TROY TECHNICAL

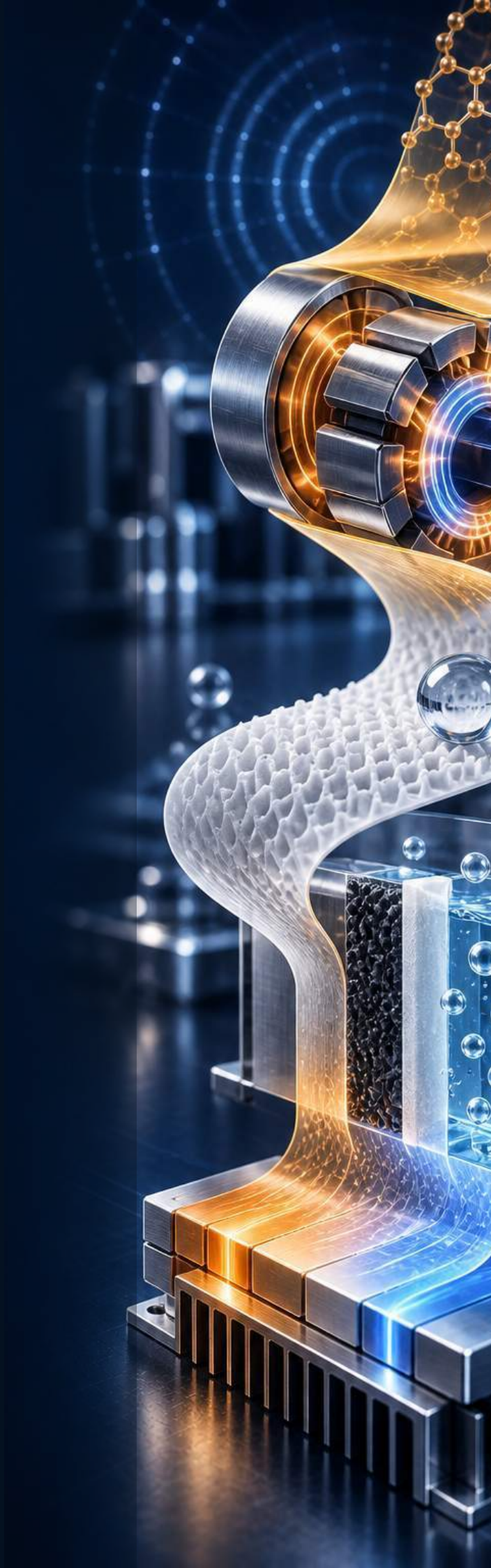
FUNCTIONAL MATERIALS
WEEKLY REPORT

September 12 - September 18, 2026 | Issue 2026-W37

Measurable device or process function, reliability and manufacturable integration

34	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-09-18 | English edition | fixed approved cover artwork



Functional Materials: the boundary moved from isolated claims to qualification evidence

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

SIGNAL 01 | COMPOSITION

Factorial Energy Partners with Mitsui Kinzoku for Mass Production of Solid-State Battery Electrolytes

Factorial Energy has partnered with Mitsui Kinzoku, a leading producer of sulfide-based solid electrolytes, to scale up its solid-state battery technology.

SIGNAL 02 | FUNCTIONAL PROPERTY

DuPont Launches Bio-Circular Tyvek for C&I Applications, Achieving ~30% Carbon Footprint Reduction via

DuPont has introduced Tyvek® with Renewable Attribution, a bio-circular material designed for consumer and industrial (C&I) applications, enabling approximately 30% reduction in product carbon footprint (Scope 3 emissions) without requiring changes to existing.

SIGNAL 03 | PROCESSING

Panjab University Startup Secures ~$13,000 Grant for Commercialization of Indigenous Advanced Functional Materials

Advanced Functional Material Technologies (AFMTech), a Panjab University-incubated startup, has received a ☒12 lakh (approx. $13,000) commercialization grant from the Chandigarh Administration.

SIGNAL 04 | DEVICE INTEGRATION

Solid Power Confirms South Korea Sulfide Solid Electrolyte JV, Targeting 500 Tons by

Solid Power has confirmed plans to establish a sulfide solid electrolyte joint venture in South Korea, targeting an initial capacity of 500 tons by 2028 with a long-term goal of up to 20,000 tons/year.

DECISION

Focus this week's management attention on measurable device or process function, reliability and manufacturable integration. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: prioritize performance that survives integration, aging and system-level trade-offs.
2. Suppliers: connect material property to process control, interface behavior and customer acceptance data.
3. Executives: track repeatability, interface stability, process compatibility, cost and qualification.

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

450 W
A31

SOURCE-BOUND CONDITION
Factorial's Solstice platform targets up to 450 Wh/kg energy density and aims to resolve scalable manufacturing challenges for all-solid-state batteries.

30%
A28

SOURCE-BOUND CONDITION
DuPont has introduced Tyvek® with Renewable Attribution, a bio-circular material designed for consumer and industrial (C&I) applications, enabling approximately 30% reduction in product carbon footprint (Scope 3.

2028 w
A34

SOURCE-BOUND CONDITION
Solid Power has confirmed plans to establish a sulfide solid electrolyte joint venture in South Korea, targeting an initial capacity of 500 tons by 2028 with a long-term goal of up to 20,000 tons/year.

26.49 million
A11

SOURCE-BOUND CONDITION
Stirling-based DeepTech company iGii has secured €26.49 million in new funding to accelerate the commercialization and industrial adoption of its proprietary three-dimensional porous carbon nanomaterial, Gii.

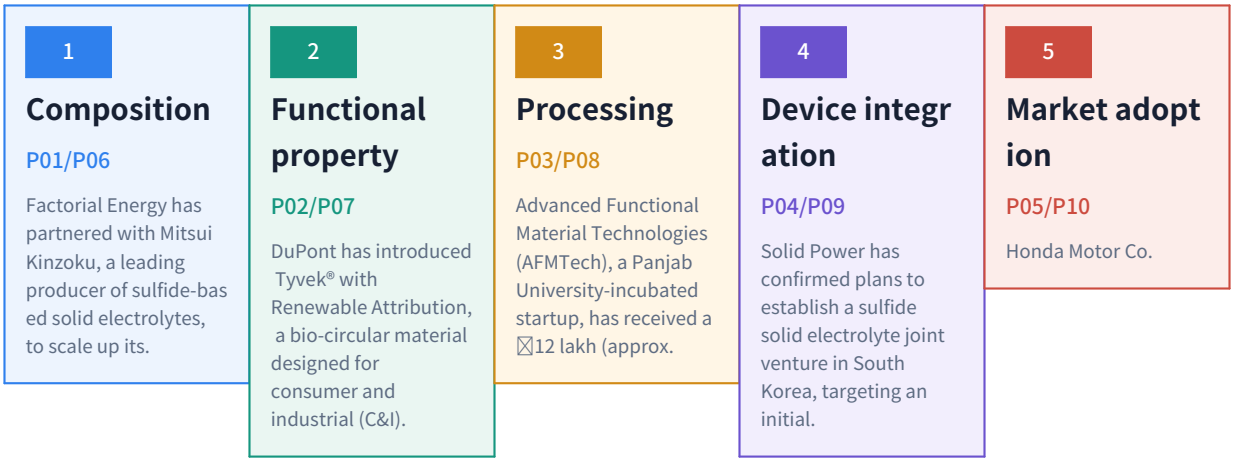
$10.5 million
A26

SOURCE-BOUND CONDITION
CorePower Magnetics has raised $10.5 million to commercialize its grid-ready magnetic materials, preparing to launch standardized transformer products for power electronics manufacturers operating between 10 kHz and 100.

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

Composition to Functional property	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck repeatability, interface stability, process compatibility, cost and qualification.
Functional property to Processing	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck repeatability, interface stability, process compatibility, cost and qualification.
Processing to Device integration	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck repeatability, interface stability, process compatibility, cost and qualification.
Device integration to Market adoption	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck repeatability, interface stability, process compatibility, cost and qualification.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented repeatability, interface stability, process compatibility, cost and qualification.

Priority map: maturity and business impact

P01	Factorial Energy Partners with Mitsui Kinzoku for Mass Production of Solid-State Battery Electrolytes
P02	DuPont Launches Bio-Circular Tyvek for C&I Applications, Achieving ~30% Carbon Footprint Reduction via
P03	Panjab University Startup Secures ~$13,000 Grant for Commercializatio n of Indigenous Advanced Functional Materials
P04	Solid Power Confirms South Korea Sulfide Solid Electrolyte JV, Targeting 500 Tons by
P05	Honda Invests in Niron Magnetics to Advance Rare-Earth-Free Magnets for EV Powertrains
P06	iGii Secures €26.5 Million Funding for Commercialization of Proprietary 3D Porous Carbon Nanomaterial
P07	CorePower Magnetics Secures $10.5M to Commercialize Grid-Ready Magnetic Materials, Targeting Next-Gen Transformer Products
P08	University of Queensland Develops Self-Healing Nanocoating That Boosts Steel Rust Protection by Over
P09	Elevated Materials Wins $50 Million DOE Grant to Build 3.5 GW Battery Material
P10	Chinese EV Makers Dongfeng, GAC Target 2027 Mass Production for Solid-State Batteries, Promising

REPRODUCIBLE POSITIONING RULE

Horizontal position uses five discrete stages: Research, Prototype, Joint evaluation, Product adoption and Scale. Vertical position uses three impact levels: single use, multiple customers and multiple supply tiers. Bubble diameter reflects the editorial score inherited from the weekly selection rubric.

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

P01 Factorial Energy Partners with Mitsui Kinzoku for Mass Production of Solid-State Battery Electrolytes

A31 | Composition | Scale-up

Date not stated

FACT

Factorial Energy has partnered with Mitsui Kinzoku, a leading producer of sulfide-based solid electrolytes, to scale up its solid-state battery technology. Factorial's Solstice platform targets up to 450 Wh/kg energy density and aims to resolve scalable manufacturing challenges for all-solid-state batteries.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 22/25 | MATURITY 5/5 | IMPACT 3/3

P02 DuPont Launches Bio-Circular Tyvek for C&I Applications, Achieving ~30% Carbon Footprint Reduction via

A28 | Functional property | Product adoption

Date not stated

FACT

DuPont has introduced Tyvek® with Renewable Attribution, a bio-circular material designed for consumer and industrial (C&I) applications, enabling approximately 30% reduction in product carbon footprint (Scope 3 emissions) without requiring changes to existing designs or processes. This new offering utilizes ISCC PLUS-certified bio-circular materials through a mass balance approach, with renewable attribution levels ranging from 30% to 100%.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | IMPACT 1/3

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

P03 Panjab University Startup Secures ~$13,000 Grant for Commercialization of Indigenous Advanced Functional Materials

A01 | Processing | Joint evaluation

Date not stated

FACT

Advanced Functional Material Technologies (AFMTech), a Panjab University-incubated startup, has received a ☒12 lakh (approx. $13,000) commercialization grant from the Chandigarh Administration. This funding will support the development and market deployment of indigenous target materials for advanced materials and semiconductor applications, bridging the gap from laboratory to market for deep-tech ventures.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 3/5 | IMPACT 2/3

P04 Solid Power Confirms South Korea Sulfide Solid Electrolyte JV, Targeting 500 Tons by

A34 | Device integration | Scale-up

Date not stated

FACT

Solid Power has confirmed plans to establish a sulfide solid electrolyte joint venture in South Korea, targeting an initial capacity of 500 tons by 2028 with a long-term goal of up to 20,000 tons/year. Concurrently, Factorial Energy is partnering with Mitsui Kinzoku for mass production of argyrodite-type sulfide solid electrolytes in Japan, and Panasonic Energy will begin sample delivery of its 150°C-operable solid-state battery by Q4.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 5/5 | IMPACT 2/3

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

P05 Honda Invests in Niron Magnetics to Advance Rare-Earth-Free Magnets for EV Powertrains

A30 | Market adoption | Research

Date not stated

FACT

Honda Motor Co. has strategically invested in Minnesota-based Niron Magnetics, a developer of high-performance rare-earth-free magnets utilizing iron nitride. Niron is constructing a 287,000-square-foot manufacturing plant to produce up to 1,500 tons of these magnets annually, aiming for operational status in 2027. This initiative is critical for reducing global supply chain dependence on rare earth metals for electrified vehicle powertrains.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 1/5 | IMPACT 3/3

P06 iGii Secures €26.5 Million Funding for Commercialization of Proprietary 3D Porous Carbon Nanomaterial

A11 | Composition | Joint evaluation

Date not stated

FACT

Stirling-based DeepTech company iGii has secured €26.49 million in new funding to accelerate the commercialization and industrial adoption of its proprietary three-dimensional porous carbon nanomaterial, Gii. Gii, which can be manufactured at room temperature and scaled to industrial volumes, offers a high-performance material platform for manufacturers across multiple industries facing supply chain pressures for critical materials.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 3/5 | IMPACT 3/3

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

P07 CorePower Magnetics Secures $10.5M to Commercialize Grid-Ready Magnetic Materials, Targeting Next-Gen Transformer Products

A26 | Functional property | Product adoption

Date not stated

FACT

CorePower Magnetics has raised $10.5 million to commercialize its grid-ready magnetic materials, preparing to launch standardized transformer products for power electronics manufacturers operating between 10 kHz and 100 kHz. This funding supports advancements in critical materials for aerospace, healthcare, energy, and electronics. The company's technology aims to significantly enhance efficiency and performance in next-generation power conversion systems.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | IMPACT 1/3

P08 University of Queensland Develops Self-Healing Nanocoating That Boosts Steel Rust Protection by Over

A33 | Processing | Product adoption

Date not stated

FACT

Researchers at the University of Queensland have engineered a "smart" self-repairing coating capable of dramatically extending rust protection for steel components. This innovative coating, derived from powder-like particles that transform water-based paint into corrosion shields, restricts corrosion to an unparalleled 37 nanometers per year, rendering it over 600 times more effective than many existing high-performance rust-protection products.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | IMPACT 2/3

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

P09 Elevated Materials Wins $50 Million DOE Grant to Build 3.5 GW Battery Material

A15 | Device integration | Product adoption

Date not stated

FACT

Elevated Materials, a California-based startup specializing in ultra-thin lithium film, has secured a $50 million grant from the U.S. Department of Energy (DOE). This funding will cover half the cost of a planned 3.5 GW battery material production facility, aimed at advancing battery technology and manufacturing in the U.S.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 4/5 | IMPACT 2/3

P10 Chinese EV Makers Dongfeng, GAC Target 2027 Mass Production for Solid-State Batteries, Promising

A29 | Market adoption | Scale-up

Date not stated

FACT

Chinese manufacturers Dongfeng and GAC Motors are targeting mass production of solid-state battery-powered EVs from 2027, signaling rapid commercialization of the technology. Solid-state batteries promise a 30-80% increase in energy density over current lithium-ion counterparts, enabling significantly longer ranges and faster charging. Their non-flammable solid electrolytes also provide enhanced safety, positioning them as a transformative technology for the electric vehicle industry.

WHY IT MATTERS

The decision relevance is measurable device or process function, reliability and manufacturable integration. 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 material property to process control, interface behavior and customer acceptance data.

ACTION

Within 30 days, prioritize performance that survives integration, aging and system-level trade-offs; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: repeatability, interface stability, process compatibility, cost and qualification.

EDITORIAL SCORE 21/25 | MATURITY 5/5 | IMPACT 2/3

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	prioritize performance that survives integration, aging and system-level trade-offs	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 material property to process control, interface behavior and customer acceptance data	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 repeatability, interface stability, process compatibility, cost and qualification.	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 01-12

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	Panjab University Startup Secures ~$13,000 Grant for Commercialization of Indigenous Advanced Functional Materials	https://dealroom.co/news/149920-chandigarh-grant-of-13-000-backs-panjab-university-materials-startup/
A02	University of Queensland Develops Self-Healing Smart Coating, Inhibiting Steel Corrosion by Over 600-Fold	https://thedebrief.org/new-self-healing-material-activates-as-damage-occurs-offering-a-game-changing-defense-against-rust-formation/
A03	Scientists Develop Piezoelectric Chin Strap Harvesting Power from Jaw Movements for Wearable Devices, Generating up to 18 µW	https://timesofindia.indiatimes.com/science/discovery/scientists-developed-a-chin-strap-that-turns-chewing-and-speaking-into-electricity-for-small-wearable-devices/articleshow/134009980.cms
A04	Same Sky Launches Thermoelectric Generator Modules Delivering up to 27.3W, Boosting Industrial Waste Heat Recovery	https://www.electronicsforu.com/news/thermoelectric-modules-harvest-waste-heat
A05	International Team Boosts Light Conversion Efficiency by 72,000x with Metasurface Technology, Revolutionizing Photonic Computing	https://wonford.com/2026/09/10/breakthrough-metasurface-tech-boosts-light-conversion-efficiency-by-72000-times-reshaping-photonic-computing/
A06	MAKO Advanced Materials Unveils HyperCure: Creel-Free Unidirectional Carbon Fiber Prepreg with 9-Minute Cure Time	https://natlawreview.com/press-releases/mako-advanced-materials-introduces-creel-free-unidirectional-carbon-fiber
A07	Drexel University Establishes New Vapor-Phase Synthesis for 2D Crystalline MXene, Expanding Applications in Electronics and Quantum Technologies	https://drexel.edu/news/archive/2026/September/vapor-phase-synthesis-MXenes
A08	University of Melbourne Develops Metasurface Optical Screen Converting Infrared to Visible Light with 1000x Brightness, Paving Way for Cheaper Infrared Cameras	https://www.eurekalert.org/news-releases/1144136
A09	Osaka Metropolitan University Achieves Precise Composition Control and Fabrication of High-Entropy Alloys via Underwater Laser Irradiation, Accelerating Next-Gen Material Development	https://sj.jst.go.jp/news/202609/n0910-02p.html
A10	NovoLINC Launches MaxLINC: Industry-Leading 0.7 mm2•K/W Thermal Resistance for Multi-Kilowatt AI Chips	https://www.morningstar.com/news/pr-newswire/20260917ph50124/novolinc-launches-maxlinc-achieving-industry-leading-07-mmkw-thermal-resistance-for-multi-kilowatt-ai-chips
A11	iGii Secures €26.5 Million Funding for Commercialization of Proprietary 3D Porous Carbon Nanomaterial 'Gii'	https://www.eu-startups.com/2026/09/stirling-based-igii-secures-e26-5-million-to-commercialise-its-proprietary-carbon-nanomaterial/
A12	Bactiguard Announces New Data Reinforcing Durable Noble Metal Coating for Orthopedic Implants Demonstrating Superior Infection Prevention	https://www.tradingview.com/news/modular_finance:8494c5e2526a5:0-new-data-reinforce-bactiguard-s-distinct-and-durable-approach-to-orthopedic-implant-surface-modification/

ANALYZED ARTICLES | ITEMS 13-23

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
A13	BASF Unveils New Plastics at Fakuma 2026: Ultramid H33 L and Ultramid Expand Deliver Resilience, Sustainability, and Performance	https://www.basf.com/global/en/media/news-releases/2026/09/p-26-153
A14	Alexium International Launches EcoTek: Biodegradable Microencapsulated Phase Change Material, Revolutionizing Thermal Management	https://bedtimesmagazine.com/2026/09/alexium-international-announces-launch-of-ecotek-a-new-biodegradable-microencapsulated-phase-change-material-mpcm/
A15	Elevated Materials Wins $50 Million DOE Grant to Build 3.5 GW Battery Material Plant for Ultra-Thin Lithium Film Production	https://dealroom.co/news/151306-elevated-materials-wins-50m-doe-grant-to-build-3-5-gw-battery-material-p/
A16	China's Xingyi Core Energy Technology Raises ~$14 Million for Space-Grade Flexible Perovskite Solar Wings, Accelerating Development	https://www.perovskite-info.com/space-perovskite-startup-xingyi-core-energy-technology-raises-pre-funding
A17	Matter Venture Partners Closes $450 Million Fund II for HardTech, Robotics, and Physical AI Startups, Backed by Strategic LPs like Nitto Denko	https://pulse2.com/matter-venture-partners-closes-450-million-fund-ii/
A18	Penn State and Rice University Discover Graphene's Nanowrinkles Bend Physics to Shape Electrical Flow, Enabling Device Control Without Chemical Modification	https://www.psu.edu/news/research/story/tiny-wrinkles-bend-physics-change-how-electricity-moves-through-graphene
A19	Centimeter-Scale Room-Temperature Ferromagnetic Semiconductor Films Grown on Mica Advance Spintronics	https://www.spintronics-info.com/reconstructed-mica-surface-yields-centimeter-scale-room-temperature
A20	Rice University Reveals New 'Altermagnetism' in Ultrathin Ruthenium Dioxide Films, Paving Way for Next-Gen Spintronics	https://scitechdaily.com/a-material-just-a-few-atoms-thick-reveals-strange-new-magnetism/
A21	Northeastern University Develops 'qdmag' Software for Millisecond-Scale Simulation of Molecular Magnetism, Advancing Spintronics	https://quantumzeitgeist.com/quantum-molecular-magnetism-simulation-utility-milliseconds/
A22	European Coatings: Nanofiller Design with 2D MXene and CeO2 Achieves Combined UV Protection and Corrosion Resistance, Revolutionizing Coating Tech	https://www.european-coatings.com/news/coatings-technologies/nanofiller-design-combines-uv-protection-and-corrosion-resistance/
A23	Berkeley Lab Develops Novel Method to Directly Observe Electron-Defect Interactions in 2D Semiconductors, Accelerating Quantum Device Development	https://newscenter.lbl.gov/2026/09/17/a-new-close-up-view-of-electrons-inside-semiconductors/

ANALYZED ARTICLES | ITEMS 24-34

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
A24	LG AI Research Unveils 'Exaone Discovery' AI, Identifies Hair Loss Material in 1 Day from 420K Candidates, Plans 24-Hour Autonomous Lab	https://www.chosun.com/english/industry-en/2026/09/14/NCBCFX6UJVHEBPRX3NE74CYV2M/
A25	Drexel-Led Team Achieves Direct Vapor-Phase Synthesis of MXenes, Enabling Low-Cost, Wafer-Scale Production of Low-Defect 2D Crystals	https://www.eurekalert.org/news-releases/1144417
A26	CorePower Magnetics Secures $10.5M to Commercialize Grid-Ready Magnetic Materials, Targeting Next-Gen Transformer Products for Power Electronics	https://dealroom.co/news/151557-corepower-magnetics-raises-10-5m-for-grid-ready-magnetic-materials/
A27	JNCASR Discovers Wave-like Heat Transport in Thallium Copper Selenide, Boosting Waste Heat to Electricity Conversion to ZT 1.7	https://keekli.in/waste-heat-to-electricity-jncasr-unlocks-clean-energy-breakthrough/
A28	DuPont Launches Bio-Circular Tyvek for C&I Applications, Achieving ~30% Carbon Footprint Reduction via Mass Balance	https://www.dupont.com/news/dupont-launches-tyvek-with-renewable-attribution-for-customer-and-industrial-applications.html
A29	Chinese EV Makers Dongfeng, GAC Target 2027 Mass Production for Solid-State Batteries, Promising 30-80% Higher Energy Density and Enhanced Safety	https://www.evinfrastructurenews.com/ev-battery/solid-state-vs-lithium-ion-batteries
A30	Honda Invests in Niron Magnetics to Advance Rare-Earth-Free Magnets for EV Powertrains	https://www.wardsauto.com/news/honda-invests-in-us-maker-of-rare-earth-free-magnets/830086/
A31	Factorial Energy Partners with Mitsui Kinzoku for Mass Production of Solid-State Battery Electrolytes, Accelerating EV Commercialization	https://electrek.co/2026/09/17/solid-state-battery-maker-factorial-secures-another-big-partnership/
A32	BYD's FinDreams Battery Targets 2027 for Limited Production of Sulfide-Based All-Solid-State EV Batteries	https://electrek.co/2026/09/14/byd-leading-solid-state-battery-race-first-ev-2027/
A33	University of Queensland Develops Self-Healing Nanocoating That Boosts Steel Rust Protection by Over 600-Fold, Targeting Commercialization	https://aibn.uq.edu.au/article/2026/09/self-repairing-coating-extend-rust-prevention
A34	Solid Power Confirms South Korea Sulfide Solid Electrolyte JV, Targeting 500 Tons by 2028 with Expansion to 20,000 Tons/Year	https://news.metal.com/newscontent/104122948-solid-state-battery-weekly--%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8Bindustry-deepens-technologyiteration-amid-ebb-and-flow-policy-push-intensifies

FunctionalMaterials — Selected Articles

Date: 2026-09-20

Articles: 32

Table of Contents

#16 China's Xingyi Core Energy Technology Raises ~$14 Million for Space-Grade Flexible Perovskite Solar Wings, Accelerating Development

#17 Penn State and Rice University Discover Graphene's Nanowrinkles Bend Physics to Shape Electrical Flow, Enabling Device Control Without Chemical Modification

#18 Centimeter-Scale Room-Temperature Ferromagnetic Semiconductor Films Grown on Mica Advance Spintronics

#19 Rice University Reveals New 'Altermagnetism' in Ultrathin Ruthenium Dioxide Films, Paving Way for Next-Gen Spintronics

#20 Northeastern University Develops 'qdmag' Software for Millisecond-Scale Simulation of Molecular Magnetism, Advancing Spintronics

#21 European Coatings: Nanofiller Design with 2D MXene and CeO_2 Achieves Combined UV Protection and Corrosion Resistance, Revolutionizing Coating Tech

#22 Berkeley Lab Develops Novel Method to Directly Observe Electron-Defect Interactions in 2D Semiconductors, Accelerating Quantum Device Development

#23 LG AI Research Unveils 'Exaone Discovery' AI, Identifies Hair Loss Material in 1 Day from 420K Candidates, Plans 24-Hour Autonomous Lab

#24 Drexel-Led Team Achieves Direct Vapor-Phase Synthesis of MXenes, Enabling Low-Cost, Wafer-Scale Production of Low-Defect 2D Crystals

#25 JNCASR Discovers Wave-like Heat Transport in Thallium Copper Selenide, Boosting Waste Heat to Electricity Conversion to ZT 1.7

#26 DuPont Launches Bio-Circular Tyvek for C&I Applications, Achieving ~30% Carbon Footprint Reduction via Mass Balance

#27 Chinese EV Makers Dongfeng, GAC Target 2027 Mass Production for Solid-State Batteries, Promising 30-80% Higher Energy Density and Enhanced Safety

#28 Honda Invests in Niron Magnetics to Advance Rare-Earth-Free Magnets for EV Powertrains

#29 Factorial Energy Partners with Mitsui Kinzoku for Mass Production of Solid-State Battery Electrolytes, Accelerating EV Commercialization

#30 BYD's FinDreams Battery Targets 2027 for Limited Production of Sulfide-Based All-Solid-State EV Batteries

#31 University of Queensland Develops Self-Healing Nanocoating That Boosts Steel Rust Protection by Over 600-Fold, Targeting Commercialization

#32 Solid Power Confirms South Korea Sulfide Solid Electrolyte JV, Targeting 500 Tons by 2028 with Expansion to 20,000 Tons/Year

#01 Panjab University Startup Secures ~$13,000 Grant for Commercialization of Indigenous Advanced Functional Materials

Published September 10, 2026 Dealroom News India

OVERVIEW

Advanced Functional Material Technologies (AFMTech), a Panjab University-incubated startup, has received a ₹12 lakh (approx. $13,000) commercialization grant from the Chandigarh Administration. This funding will support the development and market deployment of indigenous target materials for advanced materials and semiconductor applications, bridging the gap from laboratory to market for deep-tech ventures. It marks a critical step in strengthening domestic technology and industrialization within India's materials science sector, particularly contributing to the resilience of the semiconductor supply chain.

IN DEPTH

Key Findings

Advanced Functional Material Technologies (AFMTech), a startup incubated at Panjab University, has been awarded a commercialization grant of ₹1.2 million (approximately $13,000 USD) from the Chandigarh Administration. This funding is aimed at accelerating the development and market introduction of indigenous target materials for advanced materials and semiconductor applications in India. This grant represents a crucial step in bridging the gap faced by deep-tech startups in India when transitioning research findings into practical applications.

Technical Details

AFMTech primarily focuses on developing high-purity target materials used in the semiconductor industry. These target materials are essential components for processes such as sputtering in integrated circuit (IC) manufacturing, and their quality directly impacts device performance. The company has developed proprietary material synthesis and purification technologies. By establishing a domestic supply system, AFMTech aims to stabilize the supply chain in the highly import-dependent semiconductor materials sector. The grant will be utilized for prototyping these indigenous target materials, scaling up to mass production, and conducting necessary market validation.

Background and Industry Context

Amidst a global semiconductor shortage and increased awareness of supply chain vulnerabilities, many countries are promoting the indigenization of semiconductor-related materials. India is no exception, with the government strongly supporting advanced manufacturing and technological development as part of its 'Make in India' policy. Grants to startups like AFMTech materialize this national strategy, contributing to India's technological self-reliance and strengthening its industrial base, especially in the highly competitive semiconductor materials market. University-led ventures are playing a crucial role in achieving these strategic national goals.

Strategic Significance and Outlook

The acquisition of this grant signifies a major leap forward for AFMTech's advanced functional materials towards market commercialization. Moving forward, the company will focus on enhancing product performance and establishing production efficiency, while strengthening collaborations with Indian semiconductor manufacturers and research institutions. The successful supply of indigenous target materials will bolster India's semiconductor ecosystem and improve its international competitiveness. In the long term, AFMTech has the potential to grow into a leading company in India's advanced materials sector, expanding its presence in the global market.

Source: https://dealroom.co/news/149920-chandigarh-grant-of-13-000-backs-panjab-university-materials-startup/

#02 University of Queensland Develops Self-Healing Smart Coating, Inhibiting Steel Corrosion by Over 600-Fold

Published September 17, 2026 The Debrief Australia

OVERVIEW

Researchers at the University of Queensland (UQ) have engineered a novel 'smart' self-healing coating that inhibits steel corrosion by over 600 times compared to conventional protective coatings. This groundbreaking innovation incorporates powdery benzotriazole-based particles into water-based paint, enabling the coating to self-sense and patch scrapes and cracks. The technology promises to significantly extend the lifespan of structures and drastically reduce maintenance costs, presenting a potential game-changer for marine, infrastructure, and automotive industries.

IN DEPTH

Key Findings

Researchers at the University of Queensland (UQ) have developed a groundbreaking 'smart' self-healing coating designed to significantly inhibit steel corrosion. This innovative coating has demonstrated an ability to delay corrosion by over 600 times compared to conventional protective coatings. The core of this technology lies in its capacity for self-sensing and self-repair, representing a transformative advancement that promises to extend the lifespan of structures and drastically reduce maintenance expenses.

Technical Details

This self-healing coating is formulated by incorporating microscopic powdery particles, based on the corrosion inhibitor benzotriazole, into a water-based paint system. When a scratch or crack compromises the coating's surface, moisture and oxygen at the damaged site react, leading to the 'activation' of the benzotriazole particles. These activated particles then migrate to the damaged area, forming a protective barrier on the steel surface that rapidly impedes the corrosion reaction. This process mimics biological healing, effectively stopping corrosion at its nascent stage. Consequently, the coating maintains its long-term protective performance, significantly enhancing the durability of metal structures.

Background and Industry Context

Corrosion inflicts trillions of dollars in economic losses and poses significant safety risks annually across numerous global industries, including infrastructure, transportation, and manufacturing. Traditional anti-corrosion coatings function primarily as physical barriers; however, once damaged, corrosion tends to accelerate rapidly from that point. While self-healing materials have been extensively researched for years, challenges related to cost, scalability, and performance limitations have hindered their practical implementation. UQ's technology overcomes these obstacles by integrating into a versatile water-based paint, making it a viable solution for widespread industrial adoption.

Strategic Significance and Outlook

This new self-healing coating is applicable to all metal structures where corrosion is a major concern, such as marine structures, bridges, pipelines, automotive bodies, and aircraft components. Its value is particularly high for remote infrastructure where inspection and maintenance are challenging, and for vessels constantly exposed to harsh environments. Moving forward, the research team will focus on further optimizing the material's durability, repair efficiency, and cost-effectiveness, alongside establishing large-scale production techniques. The commercialization of this technology is expected to mitigate the global economic impact of corrosion and contribute to building a safer, more sustainable society.

Source: https://thedebrief.org/new-self-healing-material-activates-as-damage-occurs-offering-a-game-changing-defense-against-rust-formation/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#03 Scientists Develop Piezoelectric Chin Strap Harvesting Power from Jaw Movements for Wearable Devices, Generating up to 18 µW

Published September 10, 2026 The Times of India India

OVERVIEW

Scientists have developed a flexible piezoelectric fiber composite chin strap capable of generating electricity from jaw movements such as chewing and speaking. This groundbreaking proof-of-concept device can produce up to 18 microwatts of power, offering a new, battery-free power source for small wearable electronic devices. It holds particular promise for applications like medical implants and hearing aids, where frequent recharging is impractical. The technology efficiently harnesses human body movement energy, paving the way for sustainable wearable device futures.

IN DEPTH

Key Findings

Scientists have developed a flexible piezoelectric fiber composite chin strap capable of generating electricity from everyday jaw movements, specifically chewing and speaking. Published in 'Smart Materials and Structures', this proof-of-concept device has demonstrated the ability to produce up to 18 microwatts of power. This groundbreaking technology offers an innovative, autonomous power solution for small wearable electronic devices, moving beyond the limitations of conventional batteries.

Technical Details

The developed chin strap consists of a specialized fiber composite material integrated with piezoelectric elements—materials that generate an electric charge in response to mechanical stress. As the jaw opens and closes, or facial muscles move, the strap undergoes slight deformations. These deformations cause the embedded piezoelectric fibers to generate minute electrical signals, which are then efficiently harvested and converted into usable electricity. The output of up to 18 microwatts is sufficient to power low-power devices such as Bluetooth earbuds or certain medical sensors. This technology is based on the principle of energy harvesting, efficiently 'scavenging' kinetic energy generated by the human body.

Background and Industry Context

With the proliferation of wearable devices, power supply remains a significant challenge. Traditional batteries face limitations in terms of size, weight, lifespan, and charging frequency. These issues are particularly acute for devices requiring continuous operation and difficult recharging, such as medical implants and hearing aids. Energy harvesting technologies, which derive power from human motion, offer a promising approach to address these challenges, with flexible piezoelectric materials playing a central role. This chin strap is notable for focusing on facial movements, an energy source not fully exploited until now.

Strategic Significance and Outlook

This piezoelectric chin strap, powered by jaw movements, holds potential for a wide range of wearable devices, including hearing aids, smart glasses, temporomandibular joint (TMJ) monitoring devices, and even rehabilitation tools for facial paralysis. In the future, advancements in more efficient piezoelectric materials and refined device designs could increase generated power, enabling the supply of electricity to more feature-rich devices. This research demonstrates the feasibility of converting natural human movements into electrical power, marking a crucial step towards a future of sustainable, battery-independent wearable technology.

Source: https://timesofindia.indiatimes.com/science/discovery/scientists-developed-a-chin-strap-that-turns-chewing-and-speaking-into-electricity-for-small-wearable-devices/articleshow/134009980.cms

Collected: September 18, 2026 | Automated Research System (Gemini API)

#04 Same Sky Launches Thermoelectric Generator Modules Delivering up to 27.3W, Boosting Industrial Waste Heat Recovery

Published September 10, 2026 Electronics For You Germany

OVERVIEW

Same Sky has introduced new configurations for its SPG family of thermoelectric generator modules, now capable of producing up to 27.3W of electrical power. These modules efficiently convert temperature differences directly into usable electricity, making them ideal for recovering waste heat often dissipated in industrial processes. Supporting continuous hot-side operation up to 300°C, they offer high conversion efficiency within a compact design. This advancement is expected to significantly improve energy efficiency in factories and reduce operational costs and environmental impact, serving as a crucial technology for promoting sustainable industrial activities.

IN DEPTH

Key Findings

Same Sky has expanded its SPG family of thermoelectric generator modules with new configurations, achieving up to 27.3W of electrical output. These modules excel at directly converting thermal energy into electrical energy, providing an optimal solution for recovering waste heat generated in various industrial processes. This expansion is expected to enhance power recovery efficiency from existing heat sources, significantly contributing to improved energy efficiency across industrial sectors.

Technical Details

SPG thermoelectric generator modules utilize the Seebeck effect to directly convert temperature differences into electricity. The new configurations achieve an output of up to 27.3W through optimized heat flux management and advanced material selection, complementing Same Sky's existing product lineup and catering to a broader range of power needs. These modules are designed for continuous hot-side operation up to 300°C, ensuring stable performance even in harsh industrial environments. They combine a robust design with high conversion efficiency, enabling the construction of reliable waste heat recovery systems.

Background and Industry Context

Driven by rising energy costs and the imperative of climate change mitigation, improving energy efficiency in the industrial sector is a pressing challenge. Many industrial processes release vast amounts of heat into the atmosphere as waste, representing significant energy loss and environmental burden. Thermoelectric power generation technology is gaining attention as a clean energy conversion solution that can effectively reuse this waste heat. Products like Same Sky's SPG modules play a crucial role in this waste heat recovery market by contributing to efficient energy utilization and enhanced sustainability.

Strategic Significance and Outlook

The evolution of Same Sky's SPG thermoelectric generator modules indicates that technologies for converting industrial waste heat into electricity are transitioning towards more practical and large-scale applications. Accelerated adoption is anticipated in industries that emit significant amounts of waste heat, such as steel manufacturing, glass production, cement factories, and chemical plants. This will directly contribute to reducing corporate operational costs, increasing energy self-sufficiency, and lowering carbon dioxide emissions. Furthermore, these modules can also serve as power sources for IoT sensors and wireless communication devices, potentially contributing to the realization of smart factories. Same Sky is committed to advancing sustainable societies through continuous technological innovation.

Source: https://www.electronicsforu.com/news/thermoelectric-modules-harvest-waste-heat

Collected: September 18, 2026 | Automated Research System (Gemini API)

#05 International Team Boosts Light Conversion Efficiency by 72,000x with Metasurface Technology, Revolutionizing Photonic Computing

Published September 10, 2026 Wonford-press オーストリア

OVERVIEW

An international research team from Graz University of Technology, Harvard University, and the University of Texas at Austin has developed a revolutionary metasurface technology that increases nonlinear frequency light conversion efficiency by an unprecedented 72,000 times. This innovation, combining an ultra-thin semiconductor layer with precisely engineered nanostructures, optimizes light-matter interaction, resolving a long-standing bottleneck. This breakthrough is set to accelerate the miniaturization and performance enhancement of photonic devices, high-speed data processing, and chip-scale quantum technologies, reshaping the future of information technology, particularly advancing the practical realization of optical computing.

IN DEPTH

Key Findings

An international research team, comprising scientists from Graz University of Technology, Harvard University, and the University of Texas at Austin, has developed a groundbreaking metasurface technology that enhances nonlinear frequency light conversion efficiency by an unprecedented 72,000 times. This breakthrough is achieved by combining ultra-thin semiconductor layers with precisely engineered nanostructures, which optimize light-matter interactions. This innovation resolves a long-standing bottleneck in optical conversion efficiency, paving the way for miniaturized and high-performance photonic devices.

Technical Details

The developed metasurface features a hybrid structure that integrates a multi-quantum-well heterostructure with plasmonic nanogratings. This ultra-thin semiconductor layer, with its tailored nanostructures, dramatically amplifies nonlinear optical effects by tuning the wavelength of incident light to resonate with specific atomic transitions within the material. Specifically, this structure achieves significantly higher efficiency with much lower light intensities than traditional crystal-based nonlinear optical materials when converting light wavelengths (e.g., infrared light to visible light, or to different frequencies). The quantum well structure confines electrons, enabling high nonlinear response, while the nanogratings contribute to light localization and enhancement.

Background and Industry Context

Photonic computing and quantum information technologies hold immense potential for vastly increasing data processing speeds and security. However, weak light-matter interactions have posed a significant barrier to efficient light conversion. Conventional nonlinear optical materials typically require large volumes or high light intensities to achieve sufficient conversion efficiency, hindering device miniaturization and integration. This new metasurface technology overcomes these limitations, enabling high-efficiency light conversion at the chip scale and thus accelerating the development of photonic integrated circuits, quantum communication, and quantum computing.

Strategic Significance and Outlook

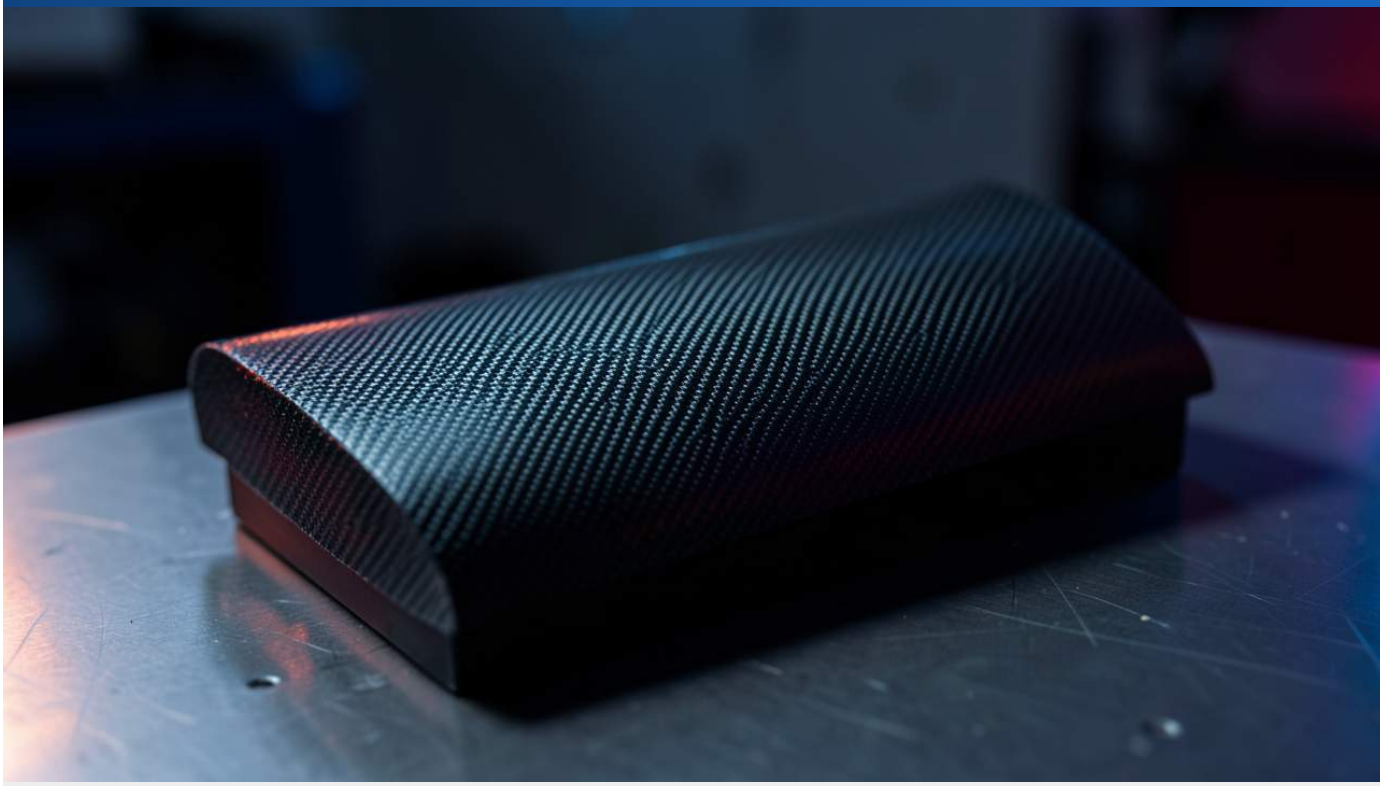
With an astounding 72,000-fold improvement in light conversion efficiency, this metasurface technology has the potential to fundamentally transform the future of information technology. For instance, it could enable ultra-high-speed data processing, energy-efficient optical computers, next-generation optical communication systems, and chip-scale interfaces between quantum bits. The technology is also applicable to new imaging techniques, such as seeing infrared light with visible light cameras, and improving the efficiency of quantum information transfer. Future research is expected to focus on scaling up this technology and integrating it into commercial products, positioning it as a key driver for new markets and innovations.

Source: https://wonford.com/2026/09/10/breakthrough-metasurface-tech-boosts-light-conversion-efficiency-by-72000-times-reshaping-photonic-computing/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#06 MAKO Advanced Materials Unveils HyperCure: Creel-Free Unidirectional Carbon Fiber Prepreg with 9-Minute Cure Time

Published September 14, 2026 The National Law Review USA



OVERVIEW

MAKO Advanced Materials has launched its new Creel-Free Unidirectional (UD) Carbon Fiber Prepreg, integrating custom carbon reinforcement with their proprietary HyperCure epoxy resin system. This innovative material offers manufacturers significantly faster cure times (approximately 9-10 minutes), lower minimum order quantities (MOQs), and shorter lead times. This advancement is set to dramatically enhance manufacturing efficiency in industries requiring high-performance composites, such as aerospace, defense, motorsports, and medical sectors. It is particularly expected to contribute to the automotive and sports equipment industries, where rapid production cycles are critical.

IN DEPTH

Key Findings

MAKO Advanced Materials has introduced a new Creel-Free Unidirectional (UD) Carbon Fiber Prepreg, which integrates custom carbon reinforcement with their proprietary HyperCure epoxy resin system. This groundbreaking product enables cure times to be dramatically reduced to just 9-10 minutes in composite manufacturing, while also offering lower minimum order quantities (MOQs) and shorter lead times. This significantly boosts production efficiency and flexibility across high-performance industries, including aerospace, defense, motorsports, and medical sectors.

Technical Details

The Creel-Free UD Carbon Fiber Prepreg simplifies the manufacturing process and reduces material waste by eliminating the need for large creel equipment, traditionally required in prepreg production. The HyperCure epoxy resin system achieves rapid cure reactions through a special formulation of catalysts and hardeners. This system is designed to maintain excellent shelf stability at room temperature while reacting swiftly upon heat activation. As a result, while conventional prepregs typically require several hours to cure, HyperCure develops structural strength within minutes, substantially improving production throughput and resolving manufacturing bottlenecks.

Background and Industry Context

In industries like aerospace, defense, and automotive, where high-performance composites are widely utilized, lightweighting and strength enhancement of components are paramount. However, the manufacturing processes for these materials, especially the curing of prepregs, often entail lengthy durations, significantly impacting production efficiency and cost. Concurrently, there is a growing demand for small-batch production and rapid prototyping to meet diverse needs. MAKO Advanced Materials' HyperCure prepreg addresses these market requirements, contributing to the overall competitiveness of the composite industry through reduced manufacturing times and increased flexibility.

Strategic Significance and Outlook

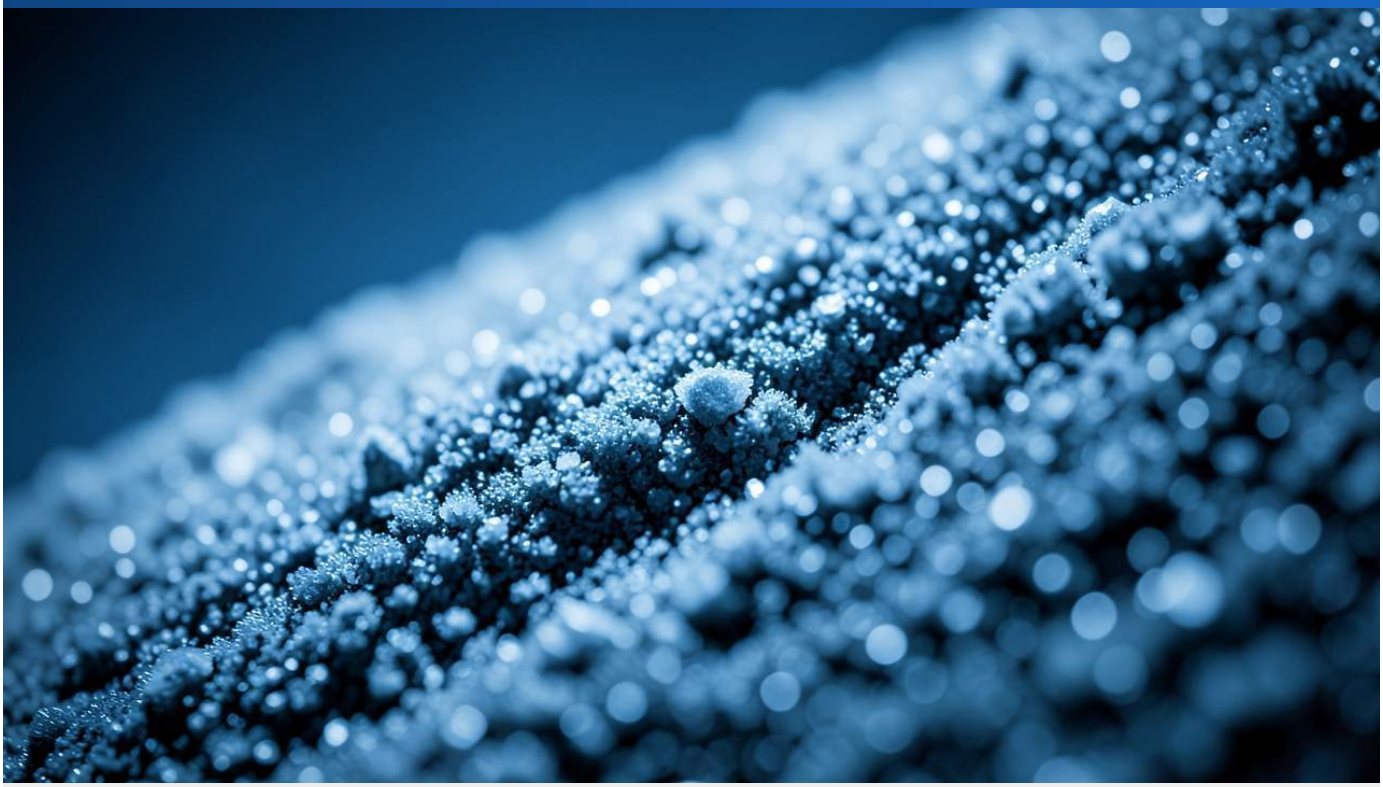
The introduction of MAKO Advanced Materials' Creel-Free UD Carbon Fiber Prepreg and HyperCure epoxy resin system has the potential to redefine the future of composite manufacturing. Adoption is expected to accelerate particularly in the motorsports and automotive industries, where rapid component production is critical, as well as in markets like medical devices and sports equipment that demand both high functionality and cost-effectiveness. In the future, as this technology advances to encompass more complex geometries and larger structures, and integrates into automated composite manufacturing processes, it holds the potential to establish new standards in composite part design and production. MAKO Advanced Materials is poised to contribute to the development of sustainable manufacturing processes through this innovative material solution.

Source: https://natlawreview.com/press-releases/mako-advanced-materials-introduces-creel-free-unidirectional-carbon-fiber

Collected: September 18, 2026 | Automated Research System (Gemini API)

#07 Drexel University Establishes New Vapor-Phase Synthesis for 2D Crystalline MXene, Expanding Applications in Electronics and Quantum Technologies

Published September 17, 2026 Drexel University USA



OVERVIEW

Researchers at Drexel University have successfully developed a novel vapor-phase synthesis process for creating crystalline two-dimensional MXene directly via gas-to-solid growth. This method, which bears similarities to industrial titania production, suggests the feasibility of producing large-area and wafer-scale MXene crystals for advanced applications in electronics, optical communication, and quantum computing technologies. This is a groundbreaking advancement that significantly enhances MXene's quality and uniformity compared to previous solution-based exfoliation methods, accelerating its application in next-generation electronics, particularly impacting the semiconductor industry.

IN DEPTH

Key Findings

A research team at Drexel University has discovered a novel vapor-phase synthesis process for producing crystalline, large-area two-dimensional MXene directly through a gas-to-solid growth mechanism. This innovative method, which shares similarities with industrial titanium dioxide production, indicates the potential for manufacturing wafer-scale MXene crystals. This advancement is expected to significantly improve the quality and uniformity of MXene, thereby expanding its applications in next-generation technologies such as electronics, optical communication, and quantum computing.

Technical Details

Historically, MXene fabrication primarily relied on solution-based exfoliation processes, using etchants like hydrofluoric acid to delaminate MXene sheets from layered MAX phase materials. However, this method often resulted in variations in size and quality of the MXene sheets, making large-scale production or high-quality single crystals challenging. The newly developed vapor-phase synthesis involves reacting precursor gases (e.g., metal halides and carbon/nitrogen sources) at high temperatures to grow MXene crystals directly on a substrate. This dry process enables the formation of purer, more crystalline MXene sheets with fewer defects and unprecedented large-area uniformity. Wafer-scale synthesis would facilitate integration into semiconductor processes, accelerating industrial applications.

Background and Industry Context

MXene, with its excellent electrical conductivity, high surface area, and tunable bandgap, has garnered significant attention for applications in energy storage (supercapacitors, batteries), electromagnetic shielding, sensors, and flexible electronic devices. Yet, manufacturing challenges have limited its practical implementation in these promising areas. Particularly in the semiconductor and optoelectronic device sectors, which require large-area, high-quality MXene, existing solution processes were unsuitable. Drexel University's vapor-phase synthesis technology addresses this manufacturing bottleneck, significantly advancing the industrial applicability of MXene.

Strategic Significance and Outlook

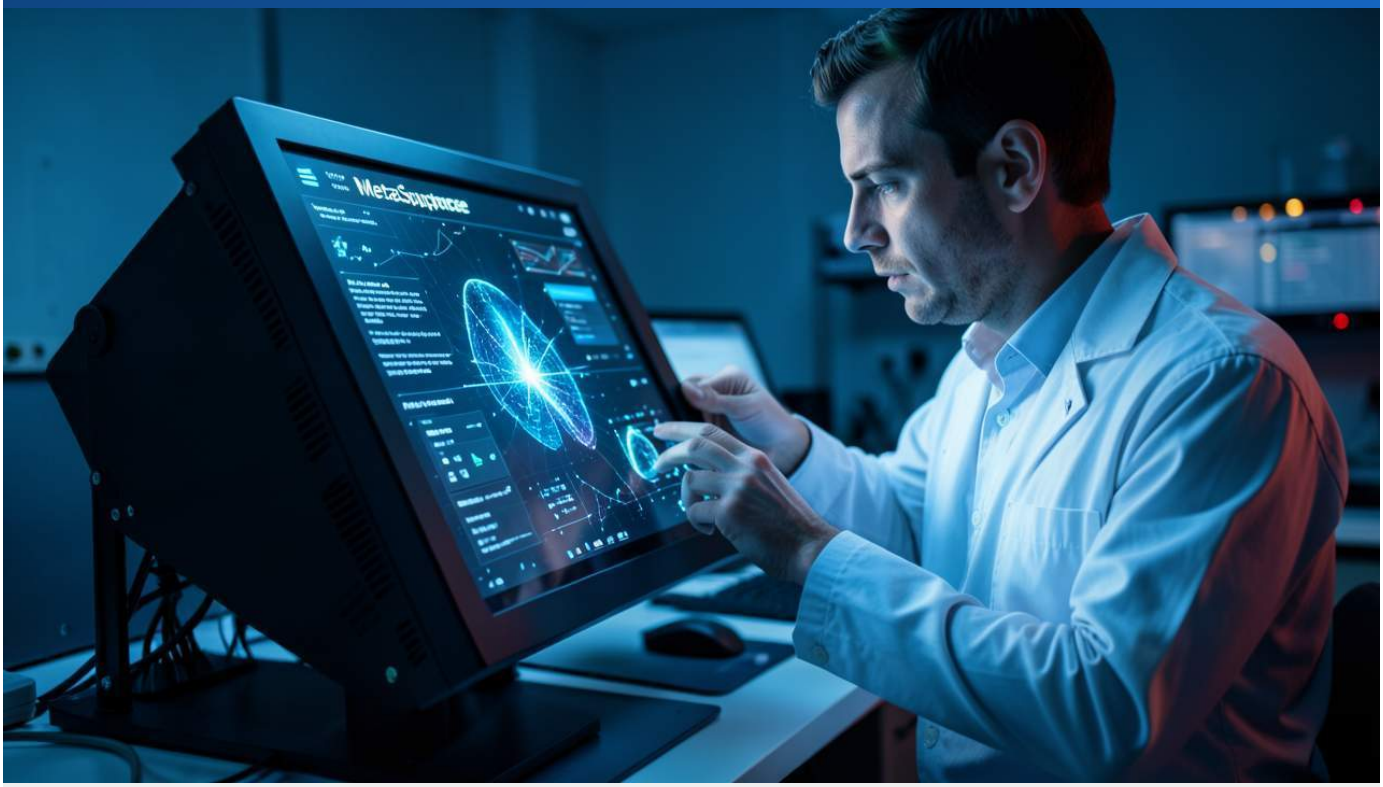
This vapor-phase synthesis technology for large-area, high-quality MXene holds the potential to revolutionize future electronics. For instance, it is expected to be utilized as a key material for ultra-high-speed transistors, high-efficiency photodetectors, flexible displays, and even quantum information devices. Should wafer-scale integration into semiconductor manufacturing lines be achieved, MXene could establish its position as a new generation material, complementing or partially replacing current silicon-based technologies. Future research will explore further optimization of this technology and its applicability to different MXene compositions, with early commercialization expected through collaboration with relevant industries.

Source: https://drexel.edu/news/archive/2026/September/vapor-phase-synthesis-MXenes

Collected: September 18, 2026 | Automated Research System (Gemini API)

#08 University of Melbourne Develops Metasurface Optical Screen Converting Infrared to Visible Light with 1000x Brightness, Paving Way for Cheaper Infrared Cameras

Published September 16, 2026 EurekAlert! Australia



OVERVIEW

Researchers led by the University of Melbourne have developed an optical screen, or 'metasurface,' covered in tiny rare-earth nanoparticles that directly converts invisible infrared light into visible light, making the converted image over 1000 times brighter. This innovative technology could lead to smaller, lighter, and more affordable infrared imaging systems for applications such as night vision, remote sensing, and biomedical imaging. This is expected to significantly expand the applicability of infrared technology, providing high-performance, low-cost solutions across various fields.

IN DEPTH

Key Findings

A research team led by the University of Melbourne has developed a unique 'metasurface optical screen' incorporating tiny rare-earth nanoparticles. This screen possesses the remarkable ability to directly convert invisible infrared light into visible light with high efficiency, resulting in a converted image that is over 1000 times brighter than achievable with existing technologies. This breakthrough eliminates the need for expensive and bulky traditional infrared detectors, thereby significantly contributing to the realization of smaller, lighter, and more affordable next-generation infrared cameras.

Technical Details

The developed metasurface is an artificial nanostructure meticulously designed to interact with specific wavelengths of light. Its surface is precisely patterned with nanoparticles utilizing rare-earth elements (e.g., erbium, ytterbium). These nanoparticles absorb energy from infrared light, which excites their electrons. These electrons then transition to higher energy levels before emitting visible light (upconversion). This process has been optimized to occur with exceptionally high quantum efficiency, resulting in an extremely bright converted visible light image. The screen's structure itself is also engineered to maximize light scattering and absorption.

Background and Industry Context

Infrared cameras are indispensable tools in diverse fields such as night vision, thermal imaging, medical diagnostics, and industrial monitoring. However, current infrared cameras rely on high-performance semiconductor detectors that often require cooling, making them expensive, bulky, and power-intensive. Consequently, their widespread adoption has been limited. This new metasurface technology has the potential to overcome these cost and size barriers by eliminating the need for conventional detectors, thereby democratizing infrared imaging technology.

Strategic Significance and Outlook

This novel metasurface optical screen is expected to find broad applications in consumer and industrial sectors, including night vision systems, automotive safety features, surveillance cameras, remote sensing (environmental monitoring, agriculture), and even integrated infrared cameras for smartphones. In the medical field, it could contribute to lowering the cost of non-invasive diagnostic tools. The research team will focus on optimizing the manufacturing process for mass production and expanding the capability to cover different spectral bands. This technology is poised to transform infrared imaging, making it more accessible and widely usable, thereby becoming a key enabler for numerous new applications beyond specialized fields.

Source: https://www.eurekalert.org/news-releases/1144136

#09 Osaka Metropolitan University Achieves Precise Composition Control and Fabrication of High-Entropy Alloys via Underwater Laser Irradiation, Accelerating Next-Gen Material Development

Published September 10, 2026 Science Japan Japan

OVERVIEW

A research group at Osaka Metropolitan University has successfully fabricated multi-element high-entropy alloy (HEA) nanoparticles using an underwater laser irradiation method. The study identified the cause of non-uniform elemental distribution within the nanoparticles and demonstrated precise control over elemental ratios through optimized laser processing. This technology maximizes the properties of HEAs, which have high compositional design flexibility, opening new avenues for fundamental research and applied development of next-generation materials. It is expected to significantly impact the field of materials science, particularly for high-performance structural materials and catalysts, thereby accelerating the new material development process.

IN DEPTH

Key Findings

A research group at Osaka Metropolitan University has successfully fabricated fine particles of multi-element high-entropy alloys (HEAs) through an innovative underwater laser irradiation method. Furthermore, the study identified the cause of non-uniform elemental distribution within these nanoparticles, a challenge in previous research, and demonstrated precise control over the elemental ratios of HEAs by optimizing the laser process. This technology is poised to maximize the potential of HEAs, which offer significant freedom in compositional design, thereby strengthening the foundation for next-generation material development.

Technical Details

The research team positioned multiple target metals in water and irradiated them with a high-power pulsed laser. Laser ablation caused the metals to vaporize into a plasma, followed by rapid quenching and condensation in the water to form nanoscale alloy particles. In this process, the team precisely controlled parameters such as laser energy density, pulse width, and the solution environment to manage the solid solubility and homogeneity of each element within the alloy particles. They specifically discovered that the cooling rate after laser irradiation significantly influences elemental distribution within the particles. By optimizing this parameter, they achieved HEA nanoparticles with uniform elemental distribution.

Background and Industry Context

High entropy alloys have garnered considerable attention for their exceptional combination of properties, including high strength, superior toughness, excellent heat resistance, and corrosion resistance, making them highly promising for aerospace, energy, and medical applications. However, efficient fabrication of HEAs with desired compositions and uniform mixing of diverse elements has remained a significant challenge. Conventional melt-solidification methods often lead to segregation due to differences in element densities and melting points, making nanoscale compositional control particularly difficult. The underwater laser irradiation method, with its rapid quenching effect, suppresses segregation and enables nanoparticle formation, making it a promising technique for HEA fabrication.

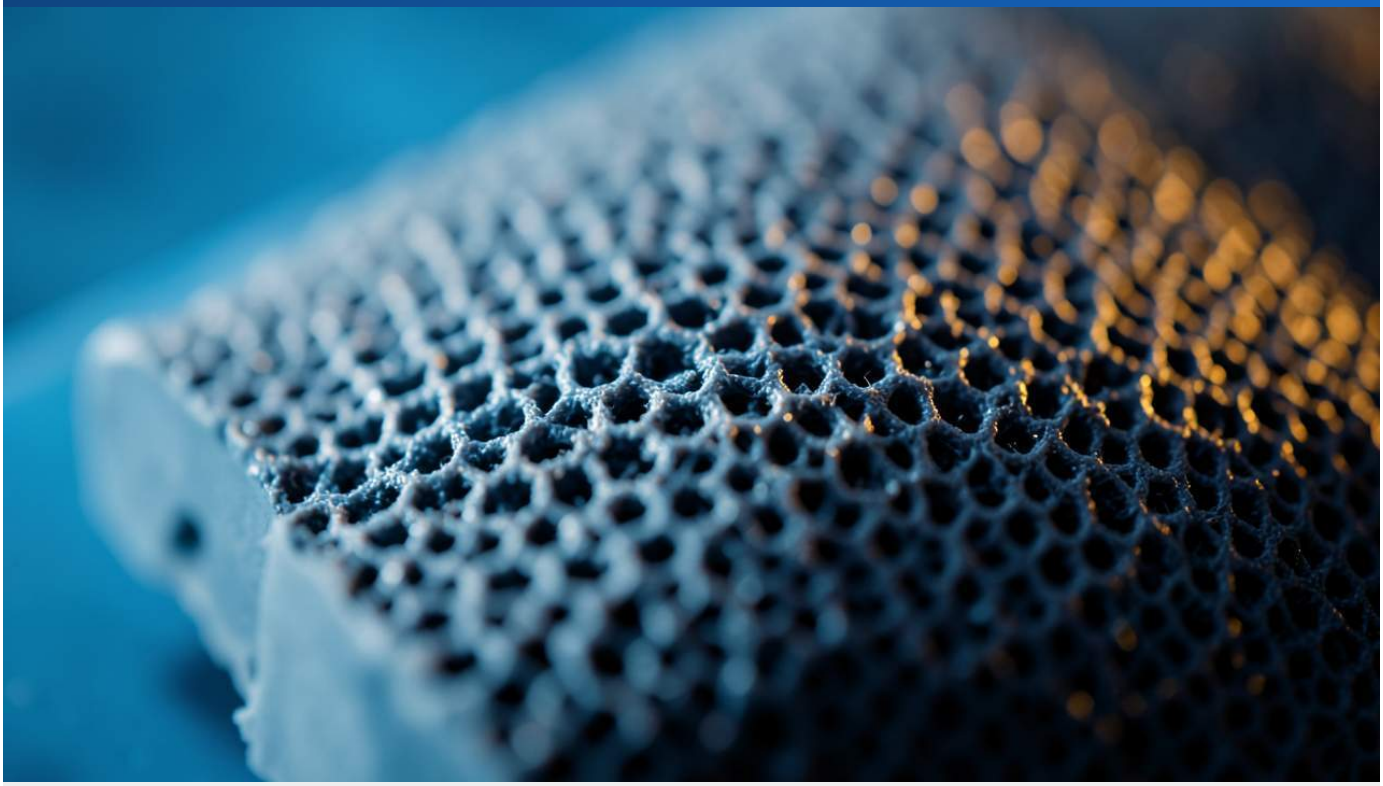
Strategic Significance and Outlook

The achievement by Osaka Metropolitan University significantly enhances the flexibility of HEA compositional design, enabling the fabrication of HEAs with specific functionalities that were previously difficult to realize. In the future, this technology is expected to lead to the development of higher-performance structural materials, more efficient catalysts, durable coating materials, and functional materials with superior magnetic or thermoelectric properties. Its combination with 3D printing also opens up possibilities for manufacturing complex HEA components. Ongoing research will further advance this laser irradiation method, exploring its scalability for mass production and applicability to different multi-element alloy systems, thereby expanding the frontiers of new materials science.

Source: https://sj.jst.go.jp/news/202609/n0910-02p.html

#10 NovoLINC Launches MaxLINC: Industry-Leading 0.7 mm²•K/W Thermal Resistance for Multi-Kilowatt AI Chips

Published September 17, 2026 Morningstar USA



OVERVIEW

NovoLINC, a Carnegie Mellon University spin-out, has launched MaxLINC, a new generation of thermal interface material (TIM) engineered for multi-kilowatt AI chips. Built on a proprietary nanostructured composite architecture, MaxLINC achieves industry-leading thermal resistance as low as 0.7 mm²•K/W. This breakthrough provides over 20% cooling energy savings for AI servers and addresses critical thermal bottlenecks in high-performance computing, presenting a revolutionary solution to reduce operational costs and enhance computational power in AI data centers. It is poised to become a key enabler for high performance in the semiconductor industry.

IN DEPTH

Key Findings

NovoLINC, a spin-out from Carnegie Mellon University, has announced MaxLINC, a next-generation thermal interface material (TIM) specifically engineered for multi-kilowatt AI chips. Leveraging its proprietary nanostructured composite architecture, MaxLINC achieves an industry-leading ultra-low thermal resistance of 0.7 mm²•K/W. This groundbreaking performance is projected to deliver over 20% cooling energy savings for AI servers, offering a critical solution to long-standing thermal bottlenecks in high-performance computing (HPC).

Technical Details

MaxLINC's exceptional thermal conductivity performance is attributed to its precisely engineered nanostructured composite architecture. This TIM efficiently arranges highly conductive nanomaterials within a polymer matrix, creating optimized pathways for heat transfer from the chip to the heatsink. A key success lies in minimizing interfacial thermal resistance (contact thermal resistance), a critical factor in TIM performance. Compared to conventional TIMs, MaxLINC significantly reduces voids and microscopic non-uniformities at the contact interface, ensuring uniform and efficient heat transfer. This effectively manages the enormous heat generated by AI chips under heavy load, preventing performance degradation and damage.

Background and Industry Context

With the rapid advancement of AI, machine learning, and high-performance computing, processors like CPUs and GPUs are consuming increasing amounts of power and generating more heat. The heat dissipation from multi-kilowatt AI chips, in particular, has become one of the most severe challenges in data center operations. Effective thermal management is crucial for maintaining stable chip performance, extending lifespan, and improving the overall energy efficiency (PUE) of data centers. NovoLINC's MaxLINC is specifically developed to meet these demands for high-heat-flux chips, pushing the boundaries of existing thermal management solutions.

Strategic Significance and Outlook

The introduction of MaxLINC is expected to have a profound impact on the AI data center and high-performance computing industries. Achieving over 20% reduction in cooling energy will not only lower operational costs but also contribute to the realization of sustainable IT infrastructure. Furthermore, effective chip temperature management will enable faster training of AI models and execution of larger-scale computations, fostering further advancements in AI technology. NovoLINC is expected to strengthen its partnerships with server manufacturers and chip vendors, establishing itself as a leading company in the HPC market. This technology is poised to become a critical enabler for future performance enhancements of semiconductor devices and the realization of Green IT initiatives.

Source: https://www.morningstar.com/news/pr-newswire/20260917ph50124/novolinc-launches-maxlinc-achieving-industry-leading-07-mmkw-thermal-resistance-for-multi-kilowatt-ai-chips

#11 iGii Secures €26.5 Million Funding for Commercialization of Proprietary 3D Porous Carbon Nanomaterial 'Gii'

Published September 16, 2026 EU-Startups UK

OVERVIEW

Stirling-based DeepTech company iGii has secured €26.49 million in new funding to accelerate the commercialization and industrial adoption of its proprietary three-dimensional porous carbon nanomaterial, Gii. Gii, which can be manufactured at room temperature and scaled to industrial volumes, offers a high-performance material platform for manufacturers across multiple industries facing supply chain pressures for critical materials. This substantial funding indicates the potential of innovative carbon materials to enhance industrial sustainability and competitiveness, with applications expected in battery, sensor, and composite material sectors.

IN DEPTH

Key Findings

iGii, a DeepTech company based in Stirling, Scotland, has successfully secured €26.49 million in new funding to accelerate the commercialization and industrial adoption of its proprietary three-dimensional porous carbon nanomaterial, 'Gii.' The Gii material is unique in its ability to be manufactured at room temperature and is suitable for scaling up to industrial volumes. This funding strengthens iGii's capacity to provide a high-performance material platform to manufacturers across numerous industries currently facing critical material supply chain challenges.

Technical Details

Gii is a 3D porous carbon nanomaterial produced through a proprietary synthesis process, exhibiting exceptionally high surface area, electrical conductivity, and chemical stability. Its ability to be manufactured at room temperature offers significant advantages in reducing energy consumption and manufacturing costs. Furthermore, the synthesis process allows for precise control over the material's microstructure and porosity, enabling the design of Gii materials with properties tailored for specific applications. For instance, as a battery electrode material, Gii can achieve high energy density and fast charge/discharge characteristics, while in sensors, it enables high sensitivity and selectivity. This scalable manufacturing method is particularly well-suited for industrial applications requiring large-volume production.

Background and Industry Context

Globally, the demand for high-performance materials is increasing, yet supply chain instability and rising manufacturing costs present challenges for many industries. In the current era, where sustainability and environmental impact reduction are paramount, there is a strong need for the development of energy-efficient and environmentally friendly material manufacturing processes. iGii's Gii material, with its room-temperature manufacturing capability, offers an innovative solution to these challenges. Compared to conventional carbon material production processes, Gii has the potential to significantly reduce energy consumption and CO2 emissions, contributing to the circular economy.

Strategic Significance and Outlook

The €26.49 million secured by iGii will be utilized to expand Gii's production capacity and accelerate its market launch. The company aims for Gii's application in a wide range of fields, including energy storage (supercapacitors, lithium-ion batteries, fuel cells), sensors, composite materials, water treatment, and catalysis. Accelerated adoption of Gii is anticipated in growth sectors such as sustainable mobility, green energy, and smart devices. Through this unique carbon nanomaterial, iGii is poised to enhance the resilience of industrial supply chains and contribute to the development of more sustainable and high-performance products. This technology holds the potential to be a crucial driver of future materials innovation.

Source: https://www.eu-startups.com/2026/09/stirling-based-igii-secures-e26-5-million-to-commercialise-its-proprietary-carbon-nanomaterial/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#12 Bactiguard Announces New Data Reinforcing Durable Noble Metal Coating for Orthopedic Implants Demonstrating Superior Infection Prevention

Published September 17, 2026　TradingView　スウェーデン

OVERVIEW

Bactiguard has released new data reinforcing its distinct and durable noble metal coating approach for orthopedic implant surface modification, demonstrating superior durability and infection prevention efficacy. This technology effectively binds noble metals like silver, gold, and palladium to the implant surface, inhibiting bacterial adhesion and biofilm formation. It particularly contributes to reducing infection risks in trauma and reconstruction surgery, offering a differentiated mechanism to improve long-term patient outcomes. This innovative advancement in combating implant-related infections (IRI) is drawing significant attention.

IN DEPTH

Key Findings

Bactiguard has released new data validating the superior durability and anti-bacterial adhesion properties of its unique noble metal coating used for orthopedic implant surface modification. This coating technology permanently binds noble metals such as silver, gold, and palladium to the implant surface, effectively inhibiting bacterial colonization and biofilm formation, thereby reducing the risk of implant-related infections (IRI). This new data reaffirms Bactiguard's solution as an unparalleled approach contributing to long-term infection prevention and patient safety in trauma and reconstructive surgery.

Technical and Clinical Details

Bactiguard's coating functions by permanently binding an ultra-thin noble metal alloy layer to the surface of medical devices. This noble metal alloy physically impedes bacterial adhesion and prevents biofilm formation. Crucially, its 'non-leaching' mechanism, meaning no active antimicrobial agents are released, results in a low risk of bacterial resistance development and minimal environmental impact. The newly published data demonstrates, through both in vitro and in vivo studies, that the coating's integrity and anti-bacterial adhesion efficacy are maintained over long periods, even in challenging environments like orthopedic implants exposed to bodily fluids and mechanical stress. This is expected to not only reduce infection risks but also contribute to lower postoperative complication rates and re-operation rates for patients.

Background and Industry Context

Implant-related infections (IRI) in orthopedic surgery pose significant challenges, leading to severe patient suffering, re-operations, and increased healthcare costs. Globally, the burden of IRI is estimated to be billions of dollars annually. Therefore, developing technologies to enhance the antimicrobial properties of implant surfaces is an urgent priority. While conventional antimicrobial implants include antibiotic-eluting or silver-ion-releasing types, concerns regarding drug resistance and duration of efficacy exist. Bactiguard's noble metal coating addresses these challenges, providing a differentiated solution with proven long-term safety.

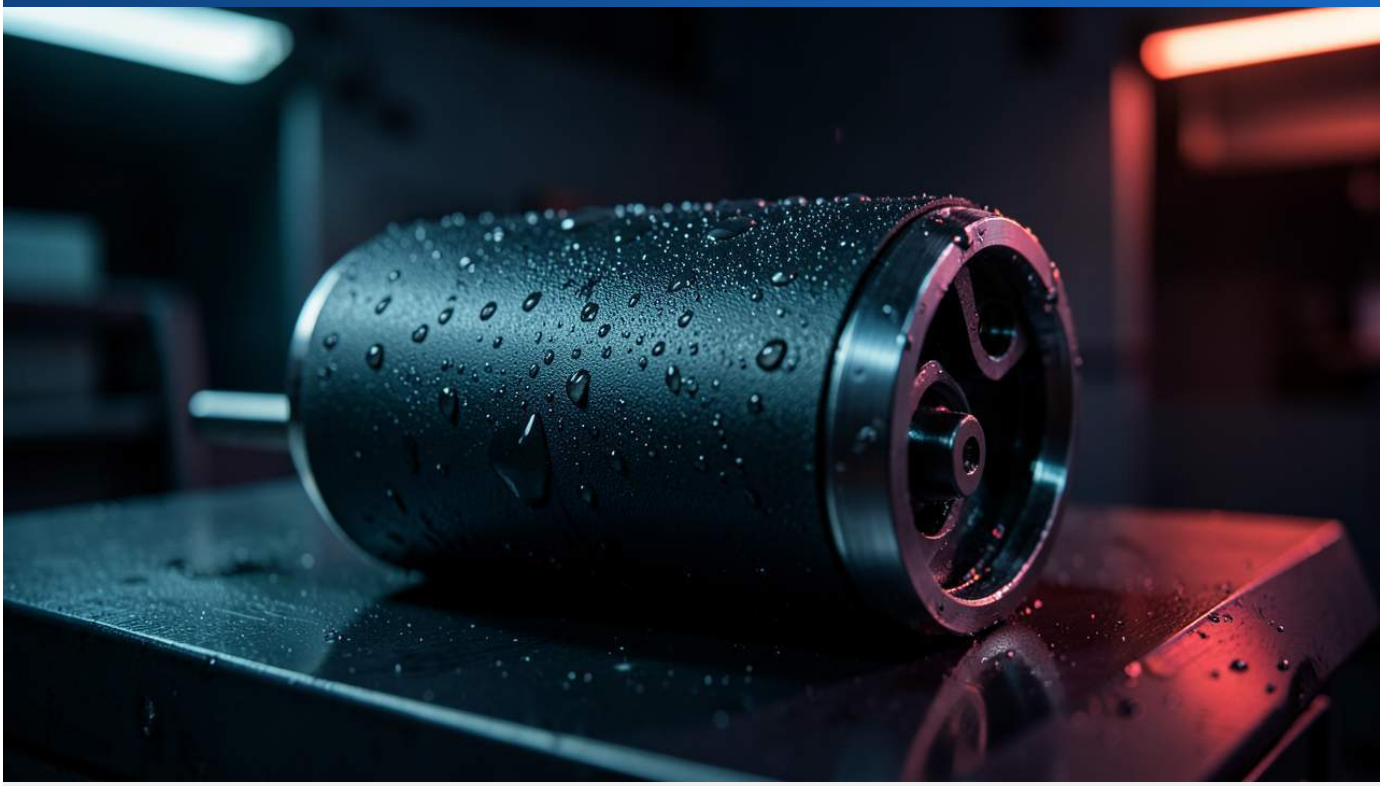
Strategic Significance and Outlook

Bactiguard's new data will further enhance the credibility of its noble metal coating technology in orthopedic implants, accelerating its market adoption. Moving forward, applications are expected to expand beyond trauma implants (e.g., plates and intramedullary nails for fracture treatment) to a broader range of orthopedic areas, including artificial joints (hip, knee). Applications for other medical devices used in cardiovascular, urology, and intensive care units are also being considered. Bactiguard aims to contribute to reducing the global burden of medical device-associated healthcare-associated infections (MD-HAI) and creating a safer healthcare environment through this unique technology. Further regulatory approvals and global market penetration will be key focuses.

Source: https://www.tradingview.com/news/modular_finance:8494c5e2526a5:0-new-data-reinforce-bactiguard-s-distinct-and-durable-approach-to-orthopedic-implant-surface-modification/

#13 BASF Unveils New Plastics at Fakuma 2026: Ultramid H33 L and Ultramid Expand Deliver Resilience, Sustainability, and Performance

Published September 17, 2026 BASF Germany



OVERVIEW

BASF unveiled new material solutions at Fakuma 2026, showcasing materials that balance resilience, sustainability, and performance. Notably, they introduced Ultramid® H33 L, the world's first thermoplastic polyamide with high water permeability for food packaging. Other innovations included Ultramid® A27AE1 L (polyamide 66 with improved yellowness index) and Ultramid® Expand (particle foam for lightweight, crash-resistant automotive components). These advancements offer new options for the plastics industry to transition towards a sustainable future, with applications expected across packaging, automotive, and electronics sectors.

IN DEPTH

Key Findings

At Fakuma 2026, BASF introduced several new material solutions that simultaneously balance three key properties: resilience, sustainability, and high performance. A standout innovation is Ultramid® H33 L, the world's first thermoplastic polyamide with high water permeability, developed specifically for the food packaging industry. Additionally, BASF showcased an improved polyamide 66, Ultramid® A27AE1 L, and Ultramid® Expand, a lightweight particle foam with excellent shock absorption capabilities. These products signal the next evolution in the plastics industry.

Technical Details

Ultramid® H33 L: This polyamide offers unprecedented water vapor permeability for packaging materials while maintaining superior mechanical strength. This enables certain foods (e.g., dry goods) to stay fresh longer by preventing condensation inside the packaging. It provides new design freedom for packaging and contributes to reducing food waste.

Ultramid® A27AE1 L: This polyamide 66 maintains excellent color stability (low yellowness index) even after exposure to harsh thermal loads and UV radiation, as required for automotive and electronic components. By combining aesthetics with functionality, it enhances product longevity and quality.

Ultramid® Expand: Utilizing particle foam technology, this material provides exceptionally lightweight characteristics along with high impact absorption and insulation properties. Used in lightweight automotive structural components, crash safety parts, or as insulation, it helps achieve improved energy efficiency and safety simultaneously.

Elastollan® TPU: A thermoplastic polyurethane (TPU) with excellent light transmittance, ideal for LED lighting and light guide solutions. It offers high design freedom and superior durability.

Background and Industry Context

The plastics industry faces significant challenges related to climate change mitigation, resource efficiency, and the transition to a circular economy. Demands for sustainability from consumers and regulators are increasing, yet product performance and safety cannot be compromised. BASF's new product portfolio addresses these conflicting requirements through innovations in materials science, integrating approaches such as the use of bio-based feedstocks, improved recyclability, and extended product lifespans. Through these efforts, BASF is reinforcing its provision of sustainable solutions across the entire plastics value chain.

Strategic Significance and Outlook

These innovative plastic materials announced by BASF are expected to have a major impact across diverse industrial sectors, including enhancing food packaging freshness, improving automotive lightweighting and safety, and increasing the reliability of electronic products. Ultramid® H33 L, in particular, offers a solution to the global challenge of reducing food loss, while Ultramid® Expand contributes to extending the range and enhancing the safety of electric vehicles. Moving forward, BASF will accelerate the commercialization and market deployment of these materials, and, through collaboration with customers, provide solutions optimized for individual applications. These materials are poised to make significant contributions to achieving a sustainable and resilient society.

Source: https://www.basf.com/global/en/media/news-releases/2026/09/p-26-153

Collected: September 18, 2026 | Automated Research System (Gemini API)

#14 Alexium International Launches EcoTek: Biodegradable Microencapsulated Phase Change Material, Revolutionizing Thermal Management

Published September 17, 2026 BedTimes Magazine USA

OVERVIEW

Alexium International has announced EcoTek, a new family of biodegradable microencapsulated phase change materials (mPCMs). EcoTek features a biodegradable microcapsule that passed OECD 301F testing and is designed for thermal management across various markets including textiles, apparel, building, electronics, and medical devices. This material balances durability in use with biodegradability at end-of-life, offering high-performance temperature regulation while reducing environmental impact. It is particularly poised to revolutionize sustainable thermal management solutions in the textile and building materials sectors.

IN DEPTH

Key Findings

Alexium International has announced the launch of 'EcoTek,' a new family of biodegradable microencapsulated phase change materials (mPCMs). The defining feature of EcoTek is its biodegradable microcapsule, which has successfully passed OECD 301F testing, thereby minimizing environmental impact at the end of its product life. This innovative material is designed to provide advanced thermal management solutions across a broad spectrum of markets, including textiles, apparel, furniture, building, electronics, and medical devices.

Technical Details

EcoTek mPCMs encapsulate phase change materials (PCMs) within tiny microcapsules. PCMs function by absorbing and releasing large amounts of latent heat during their melting and solidification cycles, effectively maintaining a stable surrounding temperature. For instance, they absorb heat when it's hot to keep cool and release heat when it's cold to provide warmth. The innovation of this material lies in the biodegradability of its capsule wall. The OECD 301F test is an international standard for assessing ready biodegradability in aqueous environments, and EcoTek's compliance with this standard clearly demonstrates its environmental superiority. While some conventional mPCM capsules have posed environmental challenges due to lack of biodegradability, EcoTek balances high-performance thermal management with environmental sustainability.

Background and Industry Context

In recent years, rising consumer environmental awareness and concerns about plastic pollution have driven strong demands for product sustainability. Particularly in the field of functional materials, the environmental impact of products is now considered not only during use but also after disposal. Phase change materials, due to their excellent thermal management capabilities, have been applied in many products. However, the non-biodegradability of their microcapsule shells has been identified as an environmental issue. Alexium International's EcoTek addresses this gap, setting a new standard as a 'green' option in the thermal management market.

Strategic Significance and Outlook

The introduction of EcoTek is expected to significantly impact the thermal management market, especially in the textiles and building materials sectors. Its biodegradable nature positions EcoTek as a competitive product in a market where brands and consumers increasingly prioritize sustainability. Potential applications include diverse products requiring temperature regulation or stabilization, such as athletic wear, bedding, outdoor gear, residential insulation, and even automotive seating. Alexium International plans to expand EcoTek's production capacity and build global partnerships. This technology represents the future direction of thermal management solutions that combine high performance with environmental protection.

Source: https://bedtimesmagazine.com/2026/09/alexium-international-announces-launch-of-ecotek-a-new-biodegradable-microencapsulated-phase-change-material-mpcm/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#15 Elevated Materials Wins $50 Million DOE Grant to Build 3.5 GW Battery Material Plant for Ultra-Thin Lithium Film Production

Published September 16, 2026 Dealroom USA

OVERVIEW

Elevated Materials, a California-based startup specializing in ultra-thin lithium film, has secured a $50 million grant from the U.S. Department of Energy (DOE). This funding will cover half the cost of a planned 3.5 GW battery material production facility, aimed at advancing battery technology and manufacturing in the U.S. This significant investment is crucial for enhancing the performance of next-generation batteries and strengthening the domestic supply chain, with impacts expected across the EV and energy storage system sectors.

IN DEPTH

Key Findings

Elevated Materials, a California-based startup, has been awarded a $50 million grant from the U.S. Department of Energy (DOE) in recognition of its ultra-thin lithium film manufacturing technology. This funding will cover half of the total cost for the company's planned 3.5 GW battery material production facility. This grant represents a critical strategic investment by the DOE towards fostering battery technology innovation and strengthening manufacturing capabilities within the United States.

Technical Details

The ultra-thin lithium film being developed by Elevated Materials is a key material poised to dramatically enhance the performance of next-generation batteries, particularly solid-state and lithium-metal batteries. This film is expected to significantly reduce the migration resistance of lithium ions compared to conventional electrode materials, thereby improving battery energy density and fast-charging capabilities. The company's manufacturing process utilizes proprietary technology to form lithium metal into an extremely thin, uniform film, which is also anticipated to improve battery safety and cycle life. The planned 3.5 GW production facility will possess the capacity to supply enough lithium film for batteries installed in millions of electric vehicles annually.

Background and Industry Context

With the widespread adoption of electric vehicles (EVs) and large-scale energy storage systems (ESS), global demand for high-performance, safe, and cost-effective batteries is surging. The U.S. government is investing heavily in battery technology R&D and manufacturing capacity expansion to ensure international competitiveness and strengthen its domestic supply chain in this sector. The DOE grant to Elevated Materials materializes this national strategy, specifically aiming to scale up innovative technologies like lithium-metal batteries within the United States.

Strategic Significance and Outlook

The $50 million grant to Elevated Materials will play a decisive role in establishing the company as a key supplier of next-generation battery materials in the U.S. Once operational, this 3.5 GW production facility will position the U.S. at the forefront of lithium-metal battery technology, significantly contributing to extending EV driving ranges and reducing charging times. Furthermore, boosting domestic production capacity will mitigate geopolitical risks and enhance supply chain resilience. Moving forward, the company is expected to advance the construction of its production facility, further optimize its technology, and strengthen partnerships with EV manufacturers and battery cell producers. This marks a critical milestone towards accelerating the transition to a clean energy economy.

Source: https://dealroom.co/news/151306-elevated-materials-wins-50m-doe-grant-to-build-3-5-gw-battery-material-p/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#16 China's Xingyi Core Energy Technology Raises ~$14 Million for Space-Grade Flexible Perovskite Solar Wings, Accelerating Development

Published September 14, 2026 Dealroom China

OVERVIEW

China-based startup Xingyi Core Energy Technology has completed a Pre-A funding round worth nearly RMB 100 million (approx. $14 million) for its space-grade perovskite solar cells and flexible packaging substrates. The company's material technology reportedly cuts solar wing areal density by 40-55% compared to glass packaging, with on-orbit verification already completed. This funding will accelerate the development of lightweight, high-efficiency space-grade solar cells, revolutionizing power supply for satellites and space probes. It is particularly expected to contribute to achieving both cost reduction and high performance.

IN DEPTH

Key Findings

Xingyi Core Energy Technology, a China-based startup, has successfully completed a Pre-A funding round totaling approximately RMB 100 million (around $14 million USD). This funding is aimed at accelerating the development of space-grade perovskite solar cells and flexible packaging substrates. The company's material technology is reported to reduce the areal density of solar wings by 40-55% compared to traditional glass packaging, and on-orbit verification has already been successfully completed. This investment significantly advances the commercialization of lightweight, high-efficiency next-generation space-grade solar cells.

Technical Details

The perovskite solar cells developed by Xingyi Core Energy Technology are attracting attention for their excellent power conversion efficiency and applicability to flexible substrates. Specifically for use in the space environment, the company is advancing technological development to ensure reliability in harsh conditions, including high-energy radiation tolerance and adaptability to wide temperature fluctuations. Their flexible packaging substrates provide lightweight and thin protection for solar cell modules, drastically reducing the overall weight and volume of solar wings compared to conventional glass-based solar panels. This contributes to lower launch costs and increased design freedom for satellites and space probes.

Background and Industry Context

The space industry is witnessing an increase in miniaturization and lightweighting of satellites, alongside a rise in deep-space missions like lunar and Martian explorations, all demanding lighter and more efficient power sources. While traditional silicon-based solar cells offer high reliability, their weight and rigidity present challenges. Perovskite solar cells are considered a next-generation solar cell technology with promising terrestrial applications, but their adaptation for the space environment introduces new hurdles. Xingyi Core Energy Technology is addressing these challenges by developing technologies that enable the application of perovskite solar cells in space, thus meeting the evolving needs of the space industry.

Strategic Significance and Outlook

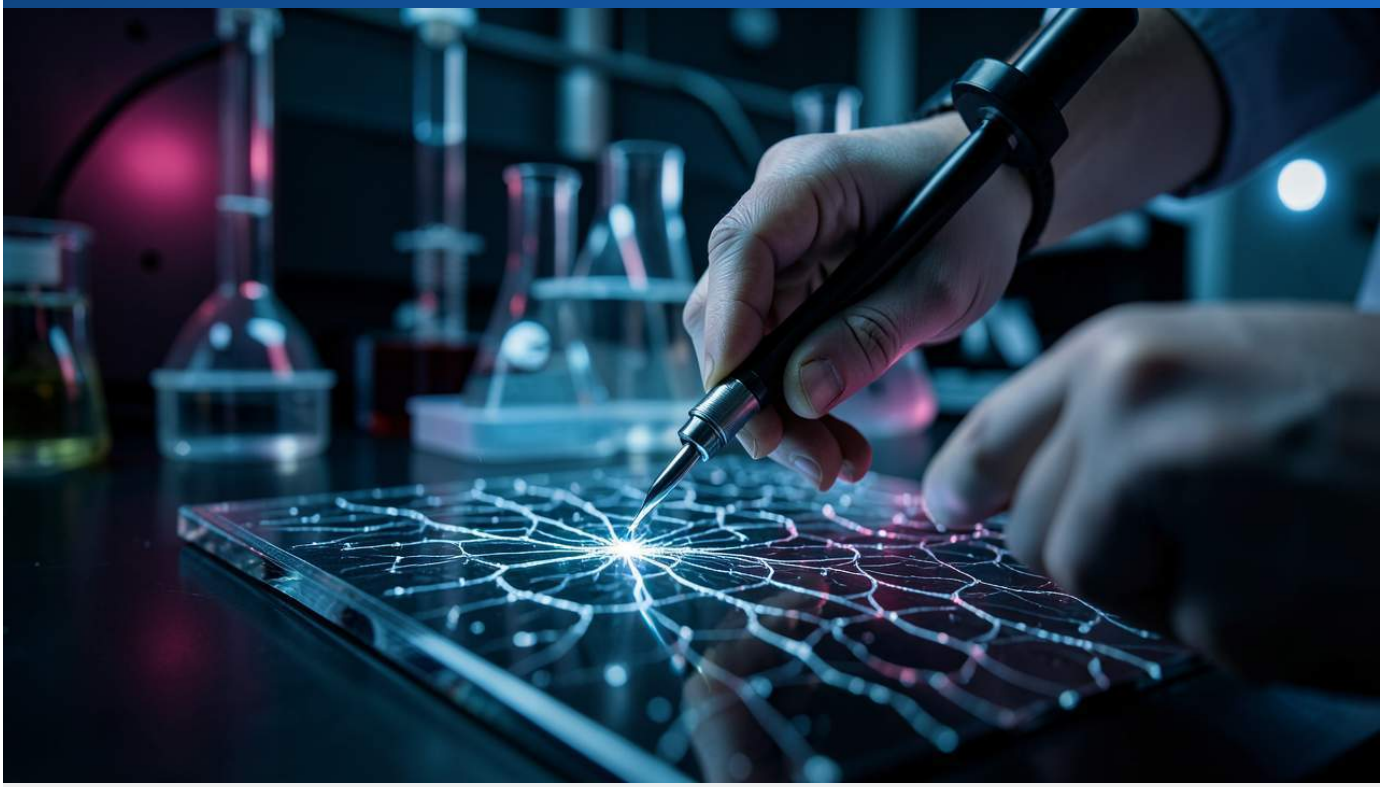
This funding round will enable Xingyi Core Energy Technology to expand its production capacity and accelerate R&D towards the commercialization of space-grade perovskite solar cells. The company's flexible and lightweight solar wings are expected to find widespread applications as power sources for small satellite constellations, deep-space probes, lunar bases, and Mars rovers. The completion of on-orbit verification underscores the maturity of their technology and serves as a significant strength for future commercialization. Xingyi Core Energy Technology is poised to drive innovation in space power supply infrastructure, making substantial contributions to the development of the space industry.

Source: https://www.perovskite-info.com/space-perovskite-startup-xingyi-core-energy-technology-raises-pre-funding

Collected: September 18, 2026 | Automated Research System (Gemini API)

#17 Penn State and Rice University Discover Graphene's Nanowrinkles Bend Physics to Shape Electrical Flow, Enabling Device Control Without Chemical Modification

Published September 17, 2026 Penn State / Rice University USA



OVERVIEW

Researchers from Penn State and Rice University have demonstrated that tiny wrinkles in graphene can significantly alter its electrical properties, allowing for the control of electricity flow in atomically thin materials through shape rather than chemical doping. Published in Advanced Materials, this breakthrough opens pathways for more responsive sensors and ultrathin electronic devices. The team utilized specialized microscope probes to precisely measure the interplay between wrinkle geometry, electrical energy, and current at the nanoscale.

IN DEPTH

Key Findings

A collaborative research team from Penn State and Rice University has made a pivotal discovery, demonstrating that minute, naturally occurring wrinkles in graphene can fundamentally alter its electrical transport properties. This finding establishes a novel mechanism for controlling the flow of electricity in atomically thin materials by manipulating their physical shape, eliminating the need for traditional chemical modifications. The research was published in the esteemed journal *Advanced Materials*.

Technical / Clinical Details

- **Wrinkle-Induced Electrical Modulation**: The scientists observed that the subtle topographical variations, or nanowrinkles, within graphene significantly influence how electrons traverse the material. These wrinkles induce local changes in the electrical potential, effectively creating pathways or barriers that guide electron movement and thereby tune the material's overall electrical characteristics.
- **Atomic-Scale Measurement Precision**: To validate this phenomenon, the research team employed advanced scanning probe microscopy techniques. This allowed for simultaneous, high-resolution measurements of the precise wrinkle topography, the associated changes in local electrical energy, and the distribution of electrical current at an atomic scale. These experimental results provided crucial confirmation of theoretical predictions.
- **Non-Chemical Control Mechanism**: Historically, tuning the electrical properties of two-dimensional (2D) materials has primarily relied on chemical methods such as doping or surface functionalization. This new discovery highlights a physical, geometry-based control mechanism that offers unprecedented flexibility in both the manufacturing and functional design of 2D material-based devices.

Background & Context

Two-dimensional materials, with graphene at the forefront, are heralded for their exceptional electrical, mechanical, and optical properties, making them promising candidates for next-generation electronics, sensors, and energy applications. However, precisely controlling their intrinsic properties has remained a significant research challenge. The ability to manipulate electrical conduction through physical deformation represents a paradigm shift from conventional chemical approaches. This physical control is vital for fully unlocking the immense potential of 2D materials, especially in miniaturized and flexible device architectures.

Strategic Significance & Outlook

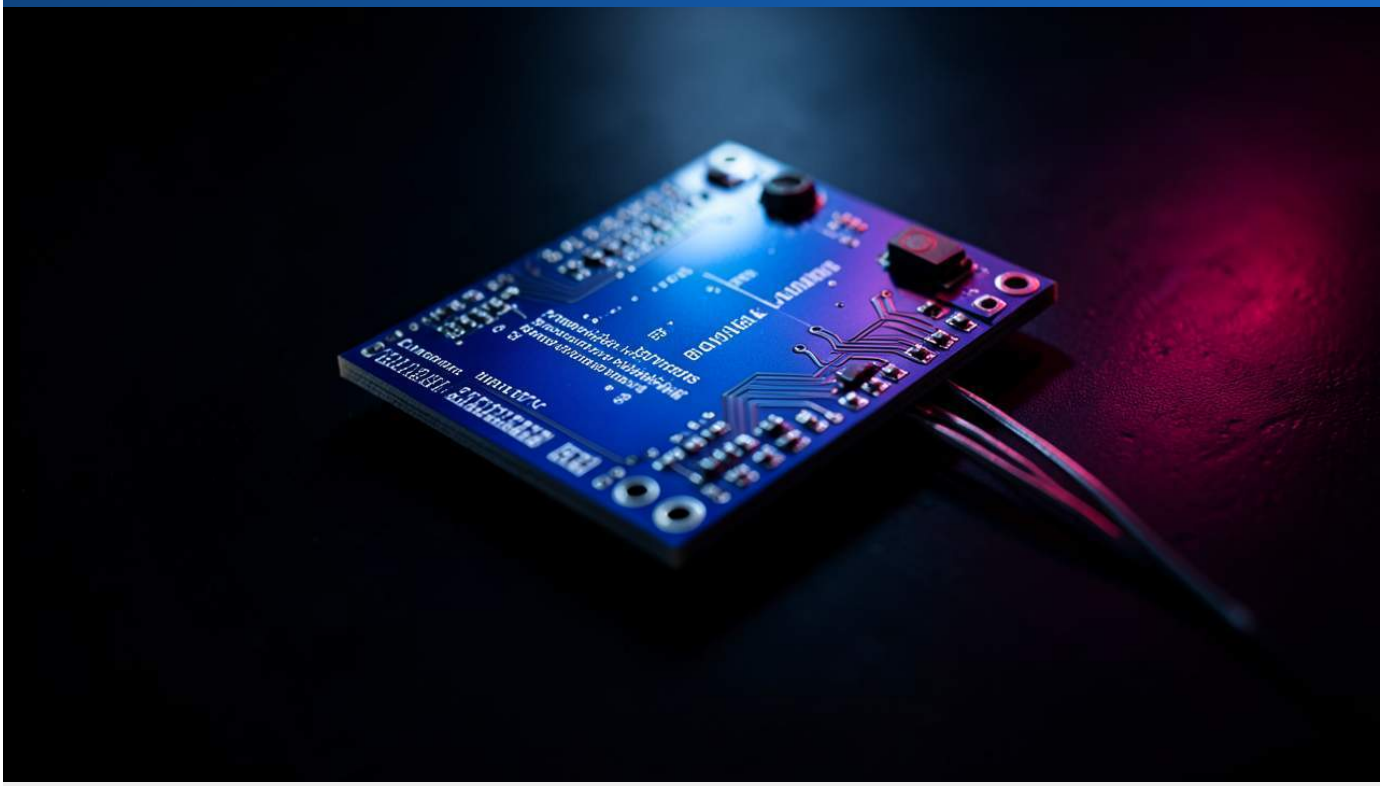
This breakthrough has profound implications for the development of future technologies. It paves the way for the creation of highly responsive sensors that can detect minute deformations, as well as ultra-thin and flexible electronic devices. Potential applications include strain sensors that generate electrical signals upon physical stress, and smart textiles that adapt their electrical characteristics based on external forces. Beyond graphene, this research suggests that similar shape-dependent control mechanisms could be applicable to other 2D materials, dramatically expanding the design space for atomically thin devices and fostering the emergence of entirely new functionalities and integrated systems. This innovation positions materials science closer to realizing truly conformable and adaptive electronics.

Source: https://www.psu.edu/news/research/story/tiny-wrinkles-bend-physics-change-how-electricity-moves-through-graphene

Collected: September 18, 2026 | Automated Research System (Gemini API)

#18 Centimeter-Scale Room-Temperature Ferromagnetic Semiconductor Films Grown on Mica Advance Spintronics

Published September 10, 2026 Spintronics-Info China、USA、Hong Kong



OVERVIEW

An international research team, including scientists from Wenzhou University and MIT, has achieved the centimeter-scale growth of single-crystalline iron-doped cobalt oxide films exhibiting room-temperature ferromagnetic semiconductor behavior. These films show a Curie temperature up to 430 K (157°C), overcoming a significant hurdle for integrating advanced spintronic, ferroelectric, and neuromorphic components directly with silicon technology. This breakthrough facilitates the development of next-generation, high-performance electronic devices.

IN DEPTH

Key Findings

Researchers from Wenzhou University, MIT, the Chinese Academy of Sciences, Caltech, the Hong Kong University of Science and Technology, and Fuzhou University have successfully developed a novel method to grow large-scale, single-crystalline films of two-dimensional metal oxides that are directly compatible with existing silicon technology. This groundbreaking work has led to the production of iron-doped cobalt oxide films exhibiting robust room-temperature ferromagnetic semiconductor behavior, with a Curie temperature reaching 430 K (157°C). This advancement eliminates a critical barrier for the widespread adoption of spintronic, ferroelectric, and neuromorphic components.

Technical Details

The core innovation lies in the reconstruction of the oxygen atomic plane on mica surfaces, which provides an ideal template for the epitaxial growth of these advanced oxide films. This precise atomic engineering enables the production of centimeter-scale films with exceptional uniformity and crystalline quality. Unlike previous methods often limited to microscale dimensions or requiring complex fabrication, this technique offers a scalable pathway to large-area functional materials. The specific iron-doped cobalt oxide composition was critical for achieving the desired ferromagnetic properties above room temperature.

Background & Context

The quest for room-temperature ferromagnetic semiconductors has been a long-standing challenge in materials science, primarily due to difficulties in achieving both magnetic order and semiconducting properties simultaneously at practical temperatures, or integrating such materials with conventional silicon platforms. Current spintronic devices often rely on exotic materials or require cryogenic cooling, limiting their practical applications. This new development offers a pathway to overcome these limitations, potentially enabling more energy-efficient and faster computing architectures than purely charge-based electronics.

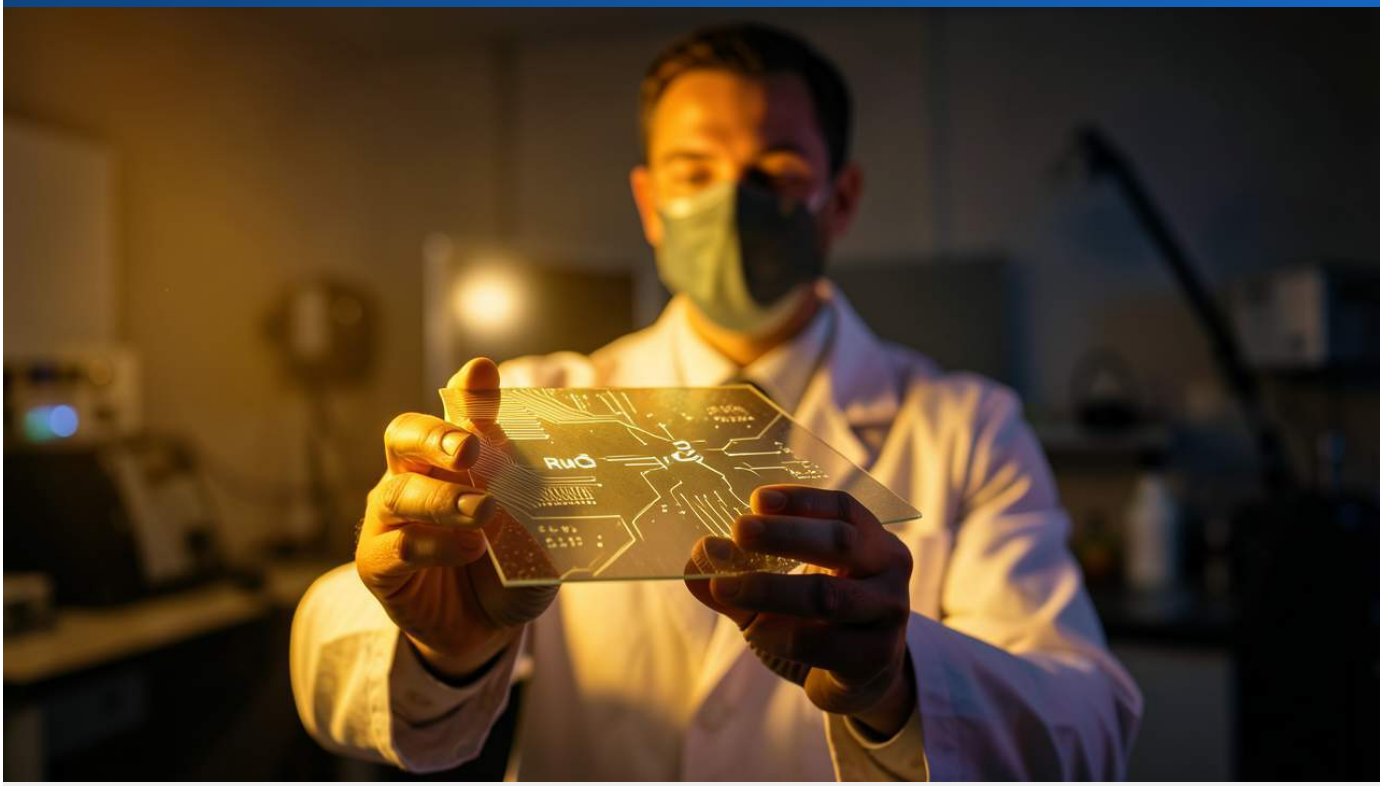
Strategic Significance & Outlook

This breakthrough holds immense potential for revolutionizing various fields, including data storage, advanced computing, and sensor technologies. By enabling the seamless integration of ferromagnetic semiconductors with silicon, it paves the way for commercialization of high-density, non-volatile memory devices and ultra-low-power neuromorphic systems that mimic the human brain. The research team plans further work on optimizing the film properties and exploring integration into prototype devices, positioning this technology as a cornerstone for future generations of electronic components.

Source: https://www.spintronics-info.com/reconstructed-mica-surface-yields-centimeter-scale-room-temperature

#19 Rice University Reveals New 'Altermagnetism' in Ultrathin Ruthenium Dioxide Films, Paving Way for Next-Gen Spintronics

Published September 15, 2026 SciTechDaily USA



OVERVIEW

Researchers including those from Rice University have found evidence that ultrathin films of ruthenium dioxide (RuO_2) exhibit an unusual form of magnetism called altermagnetism. This discovery suggests that lattice strain can serve as a tuning knob to control this novel magnetic state, which is crucial for advancing next-generation spintronics and RAM architectures by enabling new electron spin manipulation methods.

IN DEPTH

Key Findings

A research team, including scientists from Rice University, has uncovered compelling evidence that ultrathin films of ruthenium dioxide (RuO_2), a quantum material, can display a unique magnetic state known as altermagnetism. This groundbreaking finding, published in a leading scientific journal, indicates that mechanical lattice strain can effectively act as a 'tuning knob' to induce or control this novel form of magnetism. The discovery holds immense promise for the development of next-generation spintronic devices and advanced RAM architectures, offering unprecedented avenues for manipulating electron spins in future memory and information technologies.

Technical / Clinical Details

- **Observation of Altermagnetism:** The team specifically observed altermagnetism in RuO_2 when prepared as a film just a few atomic layers thick. Altermagnetism is a recently theorized magnetic order distinct from ferromagnetism and antiferromagnetism, characterized by a specific spin polarization in momentum space that is crucial for its unique properties.
- **Strain Engineering for Control:** A key aspect of this research is the demonstration that subtle lattice strain—induced during the thin-film preparation process—can be utilized to either activate or finely tune the altermagnetic state. This implies a powerful mechanism for external control over the material's magnetic properties, offering significant flexibility in device design.
- **Ultrathin Film Fabrication:** The ability to precisely fabricate RuO_2 into films of only a few atomic layers was critical. At these nanoscale dimensions, quantum effects become prominent, allowing for the manifestation of properties not observed in bulk materials.

Background & Context

Modern electronics are pushing beyond charge-based computing towards spintronics, which harnesses the electron's spin degree of freedom for faster and more energy-efficient information processing. However, traditional spintronic devices, often based on ferromagnets, face challenges related to stray magnetic fields and stability. Altermagnets offer a compelling alternative, potentially combining the strong signals of ferromagnets with the robustness and lack of external magnetic fields characteristic of antiferromagnets. This hybrid nature could overcome current limitations, leading to memory solutions that are faster and consume less power than existing RAM technologies.

Strategic Significance & Outlook

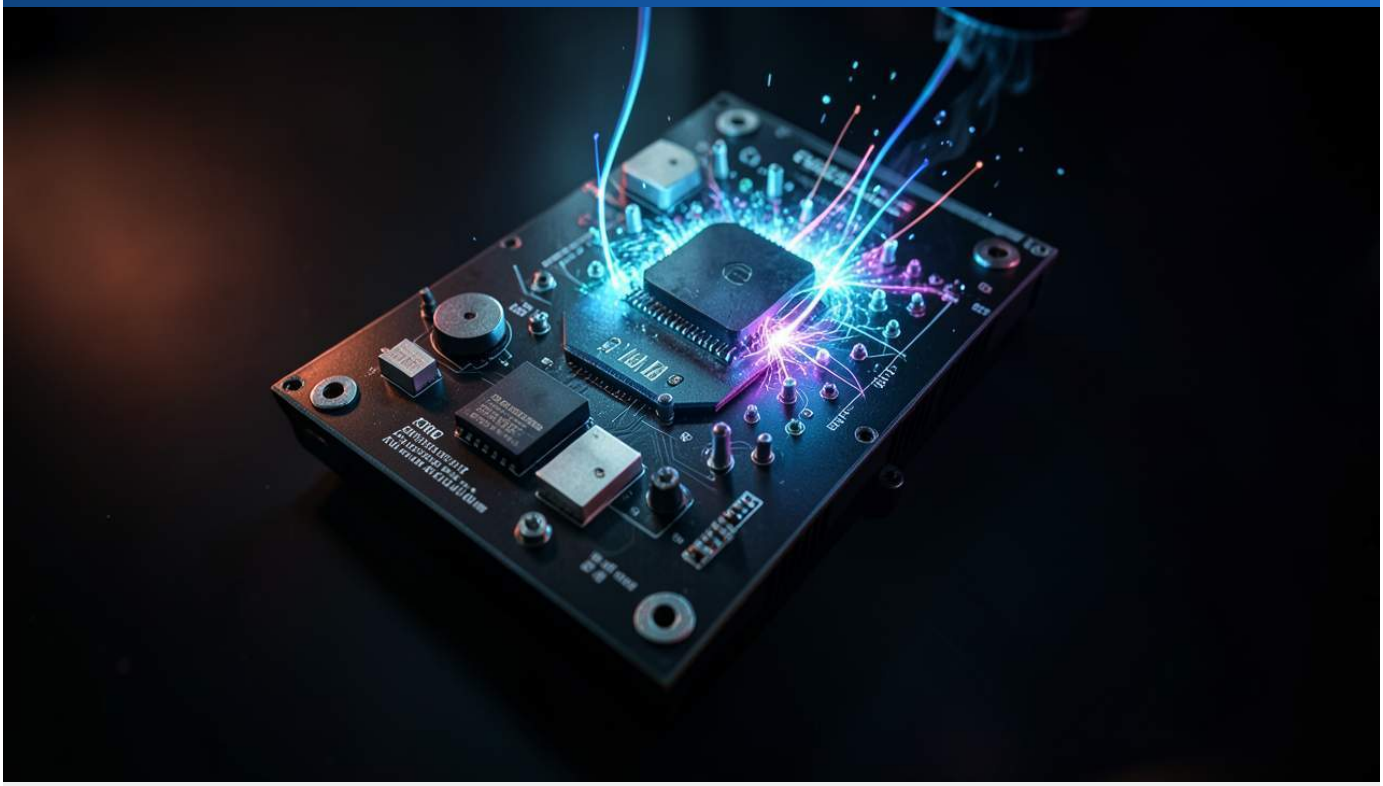
This discovery significantly advances the fundamental understanding of altermagnetic materials. In the long term, altermagnetic materials like RuO_2 could find applications in magnetic random-access memory (MRAM), advanced sensors, and potentially quantum computing. The concept of using lattice strain as a 'tuning knob' opens new frontiers in materials science and device engineering. This approach promises to enable the realization of smaller, faster, and more energy-efficient electronic devices, thereby shaping the future landscape of information technology. Further research will focus on elucidating the precise mechanisms and optimizing materials for practical deployment, potentially setting new benchmarks for spintronic performance.

Source: https://scitechdaily.com/a-material-just-a-few-atoms-thick-reveals-strange-new-magnetism/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#20 Northeastern University Develops 'qdmag' Software for Millisecond-Scale Simulation of Molecular Magnetism, Advancing Spintronics

Published September 17, 2026　Quantum Zeitgeist (ノースイースタン大学より)　USA



OVERVIEW

Scientists at Northeastern University have created qdmag, a Python package designed for accurately simulating molecular magnetism's dynamic behavior over milliseconds. This tool, which solves a generalized Lindblad quantum master equation incorporating spin-phonon coupling, allows investigation of previously inaccessible dynamic processes and represents a key advancement for spintronics and quantum information science.

IN DEPTH

Key Findings

Scientists at Northeastern University have unveiled a groundbreaking new software, 'qdmag,' a Python package engineered to accurately simulate the dynamic magnetic behavior of molecules over milliseconds. This tool solves a generalized Lindblad quantum master equation, critically incorporating spin-phonon coupling, enabling researchers to investigate dynamic processes that were previously inaccessible through computational methods. Qdmag's capability to model how magnetism changes in molecules over extended periods represents a significant advancement for both spintronics and quantum information science, providing an unprecedented window into the temporal evolution of molecular magnetic states.

Technical / Clinical Details

- **Millisecond-Scale Simulation:** Qdmag's most notable feature is its ability to simulate molecular magnetic dynamics over a millisecond timescale, which is exceptionally long for quantum phenomena. This allows for a theoretical understanding of relaxation processes, coherence times, and other dynamic behaviors frequently observed in experiments.
- **Generalized Lindblad Quantum Master Equation:** The software is built upon a generalized Lindblad quantum master equation, a fundamental framework for describing open quantum systems that interact with their environment. This formulation enables precise modeling of how environmental noise, particularly phonons (lattice vibrations), influences molecular magnetic states.
- **Incorporation of Spin-Phonon Coupling:** Spin-phonon coupling, which dictates how a molecule's spin state interacts with its surrounding lattice vibrations, is fully integrated into qdmag. This comprehensive inclusion provides more realistic and accurate simulation results, offering indispensable insights for the design of molecular magnetic materials.
- **Python Package Accessibility:** Developed as a Python package, qdmag can be widely adopted and customized by the research community, facilitating broader access and accelerating collaborative research efforts in molecular magnetism.

Background & Context

Molecular magnets are promising candidates for a wide range of applications, including next-generation spintronic devices, quantum computing, advanced data storage, and molecular-scale sensors. However, understanding their complex magnetic behavior, especially dynamic changes influenced by environmental interactions, has been a major experimental and theoretical challenge. Traditional simulation tools have often been limited to static properties or very short timescales, leaving a gap in our understanding of millisecond-scale magnetic relaxation and coherence mechanisms. Qdmag bridges this gap, serving as a crucial link between fundamental research and applied development in molecular magnetic materials.

Strategic Significance & Outlook

Qdmag is poised to contribute to solving diverse challenges in spintronics and quantum information science, such as optimizing single-molecule magnet designs, predicting coherence times for qubit candidate materials, and enhancing spin information transfer efficiency. It provides materials scientists and device engineers with a powerful tool to predict and optimize the dynamic behavior of molecules with specific magnetic properties before experimental synthesis. The advent of this software is expected to accelerate the entire process from discovery to commercialization of molecular magnetic materials, significantly contributing to the realization of more high-performance and stable quantum technologies globally.

Source: https://quantumzeitgeist.com/quantum-molecular-magnetism-simulation-utility-milliseconds/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#21 European Coatings: Nanofiller Design with 2D MXene and CeO_2 Achieves Combined UV Protection and Corrosion Resistance, Revolutionizing Coating Tech

Published September 11, 2026 European Coatings Germany

OVERVIEW

A newly developed epoxy-based double-layer superhydrophobic coating offers high mechanical durability, over 30 days of corrosion protection, and significantly enhanced UV resistance through 2D MXene barriers and CeO_2-mediated radical scavenging, improving bonding strength by 33% over silane systems. This research challenges the notion that maximum hydrophobicity equals maximum corrosion protection, demonstrating optimal performance at moderate water repellency.

IN DEPTH

Key Findings

European researchers have developed an innovative epoxy-based double-layer superhydrophobic coating that simultaneously delivers exceptional mechanical durability, long-term corrosion resistance, and superior UV protection. This groundbreaking material enhances bonding strength by 33% compared to existing silane-based systems and provides over thirty days of robust corrosion protection. Crucially, its advanced UV resistance is achieved through the synergistic integration of 2D MXene barriers and a cerium oxide (CeO_2) mediated radical scavenging mechanism, challenging the conventional wisdom that maximum hydrophobicity always correlates with maximum corrosion protection, by showing optimal performance at moderate water repellency.

Technical / Clinical Details

- **Double-Layer Superhydrophobic Design:** The coating features a hierarchical nanoscale structure comprising two distinct layers. The top layer provides the superhydrophobic effect, repelling water droplets effectively, while the bottom layer ensures strong adhesion to the substrate, contributing to overall durability and robustness.
- **Synergistic Effect of MXene and CeO_2:** Enhanced UV protection is achieved by incorporating 2D MXene, a layered material acting as a physical barrier against UV light penetration and reinforcing mechanical strength, alongside CeO_2 nanoparticles, known radical scavengers. CeO_2 efficiently neutralizes reactive oxygen species (radicals) generated by UV exposure, preventing polymer degradation and significantly extending the coating's lifespan.
- **Improved Adhesion Strength:** Addressing a common weakness in silane-based superhydrophobic coatings, the new epoxy-based system achieves a 33% improvement in adhesion strength to the substrate. This bolsters the coating's resistance to delamination under external physical stress.
- **Exceptional Corrosion Protection:** The coating maintains superior corrosion protection for over thirty days, even under harsh conditions. This performance is attributed to a dense barrier layer and the superhydrophobic surface effectively blocking the ingress of water and corrosive ions.

- **Optimal Hydrophobicity Principle:** A notable finding is that maximum water repellency (high contact angle) does not necessarily equate to maximum corrosion protection. The study indicates optimal protective performance at moderate water repellency, suggesting new optimization strategies for coating design.

Background & Context

Corrosion of metal structures results in trillions of dollars in economic losses globally each year, making its prevention a persistent challenge across industries. Structures exposed to outdoor elements, aerospace components, and marine infrastructure face severe degradation from combined UV radiation and corrosive environments. While effective, conventional anti-corrosion coatings often suffer from limitations in mechanical durability, UV resistance, or environmental impact. This new coating offers a solution that addresses these challenges by providing long-lasting, environmentally friendlier protection.

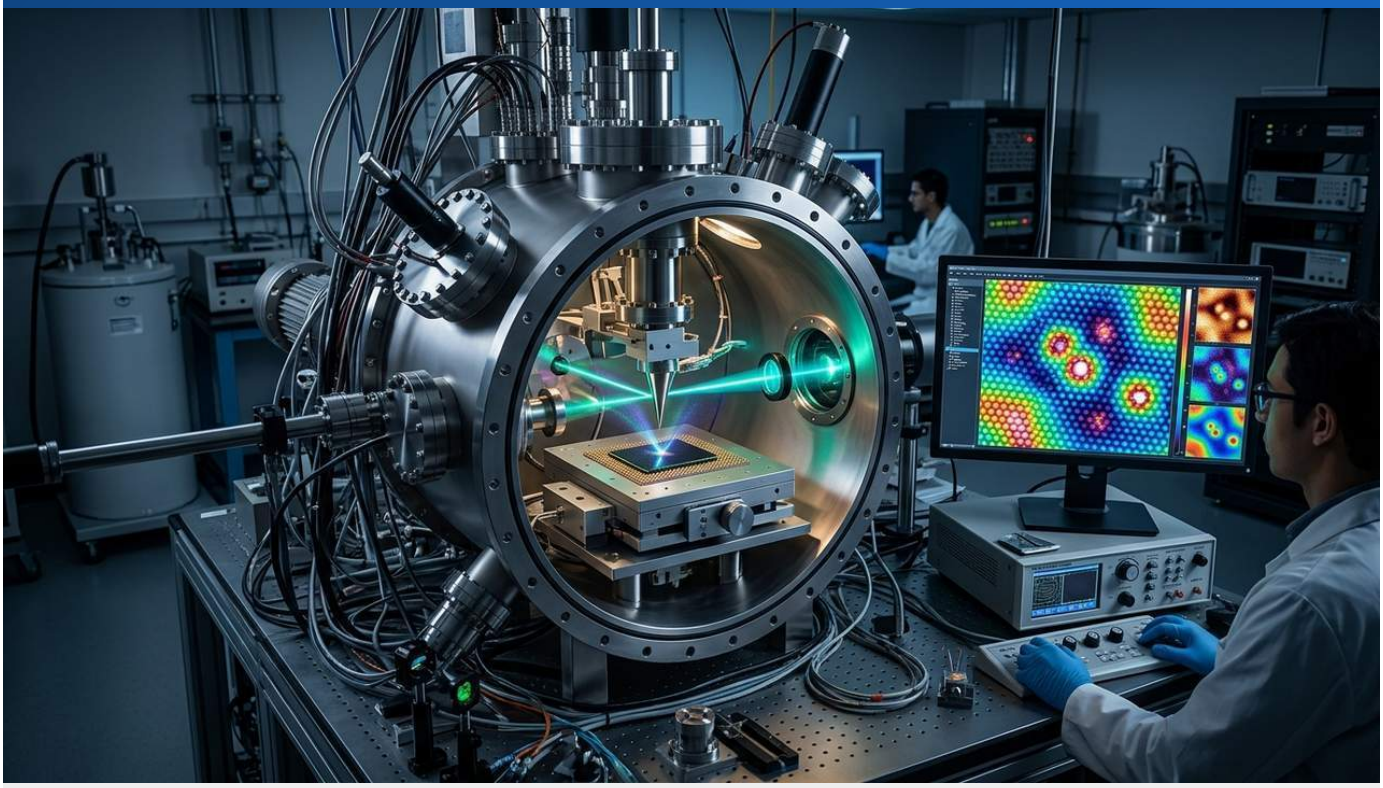
Strategic Significance & Outlook

This multifunctional coating is poised for wide-ranging applications across various industrial sectors, including aerospace, automotive, marine, construction, and infrastructure. It promises substantial contributions to reducing maintenance costs, extending product lifespans, and enhancing resource efficiency. Looking ahead, these nanofiller technologies could be adapted to other polymer matrices, fostering the development of an even broader array of functional coatings. The research team plans to optimize large-scale production processes and conduct further durability assessments to facilitate the commercialization of this innovative technology, setting a new standard in protective materials.

Source: https://www.european-coatings.com/news/coatings-technologies/nanofiller-design-combines-uv-protection-and-corrosion-resistance/

#22 Berkeley Lab Develops Novel Method to Directly Observe Electron-Defect Interactions in 2D Semiconductors, Accelerating Quantum Device Development

Published September 17, 2026　Berkeley Lab News Center (ローレンス・バークレー国立研究所)　USA



OVERVIEW

Researchers at Lawrence Berkeley National Laboratory have developed a powerful methodology to directly observe how electrons interact with defects in advanced 2D semiconductors at an unprecedented level of detail. This approach, combining direct imaging with theory-driven simulations, reveals that electron behavior changes dramatically based on the number and type of defects. These findings, published in Nature, are crucial for developing increasingly miniaturized electronic devices with new capabilities and for understanding electron behavior in quantum materials.

IN DEPTH

Key Findings

Researchers at Lawrence Berkeley National Laboratory have developed a groundbreaking methodology that enables direct observation of electron-defect interactions within advanced 2D semiconductors with unprecedented detail. This innovative approach, which integrates direct imaging techniques with theory-driven simulations, has revealed critical insights into how electron behavior dramatically shifts depending on the number and specific types of defects present in the material. Published in Nature, these findings are essential for accelerating the development of increasingly miniaturized electronic devices with novel functionalities and for enhancing our fundamental understanding of electron behavior in quantum materials.

Technical / Clinical Details

- **Direct Observation & Theory Integration:** The core of this methodology involves visualizing electron states within 2D semiconductors at atomic resolution using advanced imaging techniques, coupled with high-fidelity theoretical calculations and simulations. This synergistic approach allows for a deep interpretation of experimental results and a quantitative understanding of how defect structures impact electronic properties.
- **Defects and Electron Behavior:** The research team meticulously elucidated how defects influence the electrical and optical properties of 2D semiconductors at the molecular level. For instance, specific defect types were shown to reduce electron mobility or create new energy levels that alter light absorption characteristics. The study provides detailed insights into how electron localization and scattering mechanisms are modulated by the presence of defects.
- **Significance of 2D Semiconductors:** 2D semiconductors, such as molybdenum disulfide (MoS_2), are highly promising for next-generation transistors, sensors, and optoelectronic devices due to their atomic thinness, pronounced quantum effects, and facile control of electronic properties via gate voltage. However, the impact of fabrication-induced defects on device performance has been poorly understood until now.

- **Unprecedented Detail Level:** The developed technique possesses the capability to resolve electron-defect interactions at the single-defect level. This addresses a fundamental question of 'why defects affect device performance' that was previously inaccessible with macroscopic measurement techniques.

Background & Context

As Moore's Law approaches its physical limits, the semiconductor industry is actively seeking the next frontier in miniaturization. 2D materials, with their extreme thinness and unique physical properties, are considered key to solving this challenge. However, 2D materials are highly susceptible to defect influences due to their large surface-to-volume ratio. Accurately understanding and controlling how defects impact the performance, reliability, and energy efficiency of electronic devices is critical for realizing next-generation ultra-small, ultra-fast, and low-power devices. This research significantly contributes to deciphering the long-standing challenge of 'microscopic electron-defect interactions' in this field.

Strategic Significance & Outlook

This novel observation and analysis methodology will serve as an exceptionally powerful tool for defect engineering in 2D semiconductors, as well as other quantum and nanomaterials. Semiconductor manufacturers can leverage these insights to improve fabrication processes and to intentionally introduce defects through 'defect engineering' to create new functionalities, thereby designing and developing electronic devices with unprecedented performance. In the future, this is expected to lead to technological innovations in various fields, including more efficient solar cells, high-performance quantum bits, and revolutionary sensors. This research accelerates the convergence of materials science and device physics, providing an indispensable foundation for the advancement of the future electronics industry globally.

Source: https://newscenter.lbl.gov/2026/09/17/a-new-close-up-view-of-electrons-inside-semiconductors/

#23 LG AI Research Unveils 'Exaone Discovery' AI, Identifies Hair Loss Material in 1 Day from 420K Candidates, Plans 24-Hour Autonomous Lab

Published September 14, 2026 LG AI Research (36kr経由) South Korea

OVERVIEW

LG AI Research introduced its "Expert AI" solutions, including "Exaone Discovery" for material property prediction and design, at the LG AI Talk Concert 2026. This AI, in collaboration with LG H&H, identified the hair loss-improving material "Ramsidil" in just one day from over 420,000 candidates. LG AI Research also announced plans for a "24-hour autonomous laboratory" where AI predicts material synthesis, robots conduct experiments, and results are fed back for continuous learning.

IN DEPTH

Key Findings

LG AI Research presented its "Expert AI" solutions, prominently featuring "Exaone Discovery" for predicting material properties and designing novel materials, at the "LG AI Talk Concert 2026." This advanced AI technology demonstrated remarkable efficacy in collaboration with LG H&H, identifying "Ramsidil," a hair loss-improving material, within a single day from a vast pool of over 420,000 candidate substances. Furthermore, LG AI Research unveiled its ambitious plan to establish a "24-hour autonomous laboratory," envisioning a future where AI predicts material synthesis, robots execute experiments, and results are continuously fed back for self-improvement, aiming for fully automated material development processes.

Technical / Clinical Details

- **Exaone Discovery's Capabilities:** "Exaone Discovery" is powered by deep learning and large language models (LLMs), trained on an extensive dataset of physicochemical property data, molecular structures, and materials science literature. This enables rapid exploration and prediction of material candidates with specific functionalities and the design of novel compositions previously unattainable with traditional methods.
- **Discovery of "Ramsidil":** In the collaboration with LG H&H, the AI was tasked with searching for substances that could contribute to hair loss improvement. The AI analyzed a library of over 420,000 organic compounds, completing in just one day a task that would take human researchers months to years. This efficient discovery process led to the identification of "Ramsidil," a novel and highly effective hair growth-promoting material, showcasing a significant speed advantage over conventional screening methods.
- **Concept of the 24-Hour Autonomous Laboratory:** In this envisioned laboratory, AI will formulate experimental plans and predict chemical reactions. Robotic arms and automated experimental setups will then execute synthesis and evaluation experiments based on AI instructions. The data generated will be instantly fed back to the AI, enhancing model accuracy and informing subsequent experimental designs. This allows for rapid material development cycles without human intervention, dramatically increasing research efficiency.

Background & Context

Material development, a cornerstone of modern industry, has traditionally been a time-consuming, costly, and trial-and-error-intensive process. The search for novel functional materials, in particular, requires sifting through an immense number of candidates to find the optimal one, often heavily relying on the knowledge and experience of seasoned scientists. This AI and robotics integrated approach aims to eliminate these conventional bottlenecks, potentially transforming the material development paradigm entirely. This acceleration promises to drive product innovation across diverse sectors, including pharmaceuticals, electronic materials, and cosmetics.

Strategic Significance & Outlook

LG AI Research's "Expert AI" solutions and the concept of a "24-hour autonomous laboratory" are poised to lead the "Fourth Industrial Revolution" in materials science. This technology will significantly reduce material development timelines and drastically accelerate time-to-market. It is also expected to uncover previously unknown materials and enable the discovery of higher-performing, more sustainable substances. LG plans to apply this technology not only within its group's various businesses but also to offer services to external companies in the future, anticipating a major impact on the entire material development ecosystem. This will substantially boost the efficiency and creativity of scientific research, contributing to overall technological progress globally.

Source: https://www.chosun.com/english/industry-en/2026/09/14/NCBCFX6UJVHEBPRX3NE74CYV2M/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#24 Drexel-Led Team Achieves Direct Vapor-Phase Synthesis of MXenes, Enabling Low-Cost, Wafer-Scale Production of Low-Defect 2D Crystals

Published September 17, 2026 EurekAlert! USA

OVERVIEW

A research team, primarily from Drexel University, has developed a novel vapor-phase synthesis method for MXenes, allowing direct growth of crystalline 2D MXene from solid metal and gaseous precursors. This breakthrough bypasses traditional MAX phase synthesis and hazardous acid-etching steps, utilizing cost-effective reactants like titanium tetrachloride and methane. The scalable process is poised to expand MXene applications in energy, electronics, optical, and quantum technologies by producing large-area, wafer-scale crystals with exceptionally low defect density.

IN DEPTH

Key Findings

Researchers led by Drexel University have successfully pioneered a new vapor-phase synthesis process for producing MXenes, directly growing crystalline 2D MXene materials from solid metal and gaseous reactants. This innovative method, published in the Journal of the American Chemical Society, circumvents the conventional multi-step MAX phase synthesis and subsequent hazardous acid-etching, offering a more efficient and cost-effective route to high-quality MXenes. This achievement is critical for scaling MXene production and broadening its applications across advanced technological sectors.

Technical Details

- **Direct Synthesis:** Unlike traditional methods that first create a MAX phase precursor and then selectively etch it with corrosive acids (e.g., hydrofluoric acid), the new vapor-phase process enables the direct growth of crystalline 2D MXene from solid metal substrates reacting with gaseous precursors. This eliminates the need for an intermediate MAX phase and dangerous etching steps.
- **Cost-Effective Precursors:** The process leverages readily available and lower-cost precursors such as titanium tetrachloride ($TiCl_4$) and methane (CH_4), which significantly reduces the overall material cost compared to conventional MAX phase synthesis. This economic advantage enhances the commercial viability of MXenes.
- **Scalability and Quality:** The method demonstrates the capability to produce large-area, wafer-scale MXene crystals with extremely low defect density. This high-quality output is crucial for performance-demanding applications in electronics and photonics, where crystal imperfections can severely degrade device functionality.

Background & Context

MXenes are a rapidly emerging family of 2D transition metal carbides, nitrides, and carbonitrides known for their exceptional electrical conductivity, tunable surface chemistry, and high volumetric capacity, making them attractive for diverse applications. However, widespread commercialization has been hampered by the challenges of scalability, high production costs, and the generation of structural defects inherent in the conventional acid-etching synthesis. This method's ability to simplify and de-risk production while maintaining high quality represents a substantial leap forward for MXene research and development.

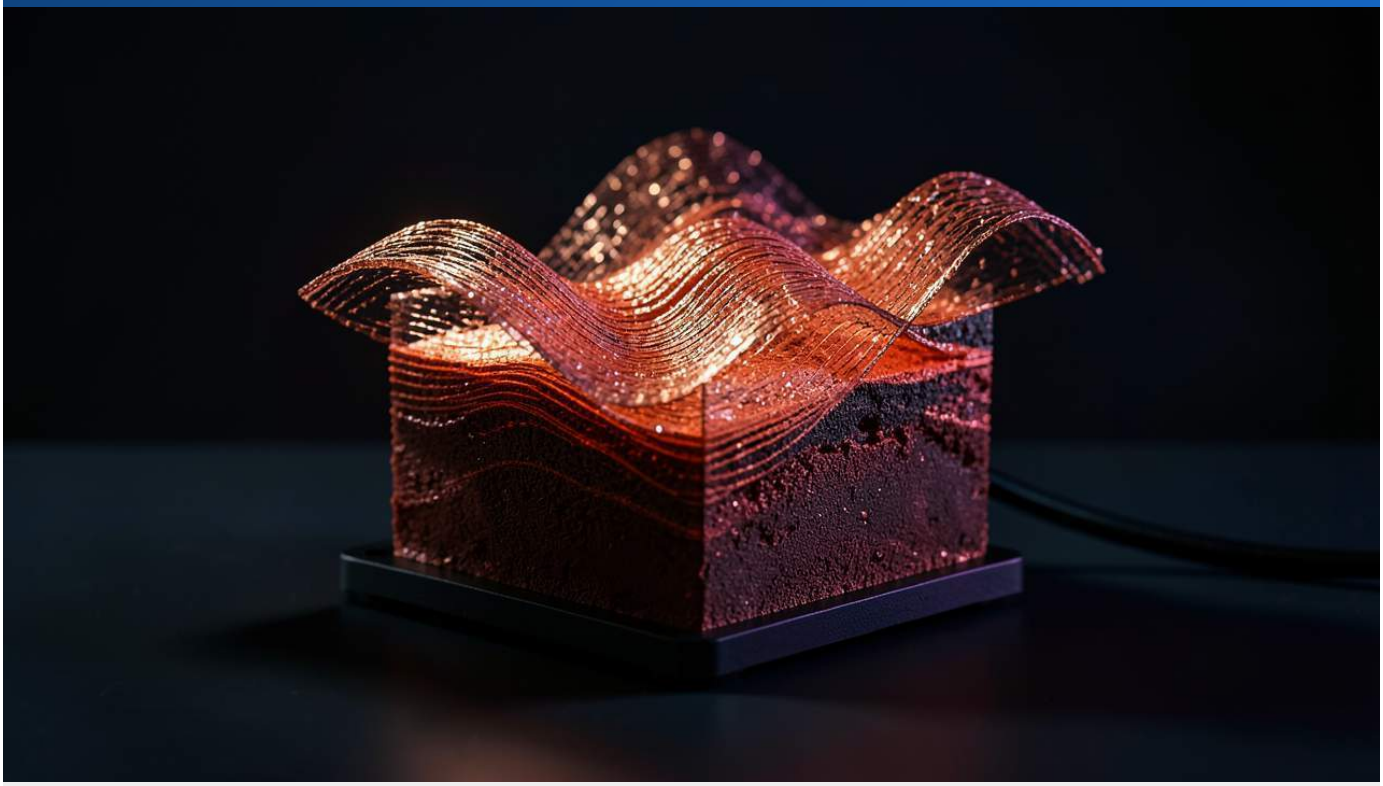
Strategic Significance & Outlook

This vapor-phase synthesis marks a pivotal advance for MXene technology, paving the way for cost-effective, high-volume manufacturing. The availability of large-area, low-defect MXene crystals will accelerate their integration into next-generation energy storage devices, high-frequency electronics, advanced sensors, and quantum technologies. Furthermore, the safer, more environmentally friendly production route could encourage broader industry adoption, establishing MXenes as a foundational material for future innovations in diverse fields from automotive to aerospace and biomedical engineering.

Source: https://www.eurekalert.org/news-releases/1144417

#25 JNCASR Discovers Wave-like Heat Transport in Thallium Copper Selenide, Boosting Waste Heat to Electricity Conversion to ZT 1.7

Published September 14, 2026 Keekli India



OVERVIEW

Researchers at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) have identified a novel wave-like heat transport mechanism in thallium copper selenide, a copper chalcogenide material. This breakthrough, published in Science Advances, enables highly efficient conversion of industrial waste heat into electricity, achieving an exceptional thermoelectric figure of merit (ZT) of 1.7. The discovery paves new design pathways for thermal barrier coatings and quantum technology thermal management, significantly advancing clean energy and waste heat recovery solutions.

IN DEPTH

Key Findings

Researchers at the Jawaharlal Nehru Centre for Advanced Scientific Research (JNCASR) have made a significant discovery, identifying an unusual wave-like heat transport mechanism within thallium copper selenide, a copper chalcogenide material. This breakthrough, published in Science Advances, enables the highly efficient conversion of industrial waste heat into electricity, demonstrating an exceptional thermoelectric figure of merit (ZT) score of 1.7. This substantial increase in efficiency opens new avenues for energy recovery and thermal management in various high-temperature applications.

Technical/Clinical Details

The JNCASR team's research unveiled a unique phonon behavior in thallium copper selenide where heat is transported in a wave-like manner, distinct from conventional diffusive heat flow. This mechanism allows for superior decoupling of thermal and electrical conductivity, which is crucial for high thermoelectric performance. The achieved ZT value of 1.7 represents a notable advance over many existing thermoelectric materials, indicating a higher efficiency in converting temperature differences into electrical voltage. This enhanced performance suggests potential applications in advanced thermal barrier coatings, where precise temperature control is critical, and in thermal management systems for quantum technologies, which require stable and efficient cooling.

Background & Context

The global imperative for sustainable energy solutions and emissions reduction has intensified the focus on waste heat recovery. Industrial processes, power generation, automotive engines, and data centers collectively generate vast amounts of unused heat energy. Thermoelectric generators, which convert heat directly into electricity, offer a clean and solid-state solution but have historically been limited by modest conversion efficiencies. The ability to achieve a ZT of 1.7 with a common copper chalcogenide material represents a significant step towards making thermoelectric waste heat recovery economically viable and widespread. This development could substantially reduce energy consumption and carbon footprints across multiple industries.

Strategic Significance & Outlook

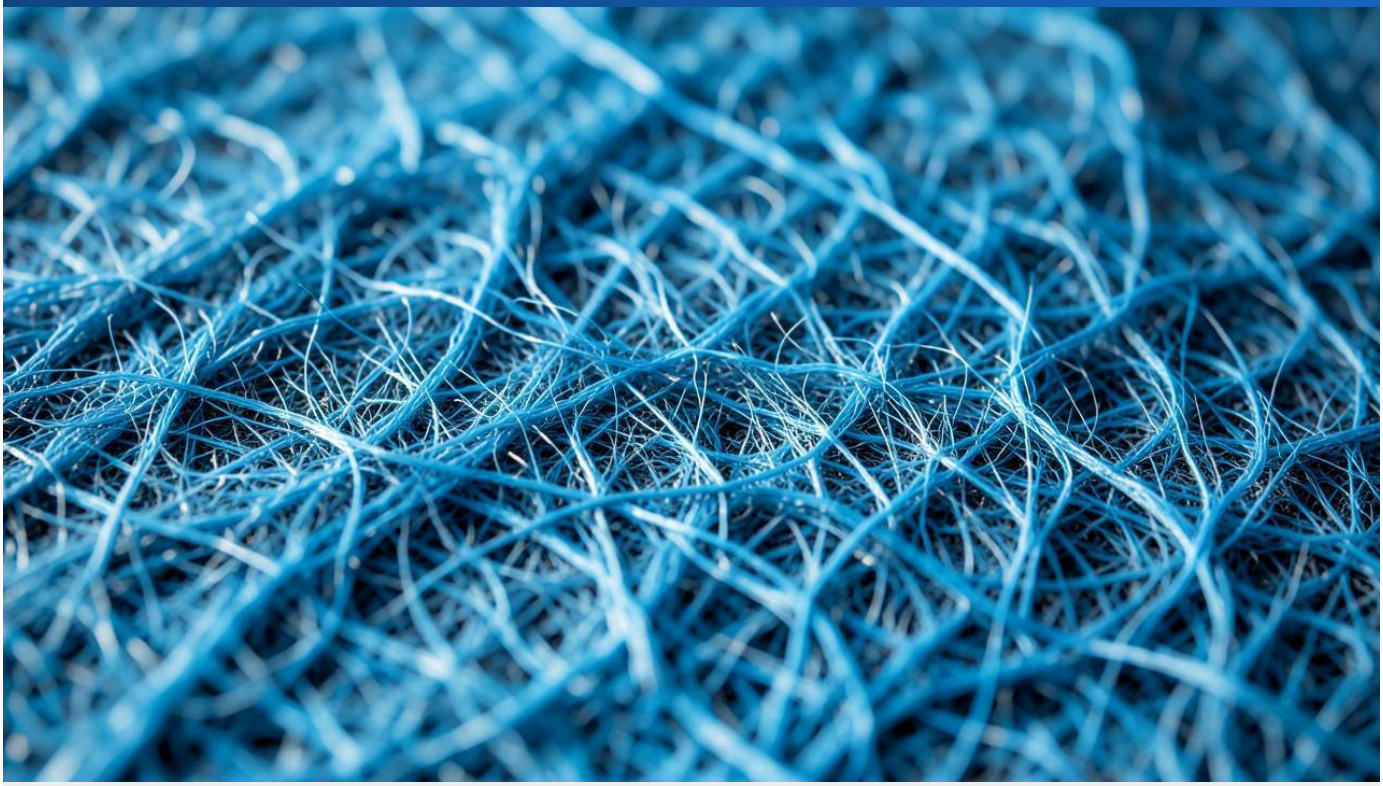
This discovery by JNCASR has profound implications for the design and deployment of thermoelectric materials. By understanding and harnessing this wave-like heat transport, researchers can explore new material compositions and structures to further optimize ZT values. The immediate impact is expected in industrial settings that generate significant waste heat, offering a pathway to convert this lost energy into usable electricity. Furthermore, the enhanced material performance could accelerate the development of compact and efficient thermoelectric devices for portable electronics, remote sensing, and even space applications. This advancement positions the field for a new generation of high-performance thermal energy harvesting technologies, driving both environmental benefits and economic growth in the clean energy sector.

Source: https://keekli.in/waste-heat-to-electricity-jncasr-unlocks-clean-energy-breakthrough/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#26 DuPont Launches Bio-Circular Tyvek for C&I Applications, Achieving ~30% Carbon Footprint Reduction via Mass Balance

Published September 16, 2026 DuPont USA



OVERVIEW

DuPont has introduced Tyvek® with Renewable Attribution, a bio-circular material designed for consumer and industrial (C&I) applications, enabling approximately 30% reduction in product carbon footprint (Scope 3 emissions) without requiring changes to existing designs or processes. This new offering utilizes ISCC PLUS-certified bio-circular materials through a mass balance approach, with renewable attribution levels ranging from 30% to 100%. Sourced from second-generation biomass, it provides a sustainable, high-performance alternative for active packaging, labels, and industrial bags, maintaining the critical properties of conventional Tyvek while significantly lowering environmental impact.

IN DEPTH

Key Findings

DuPont has globally launched Tyvek® with Renewable Attribution for Consumer & Industrial (C&I) applications, a groundbreaking bio-circular material that enables customers to reduce the carbon footprint of their products by approximately 30% (Scope 3 emissions) without necessitating any alterations to existing designs or manufacturing processes. This initiative marks a significant advancement in sustainable functional materials, offering a practical solution for industries striving to lower their environmental impact.

Technical / Clinical Details

The new Tyvek® with Renewable Attribution integrates ISCC PLUS-certified bio-circular materials using a mass balance approach, allowing for renewable content levels from 30% to 100%. This methodology means that while the physical properties of the material remain identical to conventional Tyvek®, the certified renewable feedstocks are accounted for within the supply chain, offering a verifiable reduction in the fossil-based content of the final product. The bio-circular feedstocks are responsibly sourced from second-generation biomass, ensuring they do not compete with food crops. This innovative material maintains all the renowned specifications and performance characteristics of traditional Tyvek®, including its strength, durability, and water resistance, making adoption seamless for a wide array of applications such as active packaging, labels, and industrial bags.

Background & Context

The demand for sustainable materials is rapidly increasing across various industries, driven by growing environmental concerns, stricter regulations, and consumer preferences. Companies are under increasing pressure to demonstrate their commitment to sustainability, particularly through reducing Scope 3 emissions, which encompass indirect emissions from their value chain. Tyvek® has long been a trusted material for applications requiring superior protection, safety, and durability, from construction to medical packaging. The introduction of a renewable attribution variant addresses the critical need for high-performance materials that also align with ambitious sustainability goals, without compromising on functionality or requiring costly re-engineering.

Strategic Significance & Outlook

This launch positions DuPont as a leader in providing sustainable solutions within the functional materials market, offering a tangible pathway for customers to achieve their decarbonization targets. The flexibility in renewable attribution levels allows companies to progressively transition towards more sustainable sourcing. The ISCC PLUS certification provides robust third-party verification, ensuring transparency and credibility in sustainability claims. As industries continue their shift towards circular economy models, materials like Tyvek® with Renewable Attribution will play a crucial role in enabling more environmentally friendly product lifecycles and fostering a more sustainable global economy. The widespread adoption of this material is expected to significantly contribute to the reduction of overall industrial carbon footprints.

Source: https://www.dupont.com/news/dupont-launches-tyvek-with-renewable-attribution-for-customer-and-industrial-applications.html

Collected: September 18, 2026 | Automated Research System (Gemini API)

#27 Chinese EV Makers Dongfeng, GAC Target 2027 Mass Production for Solid-State Batteries, Promising 30-80% Higher Energy Density and Enhanced Safety

Published September 10, 2026 EV Magazine Global

OVERVIEW

Chinese manufacturers Dongfeng and GAC Motors are targeting mass production of solid-state battery-powered EVs from 2027, signaling rapid commercialization of the technology. Solid-state batteries promise a 30-80% increase in energy density over current lithium-ion counterparts, enabling significantly longer ranges and faster charging. Their non-flammable solid electrolytes also provide enhanced safety, positioning them as a transformative technology for the electric vehicle industry.

IN DEPTH

Key Findings

The commercialization of solid-state batteries for electric vehicles (EVs) is accelerating, with prominent Chinese automakers Dongfeng and GAC Motors setting ambitious targets for mass production to commence in 2027. This next-generation battery technology is poised to revolutionize the EV market by offering a 30-80% higher energy density compared to current lithium-ion batteries and significantly enhanced safety due to its non-flammable solid electrolytes. This move by major players signals a crucial milestone in the global EV transition.

Technical / Clinical Details

Solid-state batteries replace the liquid or gel electrolytes found in conventional lithium-ion batteries with a solid conductive material. This fundamental change drastically reduces the risk of thermal runaway and fire, addressing a primary safety concern for EVs. Furthermore, the compact nature of solid electrolytes allows for a higher packing density of active materials, directly translating to a substantial increase in energy density—projected to be 30-80% greater than current Li-ion cells. This translates into significantly extended driving ranges for EVs and enables faster charging capabilities. Chinese manufacturers are particularly focused on achieving high energy densities of 350-500 Wh/kg, which would set new industry benchmarks and substantially reduce range anxiety for consumers. The absence of liquid components also improves battery longevity and performance stability across a wider temperature range.

Background & Context

The global EV market is experiencing exponential growth, driven by environmental mandates and technological advancements. However, challenges related to driving range, charging time, battery safety, and cost remain critical barriers to mass adoption. While lithium-ion battery technology has evolved considerably, it is approaching its theoretical limits. Solid-state batteries are widely regarded as the "game-changer" technology capable of overcoming these limitations. Consequently, automotive manufacturers and battery developers worldwide are investing heavily in their research and development. The Chinese government, recognizing the strategic importance of EV technology, has made battery innovation a national priority, with domestic companies striving for early commercialization to secure a leading position in the global market.

Strategic Significance & Outlook

The 2027 mass production targets set by Dongfeng and GAC Motors underscore the imminent arrival of solid-state batteries on a commercial scale. Industry forecasts predict small-scale production in the late 2020s (around 2027-2028), followed by full-scale manufacturing from 2030 onwards. This timeline suggests a rapid transformation of the EV landscape, making electric vehicles more appealing to a broader consumer base. The widespread adoption of solid-state batteries will not only lower barriers to EV ownership but also unlock new possibilities for vehicle design and integration. Beyond EVs, this technology's applications are expected to expand into aerospace, robotics, and grid-scale energy storage, potentially establishing a new global standard for energy storage solutions. This technological breakthrough is poised to be a pivotal driver for the transition to a cleaner, more sustainable energy future.

Source: https://www.evinfrastructurenews.com/ev-battery/solid-state-vs-lithium-ion-batteries

Collected: September 18, 2026 | Automated Research System (Gemini API)

#28 Honda Invests in Niron Magnetics to Advance Rare-Earth-Free Magnets for EV Powertrains

Published September 14, 2026 WardsAuto USA

OVERVIEW

Honda Motor Co. has strategically invested in Minnesota-based Niron Magnetics, a developer of high-performance rare-earth-free magnets utilizing iron nitride. Niron is constructing a 287,000-square-foot manufacturing plant to produce up to 1,500 tons of these magnets annually, aiming for operational status in 2027. This initiative is critical for reducing global supply chain dependence on rare earth metals for electrified vehicle powertrains.

IN DEPTH

Key Findings

Honda Motor Co. has announced a strategic investment in Niron Magnetics, a U.S.-based developer specializing in rare-earth-free magnets. This move underscores Honda's commitment to advancing sustainable material solutions for its next-generation mobility applications, particularly electrified vehicle (EV) powertrains. The investment aims to accelerate the commercialization and scaling of Niron's innovative iron nitride magnet technology, thereby mitigating reliance on geopolitically sensitive rare earth supply chains.

Technical / Clinical Details

Niron Magnetics' core innovation lies in its proprietary iron nitride ($Fe_{16}N_2$) magnet technology, which offers high performance comparable to traditional rare-earth-based permanent magnets without using critical materials like neodymium or dysprosium. Rare earth elements are known for their constrained supply and environmental impact associated with mining and processing. Niron's approach utilizes abundant and non-toxic iron and nitrogen, providing a sustainable alternative. To support commercial production, Niron is currently building a 287,000-square-foot (approximately 26,662 square meters) manufacturing plant in Sartell, Minnesota. This facility is projected to become operational in 2027 with an annual production capacity of up to 1,500 tons of rare-earth-free permanent magnets, positioning it to address significant industrial demand across various sectors.

Background & Context

The global automotive industry is rapidly transitioning towards electrification, leading to an surging demand for high-performance magnets essential for EV motors. This demand has, in turn, highlighted vulnerabilities in the supply chain for rare earth elements, which are predominantly sourced from a few regions. Major manufacturers like Honda are actively seeking alternative materials to enhance supply security, reduce environmental footprints, and hedge against price volatility. Honda's investment in Niron Magnetics aligns with broader industry efforts to de-risk critical material dependencies and foster more sustainable manufacturing practices for the electric future.

Strategic Significance & Outlook

Honda's backing through its Xcelerator Ventures arm is more than just financial; it provides critical validation for Niron Magnetics' technology and accelerates its path to market. This partnership is expected to drive the adoption of rare-earth-free magnets not only in automotive applications but also in other high-growth sectors such as robotics and consumer electronics, where powerful and sustainable magnet solutions are increasingly sought after. The successful commercialization of Niron's technology could fundamentally reshape the global magnet market, offering a more stable and environmentally responsible material supply. This strategic development is poised to have a ripple effect across industries heavily reliant on advanced magnetic materials, contributing to global sustainability initiatives and bolstering regional supply resilience.

Source: https://www.wardsauto.com/news/honda-invests-in-us-maker-of-rare-earth-free-magnets/830086/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#29 Factorial Energy Partners with Mitsui Kinzoku for Mass Production of Solid-State Battery Electrolytes, Accelerating EV Commercialization

Published September 17, 2026 Electrek USA

OVERVIEW

Factorial Energy has partnered with Mitsui Kinzoku, a leading producer of sulfide-based solid electrolytes, to scale up its solid-state battery technology. Factorial's Solstice platform targets up to 450 Wh/kg energy density and aims to resolve scalable manufacturing challenges for all-solid-state batteries. Mitsui Kinzoku will mass-produce its argyrodite sulfide solid electrolyte, A-SOLiD, at a dedicated plant in Japan, accelerating commercialization with existing automotive partners such as Mercedes-Benz, Stellantis, and Hyundai.

IN DEPTH

Key Findings

Factorial Energy, a frontrunner in solid-state battery development, has announced a significant partnership with Mitsui Kinzoku, a prominent manufacturer of sulfide-based solid electrolytes. This collaboration is designed to accelerate the large-scale production of all-solid-state battery technology, marking a crucial step towards the commercialization of next-generation battery solutions for the electric vehicle (EV) market.

Technical / Clinical Details

Factorial's "Solstice" platform features an all-solid-state battery design boasting an impressive energy density of up to 450 Wh/kg. This advanced architecture promises substantial improvements in safety, charging speed, and driving range compared to conventional lithium-ion batteries that rely on liquid electrolytes. Under the new partnership, Mitsui Kinzoku will undertake the mass production of its proprietary argyrodite sulfide solid electrolyte, "A-SOLiD." Mitsui Kinzoku has already established a dedicated mass production facility for A-SOLiD in Japan, ensuring a stable supply of high-quality solid electrolytes. The synergy between Mitsui Kinzoku's manufacturing prowess and Factorial's innovative battery design is expected to drive down production costs and enhance the performance stability of all-solid-state batteries.

Background & Context

The burgeoning EV market faces persistent challenges related to battery performance, cost, and safety. Traditional liquid-electrolyte lithium-ion batteries are nearing their theoretical limits in energy density and pose inherent thermal runaway risks. All-solid-state batteries are widely recognized as a "game-changer" for addressing these issues, offering enhanced safety characteristics and potentially superior performance. However, the complexity and cost associated with manufacturing solid electrolytes have historically hindered mass production. Factorial has already secured partnerships with major automotive players, including Mercedes-Benz, Stellantis, and Hyundai. This strategic alliance with Mitsui Kinzoku is pivotal for strengthening the supply chain to these partners and expediting the market entry of Factorial's advanced battery technology.

Strategic Significance & Outlook

The partnership between Factorial Energy and Mitsui Kinzoku has the potential to significantly shorten the commercialization timeline for all-solid-state batteries. Widespread adoption of this technology in the EV market could alleviate current concerns regarding vehicle range anxiety and charging infrastructure limitations, thereby accelerating EV penetration. Beyond automotive applications, the high energy density and inherent safety features of these batteries make them ideal for other demanding sectors, such as drones, renewable energy storage systems, and advanced portable electronic devices. This collaboration represents a critical development that could shape the future landscape of battery technology and its impact across multiple high-tech industries globally.

Source: https://electrek.co/2026/09/17/solid-state-battery-maker-factorial-secures-another-big-partnership/

Collected: September 18, 2026 | Automated Research System (Gemini API)

#30 BYD's FinDreams Battery Targets 2027 for Limited Production of Sulfide-Based All-Solid-State EV Batteries

Published September 14, 2026 Electrek China

OVERVIEW

FinDreams Battery, BYD's battery division, aims to commence limited batch production of sulfide-based all-solid-state EV batteries in 2027, with mass production slated for 2030. The company's chief scientist highlighted that all-solid-state EV batteries have reached a critical stage of development. BYD plans to initially integrate these batteries, which promise enhanced safety, faster charging, and extended driving range, into its premium EV brands.

IN DEPTH

Key Findings

FinDreams Battery, the dedicated battery manufacturing arm of Chinese automotive giant BYD, has announced plans to initiate limited batch production of its sulfide-based all-solid-state electric vehicle (EV) batteries in 2027, targeting full mass production by 2030. This ambitious timeline signifies a crucial advancement in the commercialization of next-generation battery technology, which promises substantial improvements in safety, charging speed, and driving range for electric vehicles.

Technical / Clinical Details

The all-solid-state batteries under development by FinDreams Battery utilize sulfide-based solid electrolytes, offering a significant departure from conventional lithium-ion batteries that rely on liquid electrolytes. Solid electrolytes drastically reduce the risk of leakage and thermal runaway, thereby enhancing overall battery safety and mitigating the risk of vehicle fires. Furthermore, this technology is expected to deliver superior fast-charging capabilities and stable performance across a wider range of operating temperatures. According to the company's chief scientist, the all-solid-state EV battery technology has reached a "decisive stage" for commercialization, indicating that key technical hurdles for mass production are being successfully addressed. The initial limited production phase in 2027 will likely serve to validate performance in real-world conditions and further optimize manufacturing processes.

Background & Context

As the global EV market experiences exponential growth, advancements in battery technology are paramount for improving vehicle performance and accelerating wider adoption. Leading battery manufacturers, including Tesla and CATL, are engaged in intense competition to develop batteries with higher energy density and enhanced safety features. BYD, with its vertically integrated business model spanning from battery production to EV manufacturing, leverages its battery technology as a core competitive advantage. All-solid-state batteries are widely considered a "game-changer" for the EV sector, and BYD's aggressive push in this domain is strategically vital for solidifying its market position in the future EV landscape.

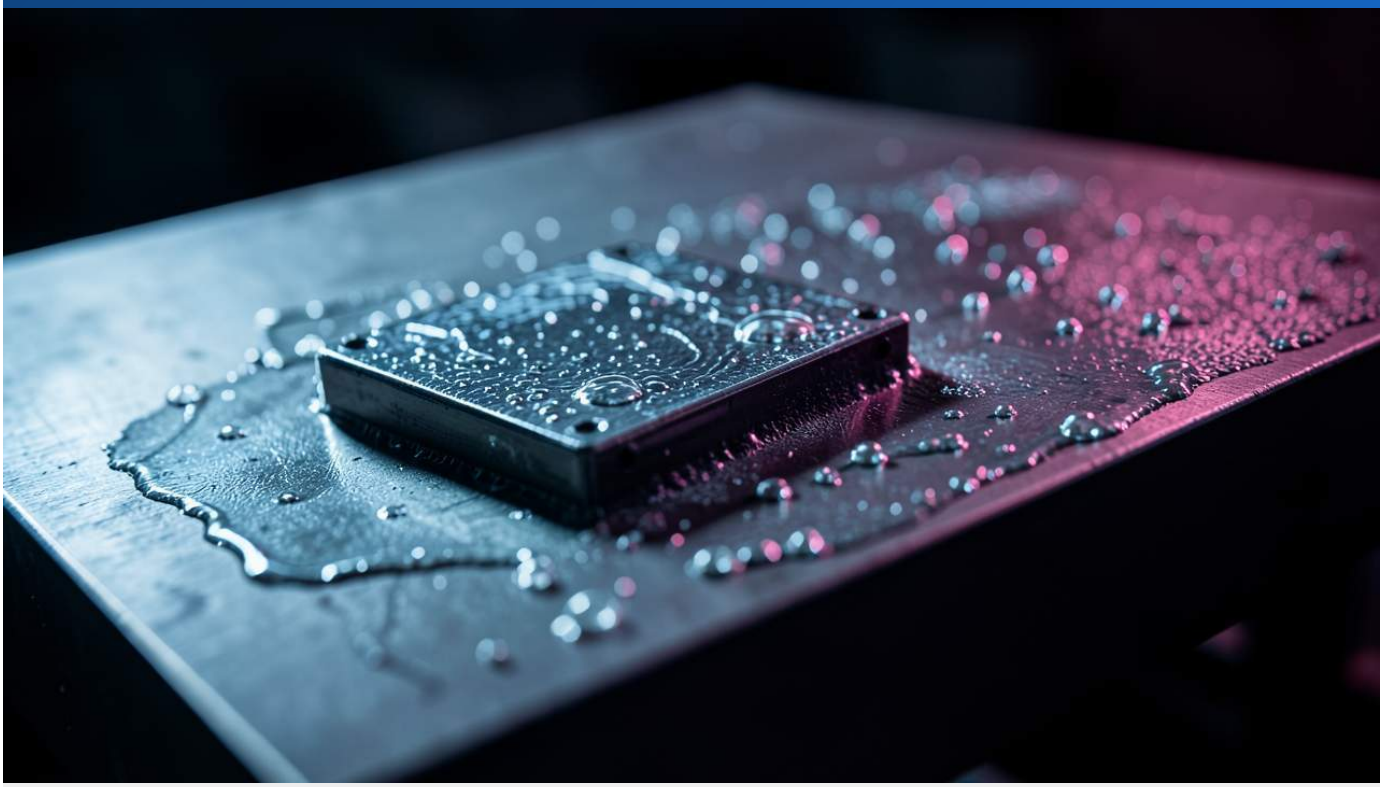
Strategic Significance & Outlook

BYD's plan to begin limited production of all-solid-state EV batteries in 2027, followed by mass production in 2030, is expected to have a profound impact on the global EV market. Initial integration into BYD's premium EV brands will showcase the technology's advanced capabilities and reinforce the company's technological leadership. As the technology matures and becomes more cost-effective, it is anticipated to significantly bolster the competitiveness of BYD's EV offerings and expand consumer choices. With other major automakers and battery suppliers also heavily invested in solid-state battery R&D, BYD's progress will be closely watched, influencing the overall technology roadmap for the industry and potentially accelerating the widespread adoption of safer and higher-performing electric vehicles.

Source: https://electrek.co/2026/09/14/byd-leading-solid-state-battery-race-first-ev-2027/

#31 University of Queensland Develops Self-Healing Nanocoating That Boosts Steel Rust Protection by Over 600-Fold, Targeting Commercialization

Published September 15, 2026 Australian Institute for Bioengineering and Nanotechnology - The University of Queensland Australia



OVERVIEW

Researchers at the University of Queensland have engineered a "smart" self-repairing coating capable of dramatically extending rust protection for steel components. This innovative coating, derived from powder-like particles that transform water-based paint into corrosion shields, restricts corrosion to an unparalleled 37 nanometers per year, rendering it over 600 times more effective than many existing high-performance rust-protection products. The technology's ability to release rust-inhibiting molecules upon damage detection positions it for commercialization within five years, promising to significantly extend the lifespan of critical infrastructure and automotive parts.

IN DEPTH

Key Findings

Researchers at Australia's University of Queensland have engineered a "smart" self-healing coating that dramatically extends rust protection for steel components, achieving a corrosion rate of just 37 nanometers per year. This breakthrough makes the coating over 600 times more effective than many high-performance rust-protection products currently on the market, offering a game-changing solution for buildings, bridges, and vehicles.

Technical / Clinical Details

- The coating is formulated from powder-like particles that, when incorporated into water-based paint, create self-repairing corrosion shields. These nanostructures encapsulate rust-inhibiting molecules, specifically benzotriazole.
- Upon sensing damage, the nanoparticles release these inhibitors to the affected area, actively preventing rust from forming and spreading. This localized, on-demand repair mechanism is a key differentiator from conventional passive coatings.
- The measured corrosion rate of 37 nanometers per year represents an unprecedented level of protection. For context, many advanced rust-prevention methods struggle to achieve such low rates, and the 600-fold improvement underscores its superior efficacy.

Background & Context

Corrosion of steel infrastructure is a global challenge, costing economies hundreds of billions of dollars annually in repairs, maintenance, and safety issues. Traditional rust protection methods often rely on barrier coatings that, once compromised, allow corrosion to proliferate. The demand for more durable, active, and sustainable anti-corrosion solutions is immense across industries from construction and transportation to marine and defense. This self-healing technology directly addresses this long-standing problem by offering a proactive defense mechanism.

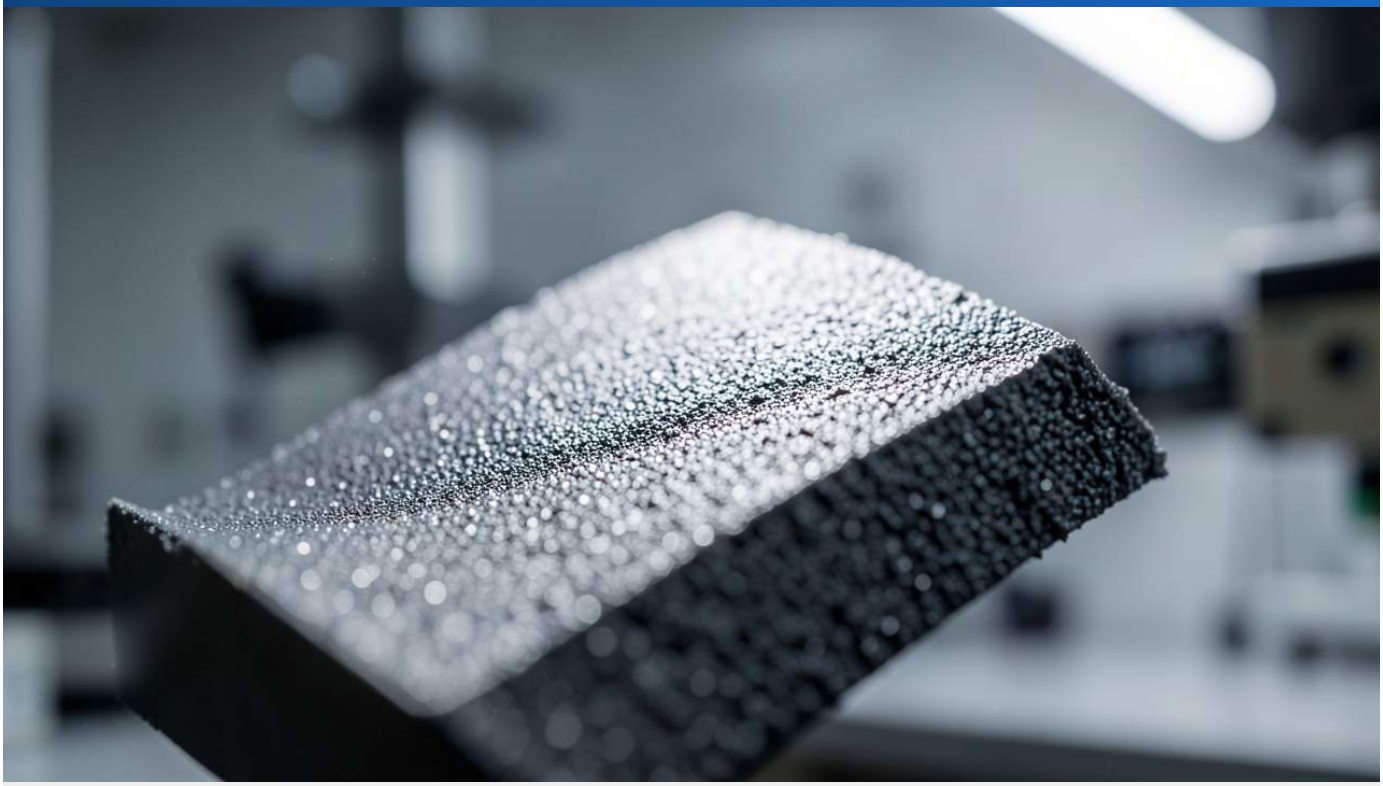
Strategic Significance & Outlook

The University of Queensland team aims to commercialize this technology within the next five years. Its applications are vast, encompassing steel components in critical infrastructure (bridges, buildings), automotive bodies, and industrial machinery where extended lifespan and reduced maintenance are paramount. The ability to dramatically curtail corrosion will not only lead to significant cost savings but also enhance the safety and longevity of steel-based assets worldwide. This represents a substantial leap forward in materials science, potentially revolutionizing how steel is protected against environmental degradation.

Source: https://aibn.uq.edu.au/article/2026/09/self-repairing-coating-extend-rust-prevention

#32 Solid Power Confirms South Korea Sulfide Solid Electrolyte JV, Targeting 500 Tons by 2028 with Expansion to 20,000 Tons/Year

Published September 18, 2026 Shanghai Metals Market (SMM) News China



OVERVIEW

Solid Power has confirmed plans to establish a sulfide solid electrolyte joint venture in South Korea, targeting an initial capacity of 500 tons by 2028 with a long-term goal of up to 20,000 tons/year. Concurrently, Factorial Energy is partnering with Mitsui Kinzoku for mass production of argyrodite-type sulfide solid electrolytes in Japan, and Panasonic Energy will begin sample delivery of its 150°C-operable solid-state battery by Q4. This marks an intensified push for solid-state battery material development and production scaling among key industry players.

IN DEPTH

Key Findings

The solid-state battery industry is witnessing an accelerated pace of technological iteration and production scaling. Solid Power has confirmed its plans to establish a sulfide solid electrolyte joint venture in South Korea, aiming for an initial production capacity of 500 tons per year by 2028, with an ambitious target to expand to 20,000 tons/year thereafter. This development is part of a broader trend, as Factorial Energy collaborates with Mitsui Kinzoku for mass production of argyrodite-type sulfide solid electrolytes in Japan, and Panasonic Energy prepares to begin sample delivery of its 150°C-operable solid-state battery by the end of the year.

Technical / Clinical Details

- **Solid Power's South Korea JV**: Solid Power, a leader in sulfide solid electrolyte technology, is making a strategic move to scale its manufacturing capabilities. Sulfide-based electrolytes are critical for solid-state batteries due to their high ionic conductivity and potential for significantly enhanced safety and energy density compared to conventional liquid electrolytes in lithium-ion batteries.
- **Factorial Energy and Mitsui Kinzoku Partnership**: The collaboration aims to mass-produce argyrodite-type sulfide solid electrolytes, known for their superior ionic conductivity and electrochemical stability. This partnership is crucial for securing a stable supply of this key material and achieving cost competitiveness.
- **Panasonic Energy's 150°C Solid-State Battery**: The capability to operate stably at 150°C is a significant breakthrough, potentially revolutionizing applications in industrial machinery and other harsh environments where thermal stability is paramount. The initiation of sample delivery is a major milestone towards practical deployment.
- **Chinese Manufacturers' Expansion**: Companies like Langu New Energy and Easpring in China are also aggressively expanding their capacities for solid electrolytes and anode materials, indicating a rapidly intensifying global competition in the solid-state battery sector.

Background & Context

The proliferation of electric vehicles (EVs) and energy storage systems (ESS) has created an urgent demand for safer, higher-performance, and longer-lasting battery technologies. Solid-state batteries, with their reduced fire risk and higher energy density potential, are widely considered the holy grail of next-generation batteries. Driven by government policy support and market demand, the localization and diversification of material supply chains, along with the transition to large-scale production, are critical challenges. These recent announcements represent substantial progress towards the commercialization of solid-state batteries within this dynamic landscape.

Strategic Significance & Outlook

The collective actions by Solid Power, Factorial Energy, Panasonic Energy, and other leading players signal a clear acceleration towards the mass production and practical application of solid-state batteries. The expansion of sulfide solid electrolyte production capacity, in particular, will be instrumental in stabilizing supply chains and driving down costs, thereby accelerating the market introduction of EVs equipped with solid-state batteries. In the coming years, solid-state battery technology is expected to mature further, leading to innovative applications across a wide range of sectors, from industrial machinery and consumer electronics to broader mobility solutions. Companies that successfully pursue both technological innovation and economies of scale will be poised to lead this evolving market.

Source: https://news.metal.com/newscontent/104122948-solid-state-battery-weekly--%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8B%E2%80%8Bindustry-deepens-technologyiteration-amid-ebb-and-flow-policy-push-intensifies