TROY TECHNICAL

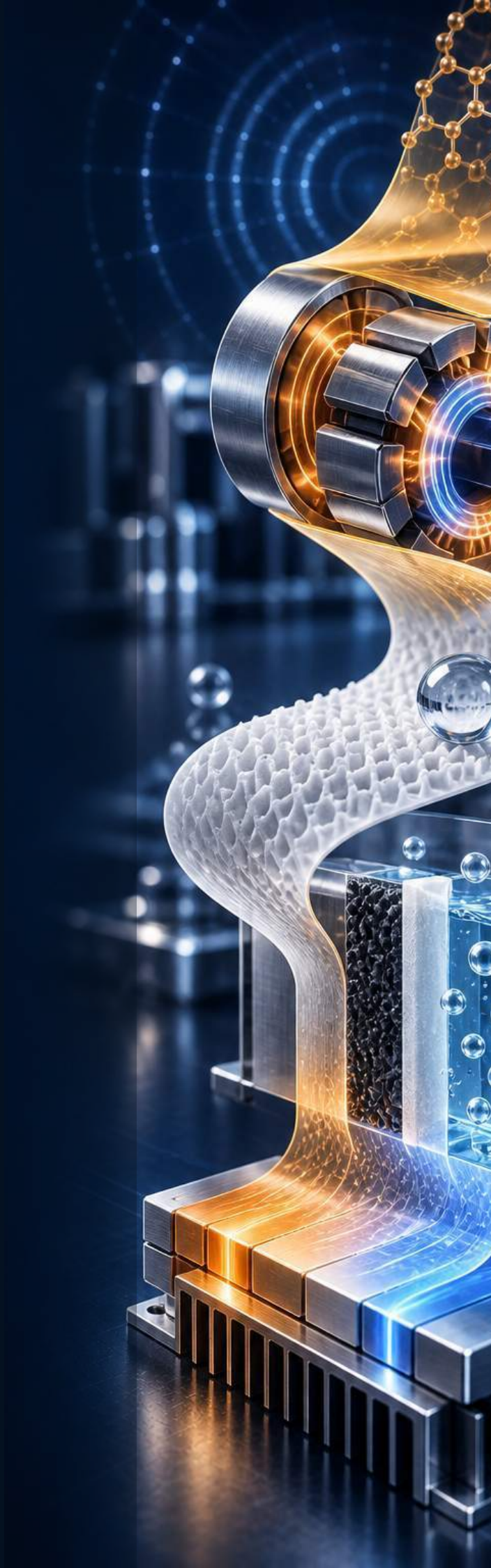
FUNCTIONAL MATERIALS
WEEKLY REPORT

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

Measurable device or process function, reliability and manufacturable integration

11	10
ANALYZED ARTICLES	PRIORITY THEMES

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



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

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

SIGNAL 01 | COMPOSITION

Graphene EMI Shielding Film: 400,000-Fold Bend Durability Specs

A joint research team from the Korea Institute of Industrial Technology (KITECH) and Hanyang University has developed a high-durability electromagnetic interference (EMI) shielding film that maintains performance after 400,000 folds.

SIGNAL 02 | FUNCTIONAL PROPERTY

PU-S Elastomer: Sulfur Substitution for Room-Temperature Healing

Researchers at South China University of Technology have developed a polyurethane (PU-S) elastomer that achieves 92% toughness recovery at room temperature without external stimuli.

SIGNAL 03 | PROCESSING

Shape-Memory Alloy Cooling: Durability and Cost Specs for 2026

Researchers have developed a honeycomb-inspired cooling structure using nickel-titanium alloys that survived over 100 million operating cycles.

SIGNAL 04 | DEVICE INTEGRATION

Graded Seebeck Coefficients: 10% Cooling Gain in Solid-State Devices

Researchers from Tongji University and Shanghai University have demonstrated that spatially grading the Seebeck coefficient in n-type bismuth telluride alloys can increase the maximum cooling temperature span by approximately 10%.

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.

Numbers and evidence anchors that require conditions

92%
A03

SOURCE-BOUND CONDITION
Researchers at South China University of Technology have developed a polyurethane (PU-S) elastomer that achieves 92% toughness recovery at room temperature without external stimuli.

100 million
A06

SOURCE-BOUND CONDITION
Researchers have developed a honeycomb-inspired cooling structure using nickel-titanium alloys that survived over 100 million operating cycles.

10%
A04

SOURCE-BOUND CONDITION
Researchers from Tongji University and Shanghai University have demonstrated that spatially grading the Seebeck coefficient in n-type bismuth telluride alloys can increase the maximum cooling temperature span by.

80%
A09

SOURCE-BOUND CONDITION
Researchers at DGIST have developed a materials-design technology that reduces dysprosium (Dy) consumption in permanent magnets by 80% without compromising magnetic performance.

95%
A08

SOURCE-BOUND CONDITION
The approach reduces training time by approximately 95% compared to conventional LLM methods, enabling property prediction on standard PCs.

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

Where the value chain moved

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

1

Composition

P01/P06

A joint research team from the Korea Institute of Industrial Technology (KITECH) and Hanyang Universit y has developed a.

2

Functional property

P02/P07

Researchers at South China University of Technology have developed a polyureth ane (PU-S) elastomer that achieves 92%.

3

Processing

P03/P08

Researchers have developed a honeycomb-inspired cooling structure using nickel-titanium alloys that survived over 100 million.

4

Device integr ation

P04/P09

Researchers from Tongji University and Shanghai University have demonstrated that spatially grading the Seebeck coefficien t.

5

Market adopt ion

P05/P10

Researchers at DGIST have developed a materials-design technology that reduces dysprosium (Dy) consumption in permanent.

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 next decision locus



P01	Graphene EMI Shielding Film: 400,000-Fold Bend Durability Specs System / adoption | cue: commercially
P02	PU-S Elastomer: Sulfur Substitution for Room-Temperature Healing Tech / process | cue: no system/business cue
P03	Shape-Memory Alloy Cooling: Durability and Cost Specs for 2026 Tech / process | cue: no system/business cue
P04	Graded Seebeck Coefficients: 10% Cooling Gain in Solid-State Devices Tech / process | cue: no system/business cue
P05	DGIST Magnet Technology: Reducing Dysprosium Use by 80% Business / rules | cue: supply chain
P06	ZEBRA-Prop: Lightweight LLM-based Material Property Prediction Business / rules | cue: standard
P07	STT-MRAM AI SoC: Tohoku University and Aisin's 16nm Specs System / adoption | cue: integrating
P08	Nb3Sn RF Superconducting Accelerator: China's Liquid-Helium-Free Prototype System / adoption | cue: system
P09	BCC Metal Alloys: High-Temperature Toughness and 20K Specs Tech / process | cue: no system/business cue
P10	Meta-WG: Metasurface Waveguides for All-Day AR Glasses Specs System / adoption | cue: application

REPRODUCIBLE POSITIONING RULE

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

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

P01 Graphene EMI Shielding Film: 400,000-Fold Bend Durability Specs

A10 | Composition | Product adoption

2026-11-10

FACT

A joint research team from the Korea Institute of Industrial Technology (KITECH) and Hanyang University has developed a high-durability electromagnetic interference (EMI) shielding film that maintains performance after 400,000 folds. By utilizing commercially available materials to prevent graphene aggregation, the team established an eco-friendly water-based process compatible with existing mass-production lines.

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

P02 PU-S Elastomer: Sulfur Substitution for Room-Temperature Healing

A03 | Functional property | Pilot

2026-11-10

FACT

Researchers at South China University of Technology have developed a polyurethane (PU-S) elastomer that achieves 92% toughness recovery at room temperature without external stimuli. By substituting oxygen with sulfur in chain extenders, the material maintains high mechanical strength (23.7 MPa) while enabling autonomous repair. This breakthrough resolves the traditional trade-off between mechanical robustness and self-healing speed in high-performance elastomers.

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 20/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

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

P03 Shape-Memory Alloy Cooling: Durability and Cost Specs for 2026

A06 | Processing | Pilot

2026-11-08

FACT

Researchers have developed a honeycomb-inspired cooling structure using nickel-titanium alloys that survived over 100 million operating cycles. The design reduces manufacturing costs by approximately 95% compared to wire-cut electrical machining, offering a viable path toward refrigerant-free cooling 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 P03.

UNKNOWN

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

EDITORIAL SCORE 20/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

P04 Graded Seebeck Coefficients: 10% Cooling Gain in Solid-State Devices

A04 | Device integration | Pilot

Prior release 2026-11-07

FACT

Researchers from Tongji University and Shanghai University have demonstrated that spatially grading the Seebeck coefficient in n-type bismuth telluride alloys can increase the maximum cooling temperature span by approximately 10%. This nonreciprocal transport approach enhances cooling performance without requiring new thermoelectric compounds, offering a new design degree of freedom for solid-state cooling.

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 20/25 | MATURITY 2/5 | DECISION LOCUS: TECH / PROCESS

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

P05 DGIST Magnet Technology: Reducing Dysprosium Use by 80%

A09 | Market adoption | Pilot

2026-11-10

FACT

Researchers at DGIST have developed a materials-design technology that reduces dysprosium (Dy) consumption in permanent magnets by 80% without compromising magnetic performance. This advancement targets the reduction of manufacturing costs and supply chain instability for electric vehicle motors and wind turbines.

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 20/25 | MATURITY 2/5 | DECISION LOCUS: BUSINESS / RULES

P06 ZEBRA-Prop: Lightweight LLM-based Material Property Prediction

A08 | Composition | Research

2026-11-11

FACT

Researchers from Science Tokyo and other institutions developed ZEBRA-Prop, a machine learning method that predicts material properties from text without retraining Large Language Models (LLMs). The approach reduces training time by approximately 95% compared to conventional LLM methods, enabling property prediction on standard PCs.

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

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

P07 STT-MRAM AI SoC: Tohoku University and Aisin's 16nm Specs

A11 | Functional property | Pilot

Prior release 2026-11-07

FACT

Tohoku University and Aisin have developed the world's first 16nm AI SoC integrating STT-MRAM to enable Near-Memory Computing (NMC). This architecture reduces energy consumption by 50 times and accelerates OS boot times by approximately 39 times compared to conventional 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 19/25 | MATURITY 2/5 | DECISION LOCUS: SYSTEM / ADOPTION

P08 Nb3Sn RF Superconducting Accelerator: China's Liquid-Helium-Free Prototype

A07 | Processing | Joint evaluation

2026-11-10

FACT

A joint team from the Institute of Modern Physics of the Chinese Academy of Sciences and the Guangdong Laboratory for Advanced Energy Science and Technology has developed the world's first liquid-helium-free Nb3Sn thin-film RF superconducting electron accelerator. The system has achieved stable beam loading, potentially transforming accelerator operation by reducing dependence on liquid helium.

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

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

P09 BCC Metal Alloys: High-Temperature Toughness and 20K Specs

A05 | Device integration | Pilot

2026-11-11

FACT

Researchers led by Lawrence Berkeley National Laboratory have developed two body-centered cubic (BCC) alloys that remain ductile from 20 Kelvin to 1,300 degrees centigrade. These materials overcome the traditional ductile-to-brittle transition, achieving a toughness of 100 MPa$\sqrt{m}$ at 20K, significantly surpassing existing BCC materials like steel.

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

P10 Meta-WG: Metasurface Waveguides for All-Day AR Glasses Specs

A02 | Market adoption | Joint evaluation

2026-11-11

FACT

Researchers have developed a dual-layer metasurface-based waveguide (meta-WG) that enables a 30° field of view and an 8<0xE2><0x80><0x89>×<0xE2><0x80><0x89>8-mm 2 eyebox. The prototype maintains high luminance efficiency within a 1.5-mm-thick form factor, facilitating bright virtual images under outdoor illumination. This approach overcomes traditional trade-offs in AR displays to move high-performance glasses closer to consumer application.

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

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	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 01-11

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	KNNS-BNZ-xSZ Ceramics: SrZrO3 Doping and O-T Phase Boundary	https://doi.org/10.21203/rs.3.rs-11386087/v1
A02	Meta-WG: Metasurface Waveguides for All-Day AR Glasses Specs	https://doi.org/10.1038/s41586-026-11277-x
A03	PU-S Elastomer: Sulfur Substitution for Room-Temperature Healing	https://bioengineer.org/sulfur-substitution-enables-room-temperature-self-healing-in-tough-polyurethane/
A04	Graded Seebeck Coefficients: 10% Cooling Gain in Solid-State Devices	https://bioengineer.org/graded-seebeck-coefficients-enable-ten-percent-colder-solid-state-thermoelectric-cooling/
A05	BCC Metal Alloys: High-Temperature Toughness and 20K Specs	https://www.miragenews.com/new-metal-alloys-withstand-extreme-heat-and-cold-1775000/
A06	Shape-Memory Alloy Cooling: Durability and Cost Specs for 2026	https://knowridge.com/2026/11/honeycomb-inspired-metal-could-make-cleaner-cooling-last-much-longer/
A07	Nb3Sn RF Superconducting Accelerator: China's Liquid-Helium-Free Prototype	https://finance.sina.com.cn/roll/2026-11-10/doc-iniyfuyz2644380.shtml
A08	ZEBRA-Prop: Lightweight LLM-based Material Property Prediction	https://www.nikkei.com/article/DGXZRSP715109_R11C26A1000000/
A09	DGIST Magnet Technology: Reducing Dysprosium Use by 80%	https://www.dongascience.com/en/news/80796
A10	Graphene EMI Shielding Film: 400,000-Fold Bend Durability Specs	https://www.mtnews.net/news/articleView.html?idxno=26492
A11	STT-MRAM AI SoC: Tohoku University and Aisin's 16nm Specs	https://monoist.itmedia.co.jp/mn/articles/2611/07/news007.html

FunctionalMaterials — Selected Articles

Date: 2026-11-15

Articles: 11

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#01 KNNS-BNZ-xSZ Ceramics: $SrZrO_3$ Doping and O-T Phase Boundary

#02 Meta-WG: Metasurface Waveguides for All-Day AR Glasses Specs

#03 PU-S Elastomer: Sulfur Substitution for Room-Temperature Healing

#04 Graded Seebeck Coefficients: 10% Cooling Gain in Solid-State Devices

#05 BCC Metal Alloys: High-Temperature Toughness and 20K Specs

#06 Shape-Memory Alloy Cooling: Durability and Cost Specs for 2026

#07 Nb3Sn RF Superconducting Accelerator: China's Liquid-Helium-Free Prototype

#08 ZEBRA-Prop: Lightweight LLM-based Material Property Prediction

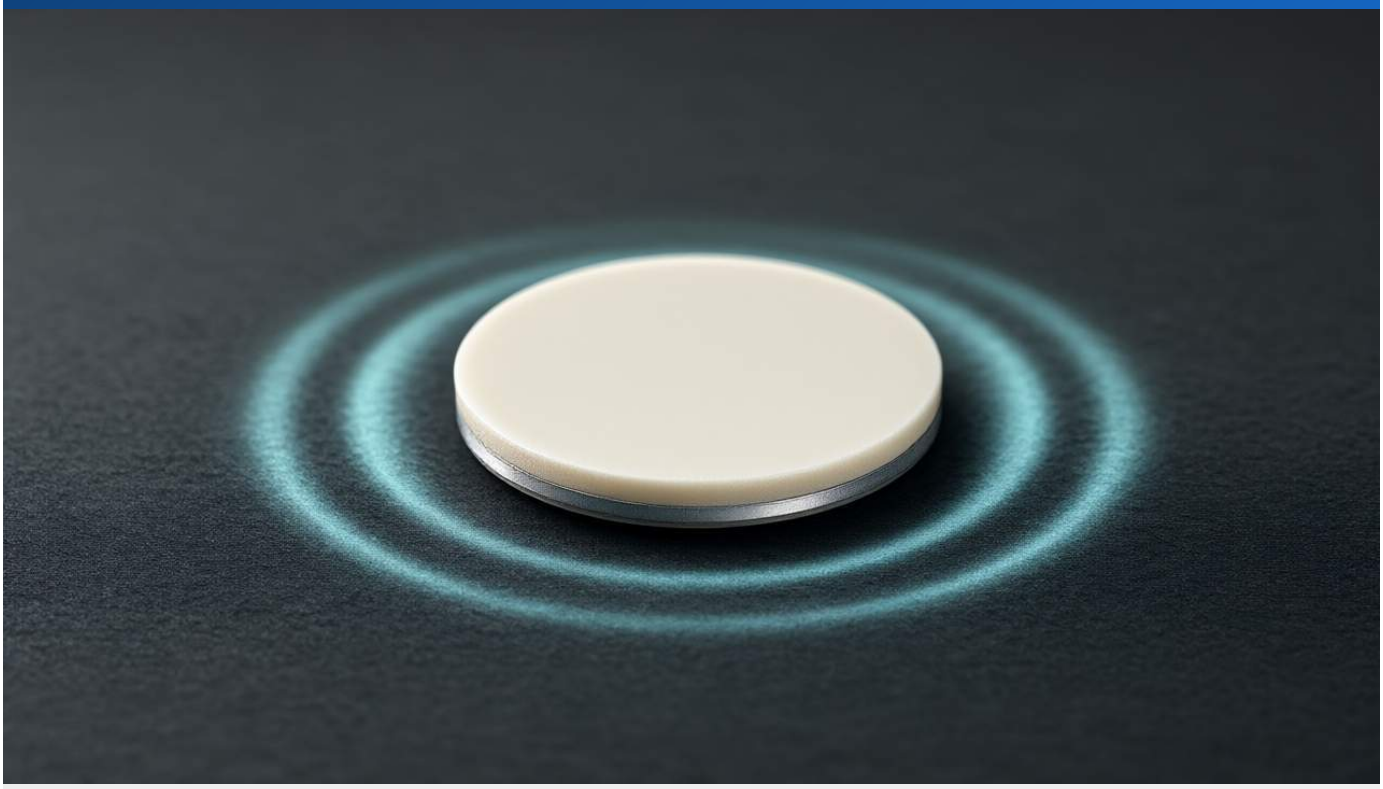
#09 DGIST Magnet Technology: Reducing Dysprosium Use by 80%

#10 Graphene EMI Shielding Film: 400,000-Fold Bend Durability Specs

#11 STT-MRAM AI SoC: Tohoku University and Aisin's 16nm Specs

#01 KNNS-BNZ-xSZ Ceramics: $SrZrO_3$ Doping and O-T Phase Boundary

Published November 12, 2026　Research Square（プレプリント）



OVERVIEW

$SrZrO_3$ (SZ) doping in KNNS-BNZ lead-free ceramics optimizes electromechanical strain by inducing an orthorhombic-tetragonal (O-T) phase boundary. The x = 0.015 composition achieved a piezoelectric coefficient d33 of 303 pC/N and a unipolar strain of 0.12%. This development provides a reference for enhancing the performance of environment-friendly piezoceramics.

IN DEPTH

Key Findings

The study demonstrates that modifying (0.96- x)(K 0.48 Na 0.52) 0.96 Li 0.04 Nb 0.96 Sb 0.04 O 3 -0.04Bi 0.5 Na 0.5 ZrO 3 - x SrZrO 3 (KNNS-BNZ- x SZ) ceramics with $SrZrO_3$ (SZ) significantly improves electrical properties. The optimal performance was observed at x = 0.015, which yielded a piezoelectric coefficient d33 = 303 pC/N, a planar electromechanical coupling factor kp = 0.39, and a large unipolar strain of 0.12%. Additional metrics for this composition include a mechanical quality factor Qm = 65, room-temperature relative permittivity of 2183, remnant polarization Pr = 14.7 μC/cm 2, and a Curie temperature TC = 235 °C.

Technical Details

X-ray diffraction confirmed that all samples maintained a pure perovskite phase. The introduction of SZ doping induced an orthorhombic-tetragonal (O-T) phase transition, and the coexistence of these phases is credited for the improved electrical performance. SEM observations indicated that increasing SZ content led to a gradual reduction in grain size. However, the research noted that excessive SZ doping compromised ceramic densification, which subsequently led to the deterioration of electrical performance. Furthermore, dielectric-temperature measurements revealed that SZ modification caused a downward shift in the Curie temperature.

Background & Context

Potassium-sodium niobate-based piezoceramics are being extensively researched as lead-free alternatives due to their environment-friendly characteristics and excellent piezoelectric performance. This study specifically investigated how varying the SZ doping content affects the phase structure, microstructure, dielectric, ferroelectric, strain, and piezoelectric properties of the KNNS-BNZ system.

Significance & Outlook

By identifying the precise SZ concentration required to establish the O-T phase boundary, this work provides a useful experimental reference for the performance optimization of KNNS-BNZ-based lead-free piezoceramics. The results highlight the balance between phase transition engineering and microstructure control to achieve high electromechanical strain in lead-free materials.

Source: https://doi.org/10.21203/rs.3.rs-11386087/v1

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

#02 Meta-WG: Metasurface Waveguides for All-Day AR Glasses Specs

Published November 11, 2026 Nature



OVERVIEW

Researchers have developed a dual-layer metasurface-based waveguide (meta-WG) that enables a 30° field of view and an 8<0xE2><0x80><0x89>×<0xE2><0x80><0x89>8-mm 2 eyebox. The prototype maintains high luminance efficiency within a 1.5-mm-thick form factor, facilitating bright virtual images under outdoor illumination. This approach overcomes traditional trade-offs in AR displays to move high-performance glasses closer to consumer application.

IN DEPTH

Key Findings

The developed meta-WG prototype achieves a 30° field of view (FoV) and an 8<0xE2><0x80><0x89>×<0xE2><0x80><0x89>8-mm 2 two-dimensional (2D) eyebox. In terms of optical performance, the system maintains an average luminance efficiency of 1,938<0xE2><0x80><0x89>nits<0xE2><0x80><0x89>lm −1, reaching peaks of up to 4,225<0xE2><0x80><0x89>nits<0xE2><0x80><0x89>lm −1. These results are achieved within a compact 1.5-mm-thick form factor, allowing the device to produce stable and bright virtual images even under outdoor ambient illumination.

Technical Details

The system utilizes spatially varying, interwoven metasurfaces to provide several grating vectors, which allows for multidirectional light control. By employing a dual-layer metasurface-based waveguide architecture, the design expands the degrees of freedom for light routing compared to conventional diffractive waveguides. This increased control allows the system to balance efficiency, viewing range, and form factor more effectively than previous optical solutions.

Background & Context

Augmented reality (AR) displays have evolved from early optical see-through head-mounted systems toward lightweight glasses. While diffractive waveguides (WGs) have been a promising path for lightweight designs, they suffer from inherent trade-offs between the field of view, optical efficiency, and eyebox size. These limitations stem from the restricted degrees of freedom available for light control in standard diffractive systems.

Significance & Outlook

By overcoming the limitations of conventional diffractive WGs, this metasurface approach provides a scalable framework for developing wearable displays that meet practical consumer requirements. The ability to maintain high brightness and a wide eyebox in a thin profile suggests a viable path toward all-day-wearable AR glasses that seamlessly integrate digital information with the physical world.

Source: https://doi.org/10.1038/s41586-026-11277-x

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

#03 PU-S Elastomer: Sulfur Substitution for Room-Temperature Healing

Published November 10, 2026 BIOENGINEER.ORG China



OVERVIEW

Researchers at South China University of Technology have developed a polyurethane (PU-S) elastomer that achieves 92% toughness recovery at room temperature without external stimuli. By substituting oxygen with sulfur in chain extenders, the material maintains high mechanical strength (23.7 MPa) while enabling autonomous repair. This breakthrough resolves the traditional trade-off between mechanical robustness and self-healing speed in high-performance elastomers.

IN DEPTH

Key Findings

The developed PU-S elastomer demonstrates a tensile strength of 23.7 MPa and an elongation at break of 1080%, while maintaining an initial tensile modulus of 5.81 MPa. In self-healing tests conducted at 25 °C for 24 hours, the material recovered 92% of its toughness, with tensile strength returning to 19.5 MPa. In contrast, a traditional PU-O control sample achieved only 27% healing efficiency under the same conditions and only 52% when heated to 50 °C.

Technical Details

The team employed an "S-for-O" substitution strategy, replacing traditional urea chain extenders with thiourea units. Because sulfur has a larger atomic radius and lower electronegativity than oxygen, it prevents the formation of ordered, crystalline hard domains. Instead, it creates a disordered, asymmetric, and dense multi-point hydrogen bond network. FT-IR spectroscopy showed that hydrogen-bonded carbonyl groups in PU-S decreased to 60.8%, compared to 75.7% in the PU-O sample.

Molecular analysis revealed the following drivers of the healing process:

- **Activation Energy:** PU-S exhibited an activation energy of 41.8 kJ/mol, significantly lower than the 106.7 kJ/mol of PU-O, facilitating easier chain segment diffusion.
- **Binding Energy:** DFT calculations showed the thiourea-thiourea dimer binding energy is -13.05 kcal/mol, less than half of the urea-urea dimer's -29.61 kcal/mol.
- **Rheology:** Storage (G’) and loss (G”) moduli crossover in the low-frequency region at 25 °C, confirming active internal dynamics at room temperature.

Background & Context

Traditional high-strength PU elastomers rely on dense hydrogen bonds to create rigid microdomains. While these provide strength, they restrict polymer chain migration, typically requiring external heat to initiate healing. This limitation has previously hindered the use of high-strength PU in flexible electronics and other dynamic environments.

Significance & Outlook

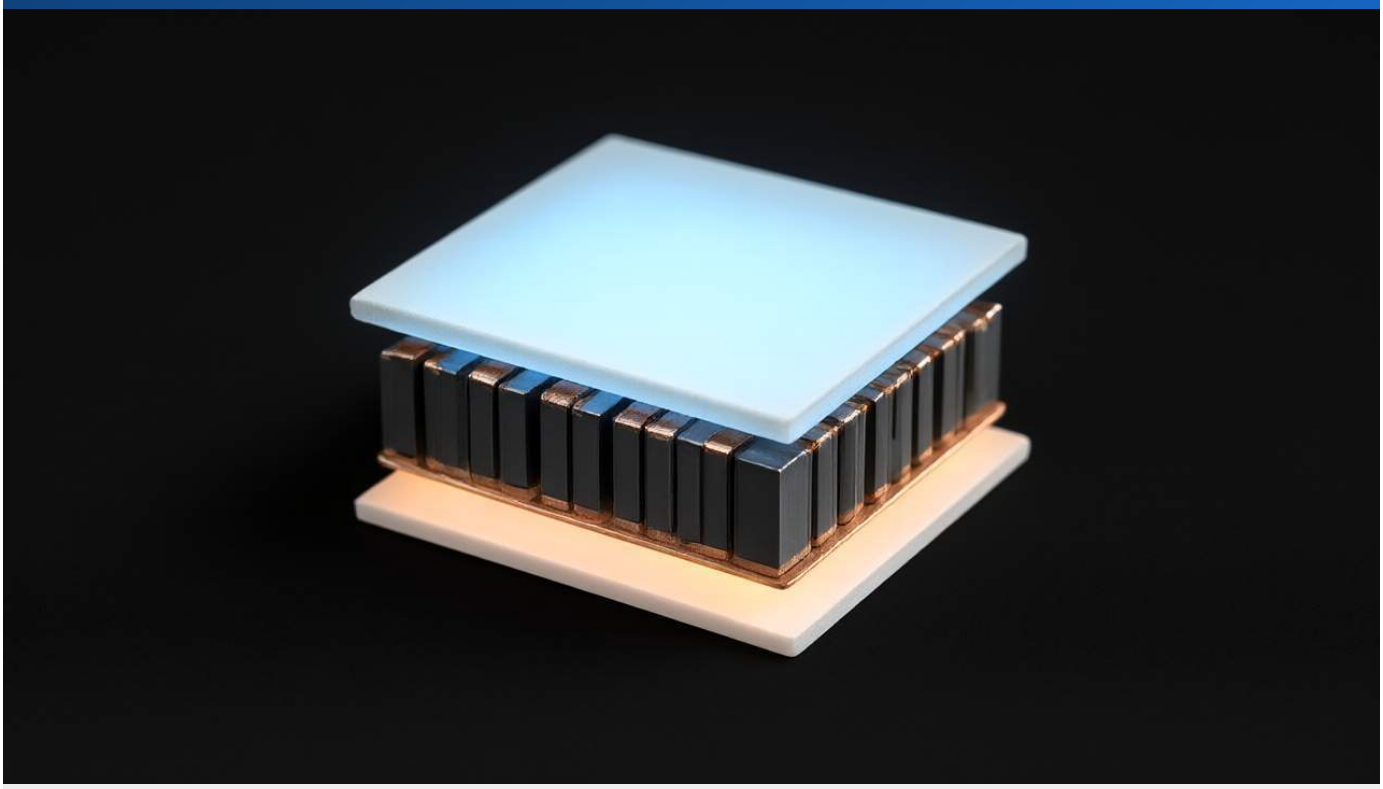
By constructing a dynamic supramolecular network that allows hydrogen bonds to break and reform easily, the researchers have created a material suitable for structural applications that require autonomous repair. The study also notes the recyclability of the PU-S elastomer as a key factor for sustainable design.

Source: https://bioengineer.org/sulfur-substitution-enables-room-temperature-self-healing-in-tough-polyurethane/

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

#04 Graded Seebeck Coefficients: 10% Cooling Gain in Solid-State Devices

Published November 07, 2026 BIOENGINEER.ORG USA



OVERVIEW

Researchers from Tongji University and Shanghai University have demonstrated that spatially grading the Seebeck coefficient in n-type bismuth telluride alloys can increase the maximum cooling temperature span by approximately 10%. This nonreciprocal transport approach enhances cooling performance without requiring new thermoelectric compounds, offering a new design degree of freedom for solid-state cooling.

IN DEPTH

Key Findings

A research team led by Tongji University and Shanghai University has achieved a maximum cooling temperature span approximately 10 percent larger than that of conventional uniform reference coolers. This improvement was realized by aligning the electrical current flow with a spatially graded Seebeck coefficient in an n-type bismuth telluride alloy single crystal. The study demonstrated a directional asymmetry in performance; reversing the current direction shifted the maximum cooling temperature span by about 20 percent.

Technical Details

The team utilized a compositionally graded n-type $Bi_2Te_{2.7}Se_{0.3}$ single crystal. While commercial thermoelectric legs of the same alloy typically show Seebeck values differing by only 2.5 percent between ends, the experimental crystal featured an internal chemical-potential gradient that spread the Seebeck coefficient across a difference of roughly 50 microvolts per kelvin. To analyze this, the researchers proposed an extended figure of merit, $z_{extended}$, which accounts for total electronic entropy changes along the transport path, including variations caused by local temperature, chemical potential, and magnetic fields.

Background & Context

Solid-state cooling relies on the Peltier effect, where heat exchange occurs primarily at the junctions between thermoelectric materials and metallic electrodes. The Thomson effect—heat exchange within the material volume—is usually negligible because the Seebeck coefficient remains uniform. Traditionally, the maximum temperature span (ΔT_{max}) has been limited by the material's intrinsic thermoelectric figure of merit (zT). This technology is currently used in portable insulin coolers, automotive miniature refrigerators, and laser temperature stabilization for fiber-optic networks.

Significance & Outlook

The cooling bonus increases as the material electronic quality factor (B) decreases. For typical bismuth telluride alloys, B is around 0.33, and it drops further at cryogenic temperatures where lattice thermal conductivity hinders performance. Consequently, the researchers identified low-temperature environments as the most promising application for this graded-property approach. While the proof-of-concept device reached a temperature difference of roughly 15 kelvins, the authors noted a thermodynamic trade-off where boosting heat absorption pulls the alloy away from its optimal average zT value.

Source: https://bioengineer.org/graded-seebeck-coefficients-enable-ten-percent-colder-solid-state-thermoelectric-cooling/

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

#05 BCC Metal Alloys: High-Temperature Toughness and 20K Specs

Published November 11, 2026　Mirage News（Berkeley Lab発表）　USA



OVERVIEW

Researchers led by Lawrence Berkeley National Laboratory have developed two body-centered cubic (BCC) alloys that remain ductile from 20 Kelvin to 1,300 degrees centigrade. These materials overcome the traditional ductile-to-brittle transition, achieving a toughness of 100 MPa√m at 20K, significantly surpassing existing BCC materials like steel.

IN DEPTH

Key Findings

A research team led by Lawrence Berkeley National Laboratory (Berkeley Lab) has designed two metal alloys with a body-centered cubic (BCC) atomic arrangement that exhibit remarkable resistance to fracturing across an extreme temperature range. The materials maintain ductility from liquid helium temperatures (20 Kelvin) up to 1,300 degrees centigrade. Notably, these alloys achieve a toughness of 100 MPa√m at 20K and above 250 MPa√m at room temperature, whereas the toughest existing BCC materials, such as steel, only reach 10 to 20 MPa√m at 20K.

Technical Details

The study evaluated two distinct compositions: a binary alloy consisting of Nb 70 Ti 30 and a medium-high-entropy alloy (MHEA) with the composition Nb 45 Ta 25 Ti 15 Hf 15. Unlike traditional alloys that rely on one or two main elements with trace additives, these combine similar proportions of metals selected from two regions of the periodic table. The research involved casting and rolling samples via collaborators at UC Irvine and an Air Force materials lab, with testing conducted at Berkeley Lab and the Engin-X instrument at the ISIS Neutron and Muon Source in the United Kingdom.

Background & Context

BCC alloys are highly desired for high-temperature applications, such as rocketry and turbine blades, due to their high melting points. However, most BCC alloys are prone to cracking and typically undergo a ductile-to-brittle transition at low temperatures. While other MHEAs have been developed for extreme cold, they are often unsuitable for high heat. This research addresses the "holy grail" of creating a ductile version of BCC alloys that can withstand both extremes.

Significance & Outlook

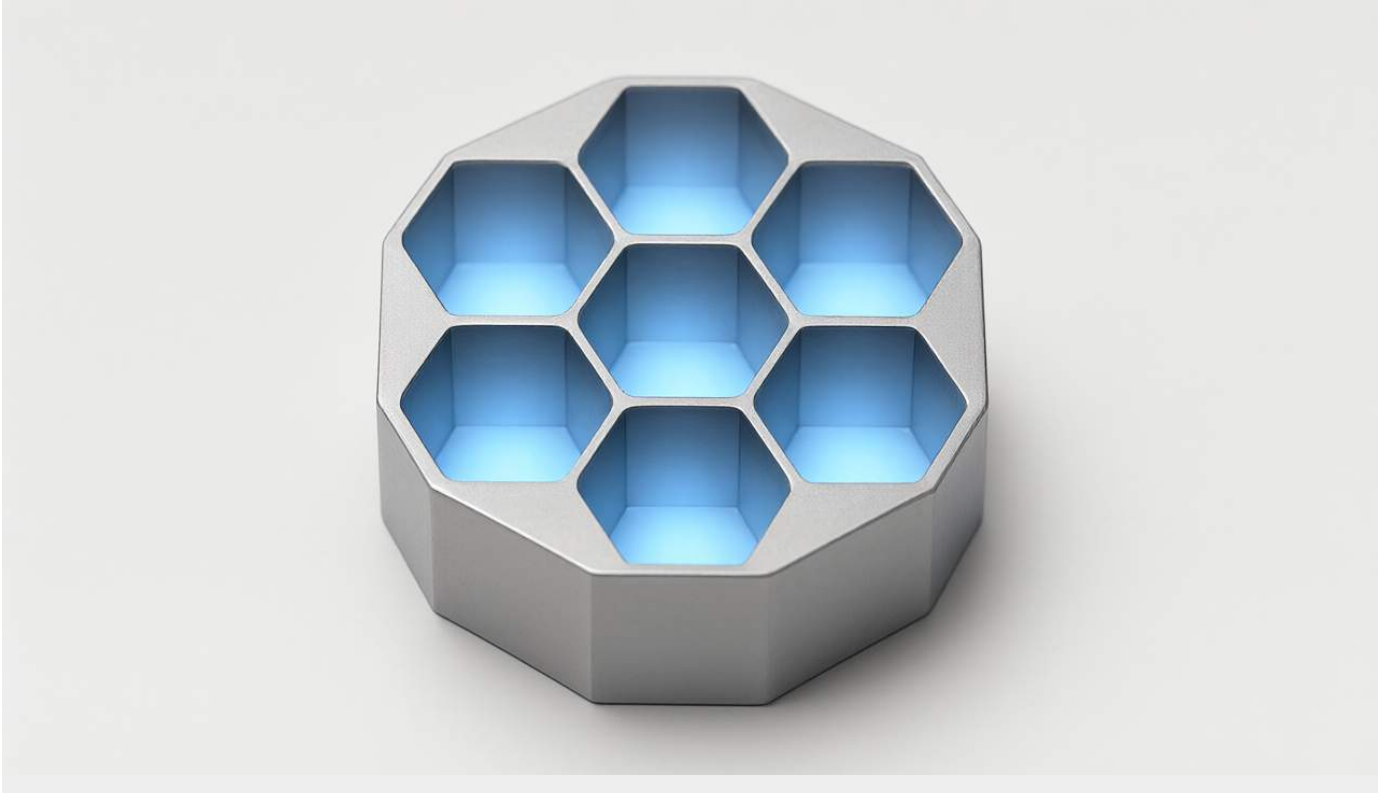
By proving that high-temperature BCCs can overcome the ductile-to-brittle transition, this study removes a major hurdle for their practical application in spacecraft, jet engines, and city-scale energy systems. Further research is required to determine how exposure to elements and oxidation will affect long-term performance before these metals are adopted for real-world use.

Source: https://www.miragenews.com/new-metal-alloys-withstand-extreme-heat-and-cold-1775000/

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

#06 Shape-Memory Alloy Cooling: Durability and Cost Specs for 2026

Published November 08, 2026 Knowridge Science Report USA



OVERVIEW

Researchers have developed a honeycomb-inspired cooling structure using nickel-titanium alloys that survived over 100 million operating cycles. The design reduces manufacturing costs by approximately 95% compared to wire-cut electrical machining, offering a viable path toward refrigerant-free cooling systems.

IN DEPTH

Key Findings

A research team from the Hong Kong University of Science and Technology has engineered a solid cooling structure capable of enduring more than 100 million operating cycles. This durability corresponds to an estimated service life exceeding ten years under tested conditions. A prototype unit, 30 millimeters long and consisting of 200 stacked chips, achieved a maximum temperature span of 11.7 degrees Celsius while demonstrating functional cooling power.

Technical Details

The system utilizes a shape-memory alloy based on nickel and titanium, which absorbs and releases heat by reversibly changing its internal crystal structure under mechanical stress. To prevent the structural failures common in single continuous tubes, the team implemented a design inspired by bamboo and honeycombs:

- **Architecture:** Thin commercial sheets are stamped into small porous chips and stacked into a tube-like structure.
- **Crack Mitigation:** The interfaces between neighboring chips act as barriers that interrupt growing cracks, preventing long splitting failures.
- **Manufacturing:** The stamping process produces approximately 100 chips per minute. This method is reported to be more than 100 times faster and approximately 95% less expensive than the benchmark wire-cut electrical machining method.

Background & Context

The technology relies on the principle of heating and cooling a special metal through repeated compression and release. The primary challenge for practical application has been creating structures that can transfer heat quickly without cracking under repeated mechanical loading. While the current results bring the material closer to practical development, the technology has not yet been integrated into mass-produced refrigerators or air conditioners.

Significance & Outlook

By addressing the durability and manufacturing barriers of refrigerant-free cooling, this approach provides a more affordable and reliable route for producing high-stress components. The research group has filed international patent applications for the technology. Future development will focus on refining the alloys, improving heat transfer, and developing more efficient methods for applying mechanical force to determine performance within a complete system.

Source: https://knowridge.com/2026/11/honeycomb-inspired-metal-could-make-cleaner-cooling-last-much-longer/

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

#07 Nb3Sn RF Superconducting Accelerator: China's Liquid-Helium-Free Prototype

Published November 10, 2026　新浪财经（中国新闻网）　China



OVERVIEW

A joint team from the Institute of Modern Physics of the Chinese Academy of Sciences and the Guangdong Laboratory for Advanced Energy Science and Technology has developed the world's first liquid-helium-free Nb3Sn thin-film RF superconducting electron accelerator. The system has achieved stable beam loading, potentially transforming accelerator operation by reducing dependence on liquid helium.

IN DEPTH

Key Findings

Researchers have successfully developed and demonstrated stable beam loading in the first liquid-helium-free Nb3Sn thin-film radio-frequency (RF) superconducting electron accelerator. This achievement, resulting from nearly ten years of research, was recognized as one of the "2026 Top Ten Advances in China Surface Technology" by the Surface Engineering Branch of the Chinese Mechanical Engineering Society.

Technical Details

The project focused on the intersection of accelerator physics, superconducting materials, and surface engineering. The team addressed core challenges related to surface interface preparation and system integration under RF superconducting conditions. Key technical breakthroughs include:

- Systematic research on niobium (Nb) substrate pretreatment and thin-film growth control.
- Identification of the intrinsic mechanism of non-uniform tin (Sn) nucleation.
- Development of processes for high-quality thin-film growth within complex cavity internal surfaces and the nanometer-scale removal of surface impurities.

The team has secured over ten invention patents and published findings in professional academic journals. The Chinese Nuclear Society's evaluation stated that the prototype provides a principle-based model for engineering applications and reaches international advanced or leading levels in the field of Nb3Sn superconducting accelerators.

Background and Context

Nb3Sn is a focal point of RF superconducting research because it can increase the operating temperature of superconducting cavities. By raising this temperature, the accelerator can move away from a reliance on liquid helium, thereby altering the traditional operational mode of superconducting linear accelerators.

Significance and Outlook

The liquid-helium-free design offers a technical path distinct from traditional routes, providing high beam output potential for high-power continuous beam applications. Potential industrial applications include:

- **Environmental Protection:** Using high-energy electron beam irradiation to break down hard-to-degrade molecules.
- **National Security:** Non-destructive testing of large components and irradiation testing of special materials.
- **Medical Health:** Large-scale production of medical isotopes for nuclear medicine diagnostics and targeted radiotherapy.
- **Agriculture and Biology:** Irradiation for food preservation, pest control, and cold sterilization of medical consumables to avoid the risks associated with traditional cobalt source irradiation.

Source: https://finance.sina.com.cn/roll/2026-11-10/doc-iniyfuyz2644380.shtml

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

#08 ZEBRA-Prop: Lightweight LLM-based Material Property Prediction

Published November 11, 2026　日本経済新聞（プレスリリース）　Japan



OVERVIEW

Researchers from Science Tokyo and other institutions developed ZEBRA-Prop, a machine learning method that predicts material properties from text without retraining Large Language Models (LLMs). The approach reduces training time by approximately 95% compared to conventional LLM methods, enabling property prediction on standard PCs.

IN DEPTH

Key Findings

A research team led by Ryuma Yamamoto, Associate Professor Ryo Takahashi, and Professor Fumiyasu Oba from Science Tokyo, in collaboration with Yokohama City University and Tohoku University, has developed a lightweight machine learning method called "ZEBRA-Prop." This technique allows for the prediction of material properties using natural language descriptions without the need to re-train or fine-tune the underlying Large Language Model (LLM).

Technical Details

ZEBRA-Prop differs from previous LLM-based approaches by keeping the LLM frozen and training only a small-scale neural network positioned after the LLM. This architecture provides several technical advantages:

- **Reduced Training Time:** Training time is shortened by approximately 95% compared to conventional LLM methods based on a comparison of approximately 2,200 data points.
- **Hardware Accessibility:** For datasets of approximately 2,200 materials, the model can be trained in tens of minutes on a general-purpose PC without requiring high-performance GPUs.
- **Input Flexibility:** The method divides material information into multiple short sentences and integrates them while learning weights, which mitigates the constraints on the volume of text an LLM can process at once while maintaining accuracy levels similar to conventional LLM methods.

Background & Context

In materials discovery, machine learning is typically used to predict properties based on structure and composition. While recent trends have shifted toward using LLMs to process material information as natural language, these methods usually require fine-tuning the LLM for every specific property being predicted. This requirement created a barrier for researchers lacking massive computational resources.

Significance & Outlook

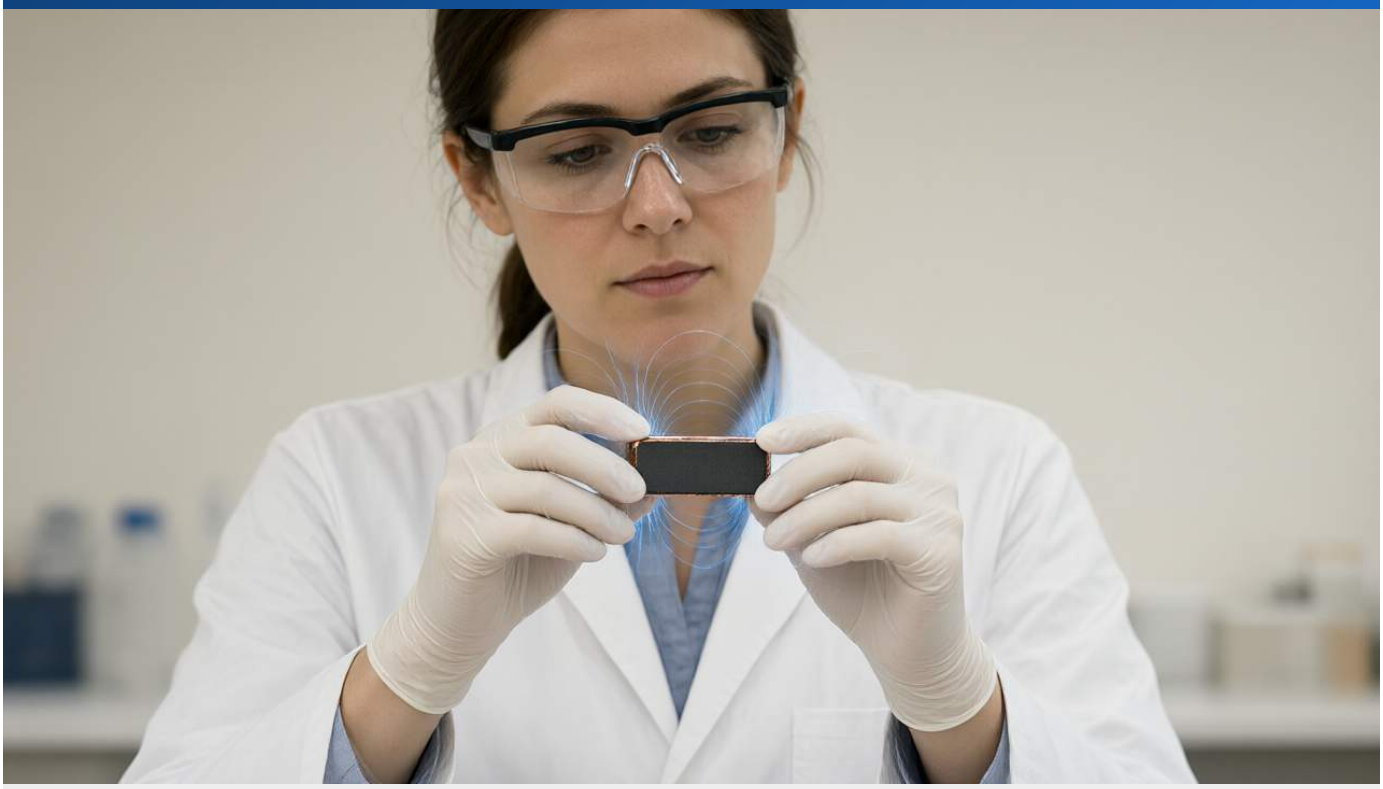
Because ZEBRA-Prop can utilize any information that can be described in natural language, the researchers expect the technology to be applied to the prediction of material properties from experimental records and synthesis conditions. The findings were published in the journal "Advanced Intelligent Systems" on November 11.

Source: https://www.nikkei.com/article/DGXZRSP715109_R11C26A1000000/

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

#09 DGIST Magnet Technology: Reducing Dysprosium Use by 80%

Published November 10, 2026 DongA Science South Korea



OVERVIEW

Researchers at DGIST have developed a materials-design technology that reduces dysprosium (Dy) consumption in permanent magnets by 80% without compromising magnetic performance. This advancement targets the reduction of manufacturing costs and supply chain instability for electric vehicle motors and wind turbines.

IN DEPTH

Key Findings

Researchers at the Daegu Gyeongbuk Institute of Science and Technology (DGIST) have successfully reduced the use of dysprosium (Dy) in permanent magnets by 80% while maintaining magnetic performance comparable to existing products. The team, led by principal researchers Jungmin Kim and Donghwan Kim of the Department of Nanotechnology, identified the causes of heavy rare earth waste and developed a method to improve material use efficiency. These results were published on October 12 in the Chemical Engineering Journal.

Technical Details

The research focuses on neodymium, iron, and boron (Nd-Fe-B) magnets. To prevent magnetization loss at high temperatures, "coercivity" must be increased, typically by adding heavy rare earths like dysprosium via "grain boundary diffusion." In conventional processes, heavy rare earths are applied to the surface and heat-treated to diffuse inward, forming shells around fine grains. However, this often results in excessive accumulation near the surface or unnecessary penetration into grain interiors.

The DGIST team developed a new diffusion material that combines dysprosium with light rare earths—praseodymium (Pr) and neodymium (Nd)—along with zinc (Zn) and copper (Cu). The zinc and copper promote diffusion, while the light rare earths prevent dysprosium from penetrating too deeply into the grain interiors. This ensures the formation of a thin, uniform shell on the grain surfaces. Experiments confirmed that this method mitigates surface accumulation and achieves excellent high-temperature magnetic properties and room-temperature coercivity.

Background & Context

Heavy rare earths are expensive and subject to unstable supply chains. By replacing the heavy use of these materials with precise distribution control, the researchers have addressed a key challenge in magnet manufacturing. The technology allows the material to be placed exactly where it is needed inside the magnet.

Significance & Outlook

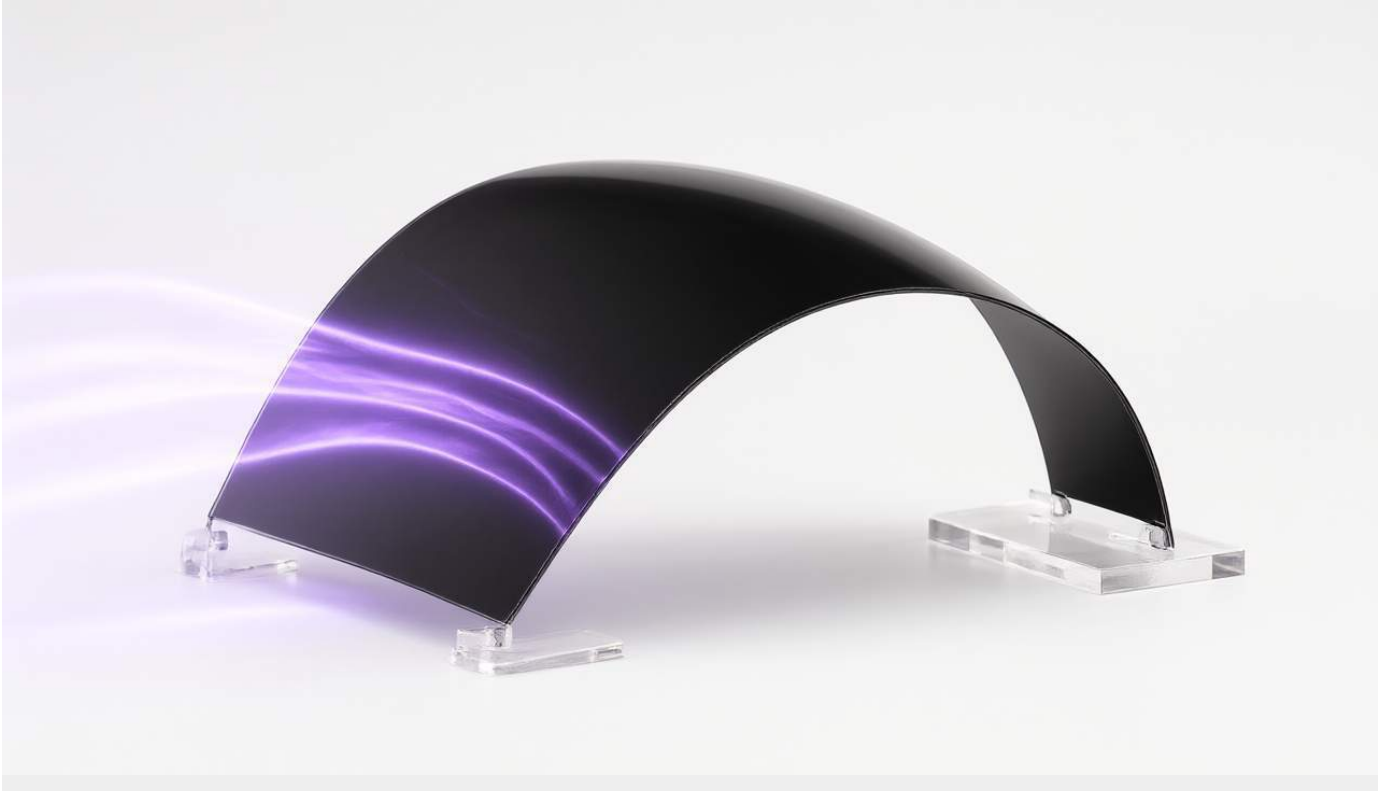
While currently verified at a laboratory scale, this approach is expected to be applicable to next-generation magnets using inexpensive light rare earths. For industrial deployment, the team must now demonstrate uniform diffusion in large-scale magnets and validate the economic viability and compatibility within existing manufacturing processes.

Source: https://www.dongascience.com/en/news/80796

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

#10 Graphene EMI Shielding Film: 400,000-Fold Bend Durability Specs

Published November 10, 2026 기계신문 South Korea



OVERVIEW

A joint research team from the Korea Institute of Industrial Technology (KITECH) and Hanyang University has developed a high-durability electromagnetic interference (EMI) shielding film that maintains performance after 400,000 folds. By utilizing commercially available materials to prevent graphene aggregation, the team established an eco-friendly water-based process compatible with existing mass-production lines.

IN DEPTH

Key Findings

The developed EMI shielding film, measuring approximately 0.1 mm in thickness, reduces electromagnetic energy to one 100,000th of its original level. In folding tests with a curvature radius of 3 mm, the film maintained 99.4% of its shielding performance and 97.9% of its electrical conductivity after 400,000 repetitions, showing no visible external damage. Additionally, the film retained over 92.5% of its initial performance under harsh conditions, including high temperature, high humidity, artificial sweat, and rapid temperature changes.

Technical Details

To overcome the inherent tendency of graphene to aggregate—which typically degrades performance—the researchers identified the core molecular structure for uniform dispersion. Instead of expensive special dispersants or chemical treatments that degrade electrical properties, the team used triethylamine, a commercially available general-purpose substance. This approach prevented precipitation for six months in solution and ensured uniform dispersion within the final film.

The film was produced using an eco-friendly water-based process combining the following materials:

- **Graphene:** Provides high electrical conductivity and lightweight properties.
- **Flexible Plastic:** Grants the film its overall flexibility.
- **Plant-derived Cellulose Nanofibers:** Reinforces the bonding between graphene layers.
- **Carbon Nanotubes:** Maximizes electrical conductivity.

These materials form a brick-like structure that prevents cracks during repeated bending.

Background & Context

Graphene is considered a next-generation material for displays, future mobility, aerospace, and medical devices due to its conductivity and lightness. However, mass production has been hindered by the high cost and complex synthesis of the special dispersants previously required to prevent graphene clumping.

Significance & Outlook

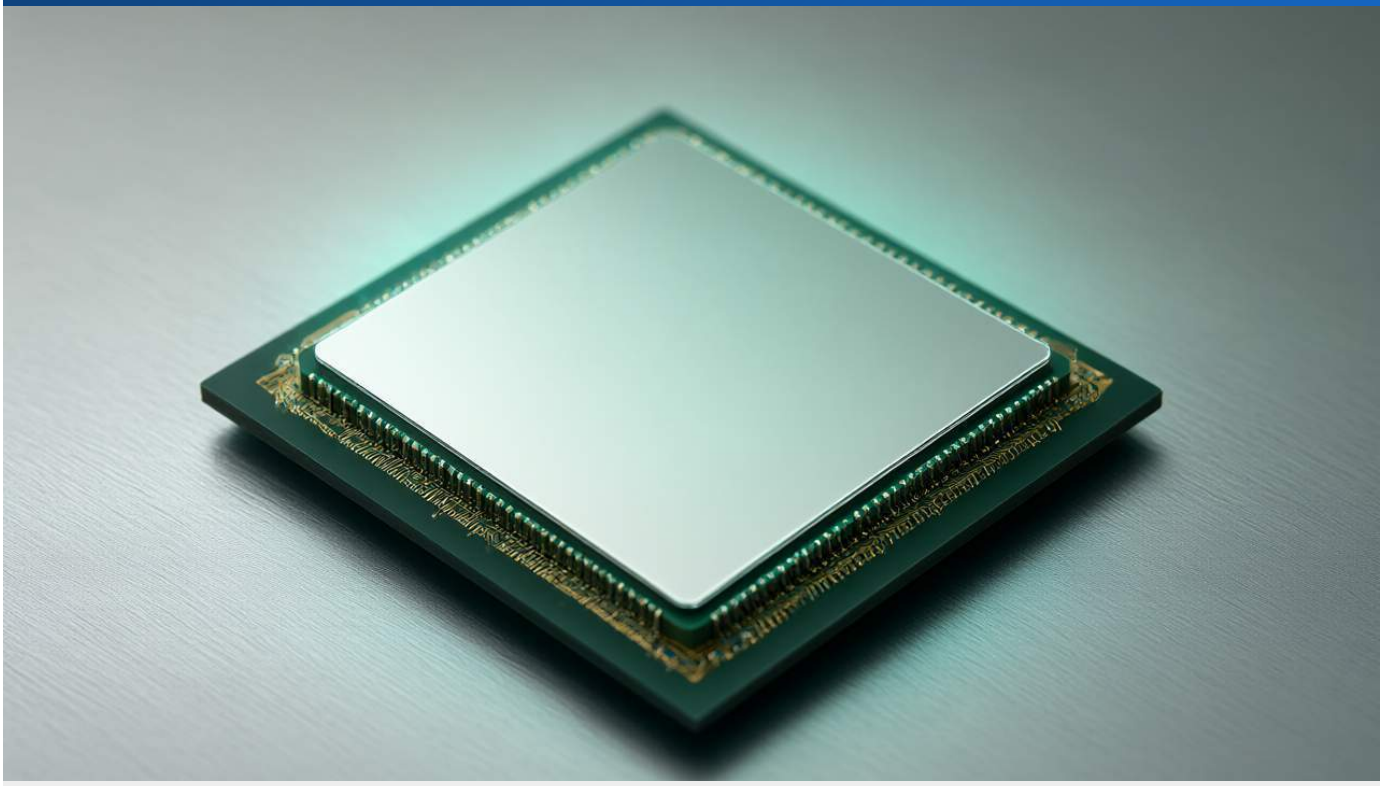
The research, supported by the National Research Council of Science and Technology and published in *Advanced Composites and Hybrid Materials*, lowers the barrier to mass production. Because the process is compatible with existing roll-to-roll coating lines, it can be applied to large-area production without modifying current facilities. This provides a lightweight, flexible solution for heat and EMI interference issues in highly integrated next-generation electronic devices and automotive components.

Source: https://www.mtnews.net/news/articleView.html?idxno=26492

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

#11 STT-MRAM AI SoC: Tohoku University and Aisin's 16nm Specs

Published November 07, 2026 MONOist Japan



OVERVIEW

Tohoku University and Aisin have developed the world's first 16nm AI SoC integrating STT-MRAM to enable Near-Memory Computing (NMC). This architecture reduces energy consumption by 50 times and accelerates OS boot times by approximately 39 times compared to conventional systems.

IN DEPTH

Key Findings

Tohoku University and Aisin announced on November 2, 2026, the development of an AI chip featuring Spin-Transfer Torque Magnetic RAM (STT-MRAM). By utilizing a Near-Memory Computing (NMC) architecture, the chip eliminates the need for external DRAM or SSDs. This design has resulted in a 50-fold reduction in energy consumption for AI processing and a 10-fold reduction in processing time for tasks such as object detection. Additionally, the time from power-on to OS boot is approximately 39 times faster than previous versions.

Technical Details

The SoC is manufactured using TSMC's 16nm FinFET process. It integrates the following components on a single chip:

- 32MB of on-chip STT-MRAM positioned close to the processor and AI accelerator to minimize data transfer.
- Two cores of the Arm Cortex-A53 CPU.
- Arm Mali-G31 GPU.
- Dedicated AI accelerators.

Background & Context

This development coincides with broader industry movements toward Software Defined Vehicles (SDV). On November 2, 2026, Infineon Technologies and Qualcomm entered a technical agreement to accelerate the deployment of SDV central vehicle computers. Infineon will provide MCU-based "subsystems" for Qualcomm's Snapdragon Ride platform, combining Infineon's expertise in safety management, connectivity, and memory management with Qualcomm's high-performance SoC capabilities.

Significance & Outlook

The shift toward software-centric hardware is further evidenced by the establishment of the SDx Platform Committee (SDxPFC) by the Japan Embedded Systems Technology Association (JASA) on November 5, 2026. This committee includes 10 members: automakers Nissan, Honda, and Mazda; Tier 1 suppliers Denso, Aisin, Astemo, and Panasonic Automotive Systems; and software vendors eSOL, Vitz, and T LEAD SCIENCES. Led by eSOL's Masaki Gondo, the committee focuses on establishing common architectures and integrating Model-Based Development (MBD) for SDx (Software Defined Everything). Detailed activity plans are scheduled for presentation at the SDx Conference on November 19, 2026, during the Edge Tech+ 2026 event.

Source: https://monoist.itmedia.co.jp/mn/articles/2611/07/news007.html

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