.com,2026-09-29:newsml_Zaw7IryIW:0-zawya-vianode-faam-achieve-breakthrough-in-battery-graphite-recycling/

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#09 KAIST Li-Sulfur Battery: Bendable nanowire cathode specs for 2026

Published October 02, 2026 Bioengineer.org South Korea



OVERVIEW

A KAIST-led research team has developed an S/NCSe@CC nanowire cathode architecture for flexible lithium-sulfur batteries that maintains high performance even when bent or wrapped around curved structures. This novel cathode achieves an impressive discharge capacity of 1,544 mAh/g at a mild 0.1C rate, approaching its theoretical limit. Crucially, in a demonstration wrapped around a drone leg, the battery retained 94% of its discharge capacity compared to its flat state, demonstrating a significant breakthrough for practical flexible battery technologies.

Key Findings

A research team from the Korea Advanced Institute of Science and Technology (KAIST) and collaborators has developed a new cathode architecture, 'S/NCSe@CC,' for lithium-sulfur (Li-S) batteries that combines high capacity with excellent flexibility, allowing it to be easily integrated into curved structures. This groundbreaking nanowire cathode achieved a discharge capacity of 1,544 mAh/g at a mild 0.1C rate, remarkably close to its theoretical capacity limit. Crucially, when actually wrapped around a drone leg, the battery demonstrated near-identical performance compared to its flat state.

Technical & Clinical Details

- **High Capacity and Flexibility:** The developed S/NCSe@CC cathode features a nanowire structure that integrates a composite of sulfur (S) and carbon selenide (NCSe) onto a carbon cloth (CC) substrate. This architecture enhances the utilization efficiency of sulfur, enabling a high discharge capacity of 1,544 mAh/g at a relatively low current rate of 0.1C, approaching the inherent high theoretical capacity of Li-S batteries (approx. 1675 mAh/g). Simultaneously, the flexible combination of nanowires and carbon cloth dramatically improves the overall bendability of the battery.
- **Performance Retention in Practical Use:** The research team conducted real-world tests by wrapping this flexible battery around the legs of a small drone. The results showed that even in a bent configuration, the battery retained 94% of its discharge capacity compared to its flat state. This implies that the battery can be used in irregularly shaped devices, such as drones and wearable electronics, with minimal performance degradation, indicating significant potential for practical applications.
- **Overcoming Traditional Challenges:** While Li-S batteries offer nearly double the theoretical energy density of conventional lithium-ion batteries (NMC, LFP), they have faced challenges such as sulfur's low electrical conductivity, the dissolution of lithium polysulfides during cycling (the 'shuttle effect'), and electrode degradation due to volumetric changes. The S/NCSe@CC cathode addresses these issues through its carbon selenide composite and stable nanowire structure, achieving excellent electrochemical performance and mechanical stability.

Background & Industry Context

The demand for high-performance, lightweight power sources in applications such as electric vehicles, drones, wearable electronics, and robotics continues to grow. There is a strong need for battery technologies that can be integrated into curved surfaces and flexible designs, which are difficult to accommodate with traditional rigid lithium-ion batteries. Lithium-sulfur batteries are considered one of the leading candidates for next-generation batteries due to their high theoretical energy density and abundant sulfur resources, but developing flexible structures that combine performance and durability has been a long-standing challenge.

Strategic Significance & Outlook

This breakthrough by the KAIST research team represents a significant step towards the commercialization of flexible, high-energy-density lithium-sulfur batteries. It holds promise for widespread applications, including extending drone flight times, enhancing the comfort and functionality of wearable devices, and powering soft robotics. Future challenges include further improving cycle life, scalability, and reducing manufacturing costs. However, this nanowire cathode architecture has the potential to profoundly impact the next-generation flexible energy storage device market, breaking through the physical constraints of battery technology and opening new avenues for product design and applications.

Source: <https://bioengineer.org/bendable-battery-breakthrough-nanowire-cathode-lets-lithium-sulfur-cells-wrap-around-drone-legs/>

#10 GM LMR Batteries: Mass production roadmap for 400+ mile range

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OVERVIEW

General Motors (GM) announced the world's first mass production of prismatic Lithium Manganese Rich (LMR) battery cells at its Ultium Cells plant in Spring Hill, Tennessee, a joint venture with LG Energy Solution. This new LMR technology offers 33% higher energy density at the cell level compared to Lithium Iron Phosphate (LFP) chemistries, while maintaining comparable costs. GM plans to deploy these batteries in future EV trucks and full-size SUVs, aiming for driving ranges exceeding 400 miles. The capability to produce high-nickel, LFP, and LMR chemistries in both pouch and prismatic formats enables GM to efficiently scale production and reach a broader customer base.

Key Findings

General Motors (GM) has announced the commencement of the world's first mass production of prismatic Lithium Manganese Rich (LMR) battery cells at its Ultium Cells facility in Spring Hill, Tennessee, a joint venture with LG Energy Solution. This pioneering LMR battery technology achieves a 33% higher energy density at the cell level compared to Lithium Iron Phosphate (LFP) chemistries, all while maintaining competitive costs. GM intends to integrate these advanced batteries into its future EV trucks and full-size SUVs, targeting impressive driving ranges of over 400 miles (approximately 640 km).

Technical / Clinical Details

LMR batteries utilize a manganese-rich cathode material, enabling high energy density at a lower cost, positioning them as a compelling alternative to both high-nickel and LFP chemistries. While LFP offers cost advantages, its energy density limits range; high-nickel offers high density but typically at a higher cost and with potential safety concerns. LMR aims to strike an optimal balance, providing LFP-like cost structures with significantly improved energy density. GM's Ultium platform is designed for flexibility, capable of producing various chemical compositions—high-nickel, LFP, and LMR—in both pouch and prismatic cell formats. This versatility in production allows GM to tailor battery solutions for diverse vehicle segments and market demands, facilitating efficient scaling of its EV production capabilities.

Background & Context

The global electric vehicle market is experiencing rapid growth, driven by increasing consumer demand for longer range, faster charging, and affordability. LFP batteries have gained traction due to their cost-effectiveness but often at the expense of energy density. High-nickel batteries, conversely, offer superior energy density but come with higher material costs. GM's introduction of LMR batteries represents a strategic move to bridge this gap, optimizing the trade-off between cost and performance. This technological deployment is a crucial step for GM in leveraging its modular Ultium platform to offer a broad portfolio of competitive EV products, thereby strengthening its leadership position in the burgeoning EV market and potentially influencing the broader industry towards similar chemistries.

Strategic Significance & Outlook

The mass production of LMR batteries marks a significant milestone for the entire EV industry. This technology, balancing the attributes of LFP and high-nickel, is expected to enhance the cost-performance ratio of EVs, potentially accelerating the transition of more consumers to electric mobility. The prospect of EV trucks and SUVs achieving over 400 miles of range could particularly catalyze EV adoption in the commercial and large-vehicle segments. Furthermore, GM's established production capability across multiple chemistries and form factors demonstrates robust adaptability to future battery technological evolutions and reinforces supply chain resilience. This positions GM with a distinct competitive advantage, enabling it to drive the future of sustainable mobility.

Source: <https://electrek.co/2026/09/29/gms-new-ev-battery-tech-cut-costs-without-sacrificing-range/>

Collected: October 02, 2026 | Automated Research System (Gemini API)