TROY TECHNICAL

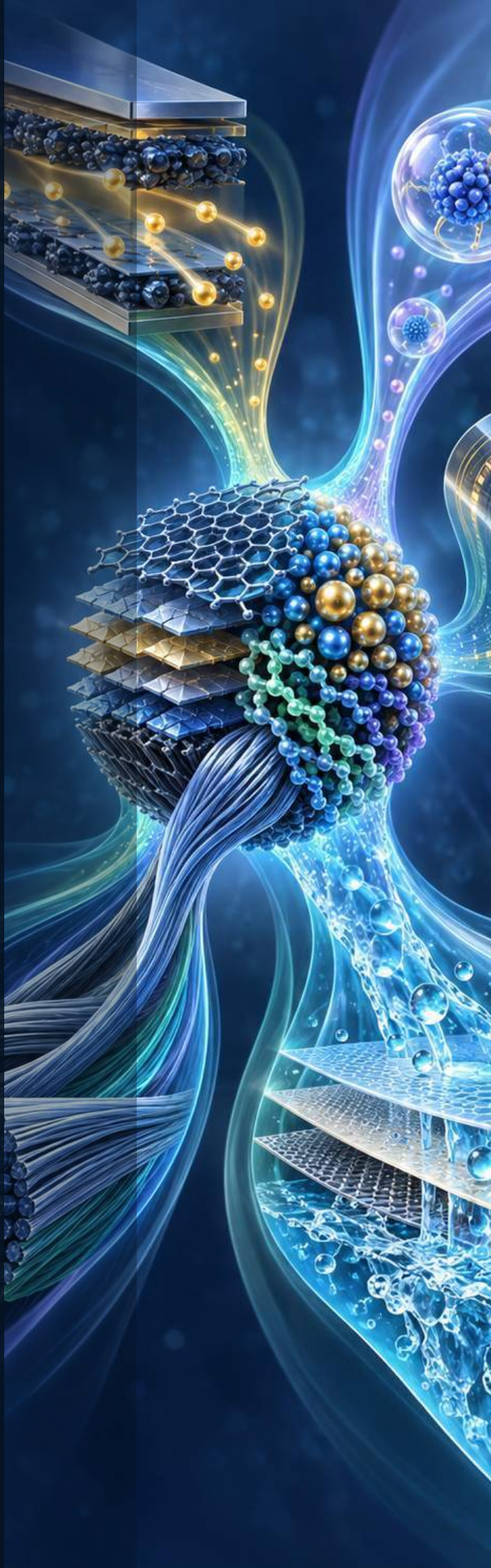
NANOTECHNOLOGY
WEEKLY REPORT

October 31 - November 6, 2026 | Issue 2026-W44

Translation from nanoscale property to reproducible, safe and scalable products

11	10
ANALYZED ARTICLES	PRIORITY THEMES

Issued 2026-11-06 | English edition | fixed approved cover artwork



Nanotechnology: 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 | NANO DESIGN

BNNT Ceramic Fiber: KIST's 99% Neutron-Shielding Specs

Researchers at the Korea Institute of Science and Technology (KIST) have developed a flexible ceramic thread based on boron nitride nanotubes (BNNTs) that blocks approximately 99 percent of thermal neutrons.

SIGNAL 02 | SYNTHESIS

Aqueous Zinc-Iodine Batteries: Hydroxyl-CNT Cathode for 10,000+ Cycles

Researchers have developed a hydroxyl-modified carbon nanotube (CNT) cathode that suppresses the "shuttle effect" in aqueous zinc-iodine batteries.

SIGNAL 03 | INTEGRATION

2D Metal Oxides: Single-Atomic-Layer Fabrication via MOX

Researchers have achieved the controlled fabrication of free-standing two-dimensional metal oxides (MO) at the single-atomic-layer limit, including CrO, ErO, and BiO.

SIGNAL 04 | APPLICATION

IBS Hydrogen Catalyst: Platinum Use Cut by 63% via Reticular Coordination

Researchers from the Institute for Basic Science (IBS) and partner universities have developed a high-density platinum catalyst that reduces platinum consumption by 63% compared to commercial alternatives.

DECISION

Focus this week's management attention on translation from nanoscale property to reproducible, safe and scalable products. Move only when the linked evidence can be reproduced under your own operating conditions.

THREE MANAGEMENT MOVES

1. Buyers: prioritize applications with measurable system advantage and a credible qualification path.
2. Suppliers: prove dispersion, interface control, batch consistency, EHS and production economics.
3. Executives: track scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

89.34%
A03

SOURCE-BOUND CONDITION
The modified cathode enabled a battery to retain 89.34% of its capacity after 10,000 cycles at 1 A/g, significantly extending the lifespan of water-based energy storage.

63%
A09

SOURCE-BOUND CONDITION
Researchers from the Institute for Basic Science (IBS) and partner universities have developed a high-density platinum catalyst that reduces platinum consumption by 63% compared to commercial alternatives.

99%
A04

SOURCE-BOUND CONDITION
The method achieved a single-crystal yield exceeding 99% across a 2-centimetre substrate, enabling the production of high-performance transistors with consistent electron mobility.

0x
A01

SOURCE-BOUND CONDITION
Researchers have demonstrated ptychographic atomic electron tomography (pAET) to achieve 3D localization of 6,648 carbon atoms with a precision of 0.12<0xE2><0x80><0x89>Å.

100 times
A06

SOURCE-BOUND CONDITION
This approach requires roughly 100 times fewer molecules than single gold nanoparticle structures to achieve similar signal levels, offering a path toward ultra-sensitive optical sensors.

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

Nano design

P01/P06

Researchers at the Korea Institute of Science and Technolog y (KIST) have developed a flexible ceramic thread based on boron.

2

Synthesis

P02/P07

Researchers have developed a hydroxyl-modified carbon nanotube (CNT) cathode that suppresses the " shuttle effect" in aqueous.

3

Integration

P03/P08

Researchers have achieved the controlled fabrication of free-standing two-dimensional metal oxides (MO) at the.

4

Application

P04/P09

Researchers from the Institute for Basic Science (IBS) and partner universities have developed a high-density platinum.

5

Scale & safety

P05/P10

Researchers at Hanyang University have developed etching-flux-mediated single-centred nucleation (EF-SCN) to precisely.

EVIDENCE REQUIRED AT EACH HANDOFF

Nano design to Synthesis	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale-up, metrology, toxicity, yield, interface stability and application-level value.
Synthesis to Integration	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale-up, metrology, toxicity, yield, interface stability and application-level value.
Integration to Application	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale-up, metrology, toxicity, yield, interface stability and application-level value.
Application to Scale & safety	Transfer test conditions, acceptance criteria, failure data, owner and decision date. Recheck scale-up, metrology, toxicity, yield, interface stability and application-level value.

COMMON CONTROL POINT

No theme moves to a commercial commitment until a named owner has reproduced the relevant evidence and documented scale-up, metrology, toxicity, yield, interface stability and application-level value.

Priority map: maturity and next decision locus



P01	BNNT Ceramic Fiber: KIST's 99% Neutron-Shielding Specs Tech / process | cue: no system/business cue
P02	Aqueous Zinc-Iodine Batteries: Hydroxyl-CNT Cathode for 10,000+ Cycles Business / rules | cue: capacity
P03	2D Metal Oxides: Single-Atomic-Layer Fabrication via MOX Tech / process | cue: no system/business cue
P04	IBS Hydrogen Catalyst: Platinum Use Cut by 63% via Reticular Coordination System / adoption | cue: partner
P05	EF-SCN Method: Hanyang University's 2D Semiconductor Nucleation Control Tech / process | cue: no system/business cue
P06	Graphene Quantum Tunneling: Attosecond Imaging of Electron Motion Tech / process | cue: no system/business cue
P07	pAET: 3D Imaging of 6,648 Individual Carbon Atoms in Graphene Tech / process | cue: no system/business cue
P08	DNA Origami Optical Circuits: Korea University's 70-Molecule Sensor Tech / process | cue: no system/business cue
P09	Aramid Nano-fiber Films: Heat Dissipation and EMI Shielding Specs Tech / process | cue: no system/business cue
P10	Graphene-Amorphous Carbon Membranes: 2nm Carbon Sieve Specs Tech / process | cue: no system/business cue

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 BNNT Ceramic Fiber: KIST's 99% Neutron-Shielding Specs

A11 | Nano design | Pilot

2026-11-03

FACT

Researchers at the Korea Institute of Science and Technology (KIST) have developed a flexible ceramic thread based on boron nitride nanotubes (BNNTs) that blocks approximately 99 percent of thermal neutrons. The material combines high tensile strength and heat resistance with the flexibility of ordinary fabric, enabling radiation protection for high-movement areas of spacesuits.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P01.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

P02 Aqueous Zinc-Iodine Batteries: Hydroxyl-CNT Cathode for 10,000+ Cycles

A03 | Synthesis | Product adoption

2026-11-05

FACT

Researchers have developed a hydroxyl-modified carbon nanotube (CNT) cathode that suppresses the "shuttle effect" in aqueous zinc-iodine batteries. The modified cathode enabled a battery to retain 89.34% of its capacity after 10,000 cycles at 1 A/g, significantly extending the lifespan of water-based energy storage.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P02.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

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

P03 2D Metal Oxides: Single-Atomic-Layer Fabrication via MOX

A10 | Integration | Pilot

2026-10-29

FACT

Researchers have achieved the controlled fabrication of free-standing two-dimensional metal oxides (MO) at the single-atomic-layer limit, including CrO, ErO, and BiO. This process utilizes electron-beam-induced dehalogenation of layered metal oxyhalides (MOX) to create stable, single-crystalline domains. The breakthrough enables the creation of moiré superlattices and heterostructures with pronounced excitonic responses.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P03.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

P04 IBS Hydrogen Catalyst: Platinum Use Cut by 63% via Reticular Coordination

A09 | Application | Product adoption

2026-11-02

FACT

Researchers from the Institute for Basic Science (IBS) and partner universities have developed a high-density platinum catalyst that reduces platinum consumption by 63% compared to commercial alternatives. By achieving a platinum content of 14.9% while maintaining atomic-level dispersion, the team significantly improved the durability and stability of hydrogen production devices.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P04.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

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

P05 EF-SCN Method: Hanyang University's 2D Semiconductor Nucleation Control

A04 | Scale & safety | Product adoption

2026-11-06

FACT

Researchers at Hanyang University have developed etching-flux-mediated single-centred nucleation (EF-SCN) to precisely control crystal formation in 2D semiconductors. The method achieved a single-crystal yield exceeding 99% across a 2-centimetre substrate, enabling the production of high-performance transistors with consistent electron mobility.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P05.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

EDITORIAL SCORE 19/25 | MATURITY 4/5 | DECISION LOCUS: TECH / PROCESS

P06 Graphene Quantum Tunneling: Attosecond Imaging of Electron Motion

A05 | Nano design | Pilot

2026-11-01

FACT

Researchers have directly imaged light-driven quantum tunneling of electrons in graphene using a new technique with attosecond precision. The method tracks electron motion across the first Brillouin zone, identifying optical phonon scattering as the primary limit for coherent control in lightwave electronics.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P06.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

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

P07 pAET: 3D Imaging of 6,648 Individual Carbon Atoms in Graphene

A01 | Synthesis | Pilot

2026-11-03

FACT

Researchers have demonstrated ptychographic atomic electron tomography (pAET) to achieve 3D localization of 6,648 carbon atoms with a precision of 0.12<0xE2><0x80><0x89>Å. Using twisted bilayer graphene as a model, the method reveals stacking-dependent interlayer spacing and chiral lattice distortions. This establishes a route to link the 3D atomic structure of light-element materials with their physical properties.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P07.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

P08 DNA Origami Optical Circuits: Korea University's 70-Molecule Sensor

A06 | Integration | Pilot

2026-10-30

FACT

Researchers at Korea University have developed an optical nanocircuit using DNA origami to precisely position gold nanoparticles, enabling the detection of optical signals from approximately 70 dye molecules. This approach requires roughly 100 times fewer molecules than single gold nanoparticle structures to achieve similar signal levels, offering a path toward ultra-sensitive optical sensors.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P08.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

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

P09 Aramid Nano-fiber Films: Heat Dissipation and EMI Shielding Specs

A07 | Application | Pilot

2026-11-03

FACT

Researchers at Korea National University of Transportation have developed an ultra-thin composite film using decomposed and recombined Kevlar fibers. The material achieves over 99.999% electromagnetic interference (EMI) shielding and maintains 95% performance after 10,000 bending cycles.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P09.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

P10 Graphene-Amorphous Carbon Membranes: 2nm Carbon Sieve Specs

A08 | Scale & safety | Pilot

2026-10-31

FACT

Researchers at Tianjin University have developed a molecular-level ultra-thin carbon membrane with a thickness as low as 2nm for carbon capture. The membrane achieves high mechanical strength and precise sub-nanometer pores, enabling superior CO2 separation from flue gas, synthesis gas, and natural gas.

WHY IT MATTERS

The decision relevance is translation from nanoscale property to reproducible, safe and scalable products. 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, prove dispersion, interface control, batch consistency, EHS and production economics.

ACTION

Within 30 days, prioritize applications with measurable system advantage and a credible qualification path; record the evidence and owner against P10.

UNKNOWN

Still unproven or incompletely stated: scale-up, metrology, toxicity, yield, interface stability and application-level value.

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

Playbook and 0-5 year roadmap

STAKEHOLDER	NOW | 0-30 DAYS	NEXT | 1-12 MONTHS	LATER | 1-5 YEARS
Operating companies	prioritize applications with measurable system advantage and a credible qualification path	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	prove dispersion, interface control, batch consistency, EHS and production economics	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 scale-up, metrology, toxicity, yield, interface stability and application-level value.	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	pAET: 3D Imaging of 6,648 Individual Carbon Atoms in Graphene	https://doi.org/10.1038/s41565-026-02316-9
A02	HX1 LNPs: Rational Design for Brain Delivery of RNA Therapeutics	https://doi.org/10.1038/s41565-026-02326-7
A03	Aqueous Zinc-Iodine Batteries: Hydroxyl-CNT Cathode for 10,000+ Cycles	https://xenospectrum.com/en/functionalized-cnt-aqueous-zinc-iodine-battery/
A04	EF-SCN Method: Hanyang University's 2D Semiconductor Nucleation Control	https://www.miragenews.com/hanyang-researchers-control-where-semiconductor-1773269/
A05	Graphene Quantum Tunneling: Attosecond Imaging of Electron Motion	https://www.graphene-info.com/new-technique-films-light-driven-quantum-tunneling-electrons-graphene
A06	DNA Origami Optical Circuits: Korea University's 70-Molecule Sensor	https://www.industrynews.co.kr/news/articleView.html?idxno=88618
A07	Aramid Nano-fiber Films: Heat Dissipation and EMI Shielding Specs	https://www.gukjenews.com/news/articleView.html?idxno=3740665
A08	Graphene-Amorphous Carbon Membranes: 2nm Carbon Sieve Specs	https://www.sohu.com/a/1095400840_355396
A09	IBS Hydrogen Catalyst: Platinum Use Cut by 63% via Reticular Coordination	https://biz.heraldcorp.com/article/10922985
A10	2D Metal Oxides: Single-Atomic-Layer Fabrication via MOX	https://doi.org/10.1038/s41563-026-02793-2
A11	BNNT Ceramic Fiber: KIST's 99% Neutron-Shielding Specs	https://biz.heraldcorp.com/article/10923919

Nanotechnology — Selected Articles

Date: 2026-11-08

Articles: 11

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#02 HX1 LNPs: Rational Design for Brain Delivery of RNA Therapeutics

#03 Aqueous Zinc-Iodine Batteries: Hydroxyl-CNT Cathode for 10,000+ Cycles

#04 EF-SCN Method: Hanyang University's 2D Semiconductor Nucleation Control

#05 Graphene Quantum Tunneling: Attosecond Imaging of Electron Motion

#06 DNA Origami Optical Circuits: Korea University's 70-Molecule Sensor

#07 Aramid Nano-fiber Films: Heat Dissipation and EMI Shielding Specs

#08 Graphene-Amorphous Carbon Membranes: 2nm Carbon Sieve Specs

#09 IBS Hydrogen Catalyst: Platinum Use Cut by 63% via Reticular Coordination

#10 2D Metal Oxides: Single-Atomic-Layer Fabrication via MOX

#11 BNNT Ceramic Fiber: KIST's 99% Neutron-Shielding Specs

#01 pAET: 3D Imaging of 6,648 Individual Carbon Atoms in Graphene

Published November 03, 2026 Nature Nanotechnology



OVERVIEW

Researchers have demonstrated ptychographic atomic electron tomography (pAET) to achieve 3D localization of 6,648 carbon atoms with a precision of 0.12<0xE2><0x80><0x89>Å. Using twisted bilayer graphene as a model, the method reveals stacking-dependent interlayer spacing and chiral lattice distortions. This establishes a route to link the 3D atomic structure of light-element materials with their physical properties.

IN DEPTH

Key Findings

The study demonstrates the use of ptychographic atomic electron tomography (pAET) to achieve the 3D localization of 6,648 individual carbon atoms. The researchers achieved a localization precision of 0.12<0xE2><0x80><0x89>Å using twisted bilayer graphene as a model moiré system. The resulting 3D structure reveals corrugation across the moiré supercell and stacking-dependent interlayer spacing.

Technical Details

The research identifies chiral lattice distortions characterized by anti-skyrmion-like, meron-like, and anti-meron-like textures. To validate the experimental results, the team employed density functional theory (DFT) calculations based on the derived structure. These calculations predict a gap at the K point and electronic band narrowing when compared to a relaxed model. Additionally, multislice pAET simulations indicate that this imaging method can be extended to amorphous carbon and diamond containing a nitrogen–vacancy centre.

Background & Context

Ptychography is a computational microscopy method that combines iterative phase retrieval with coherent diffraction to unify microscopy and crystallography. While multislice electron ptychography can achieve deep-sub-ångström lateral resolution, its depth resolution has typically been limited to the nanometre scale. pAET was developed to enable 3D atomic structure determination in nanomaterials, addressing the specific challenge of reliably resolving individual light atoms.

Significance & Outlook

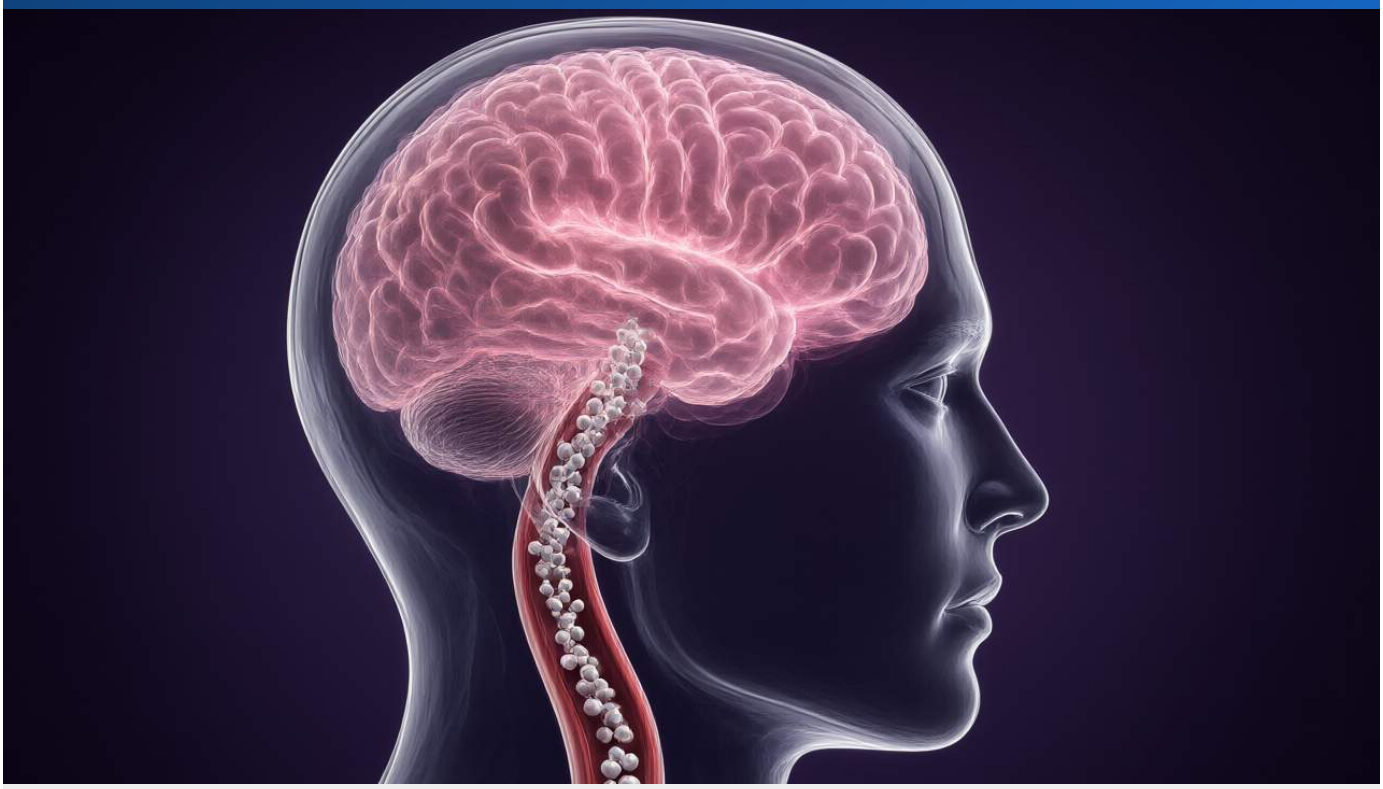
By establishing pAET for the 3D imaging of individual carbon atoms, this work provides a methodology to connect the 3D atomic arrangement of light-element materials directly to their properties. The ability to resolve light atoms in three dimensions opens new possibilities for analyzing the structural nuances of carbon-based nanomaterials and other light-element systems.

Source: https://doi.org/10.1038/s41565-026-02316-9

Collected: November 07, 2026 | Automated Research System (AI)

#02 HX1 LNPs: Rational Design for Brain Delivery of RNA Therapeutics

Published November 03, 2026 Nature Nanotechnology



OVERVIEW

Researchers have developed HX1 lipid nanoparticles (LNPs) using a hydroxyzine-based scaffold to overcome central nervous system (CNS) barriers. The platform enables efficient mRNA delivery and gene editing in mouse and non-human primate brains, demonstrating potential for treating radiation-induced brain injury.

IN DEPTH

Key Findings

The development of HX1 lipid nanoparticles (LNPs) provides a translational platform for delivering therapeutic mRNAs and genome-editing components to the brain. In mouse models, HX1 LNPs achieved robust mRNA delivery and enabled efficient gene editing through the co-delivery of CRISPR mRNA and guide RNA. Furthermore, the platform successfully delivered luciferase mRNA to the brains of non-human primates.

Technical Details

To identify molecular scaffolds capable of crossing CNS barriers, researchers analyzed the pharmaceutical profiles of over 100 CNS-active drugs. This analysis identified hydroxyzine (HX) as a promising scaffold for the design of ionizable lipids with enhanced brain-targeting properties. The resulting HX1 LNPs utilize multiple trafficking pathways to navigate across CNS barriers. In a therapeutic application, HX1 LNPs carrying Il10 mRNA were shown to mitigate radiation-induced brain injury in mice, proving effective even in the presence of intact CNS barriers.

Background & Context

Effective delivery of RNA therapeutics to the brain is historically challenging due to the multiple biological barriers inherent to the central nervous system. While various nanoparticulate RNA delivery systems and lipid nanoparticles have been explored for mRNA stability and regeneration therapy, achieving precise brain targeting remains a critical hurdle in the field of nucleic acid therapeutics.

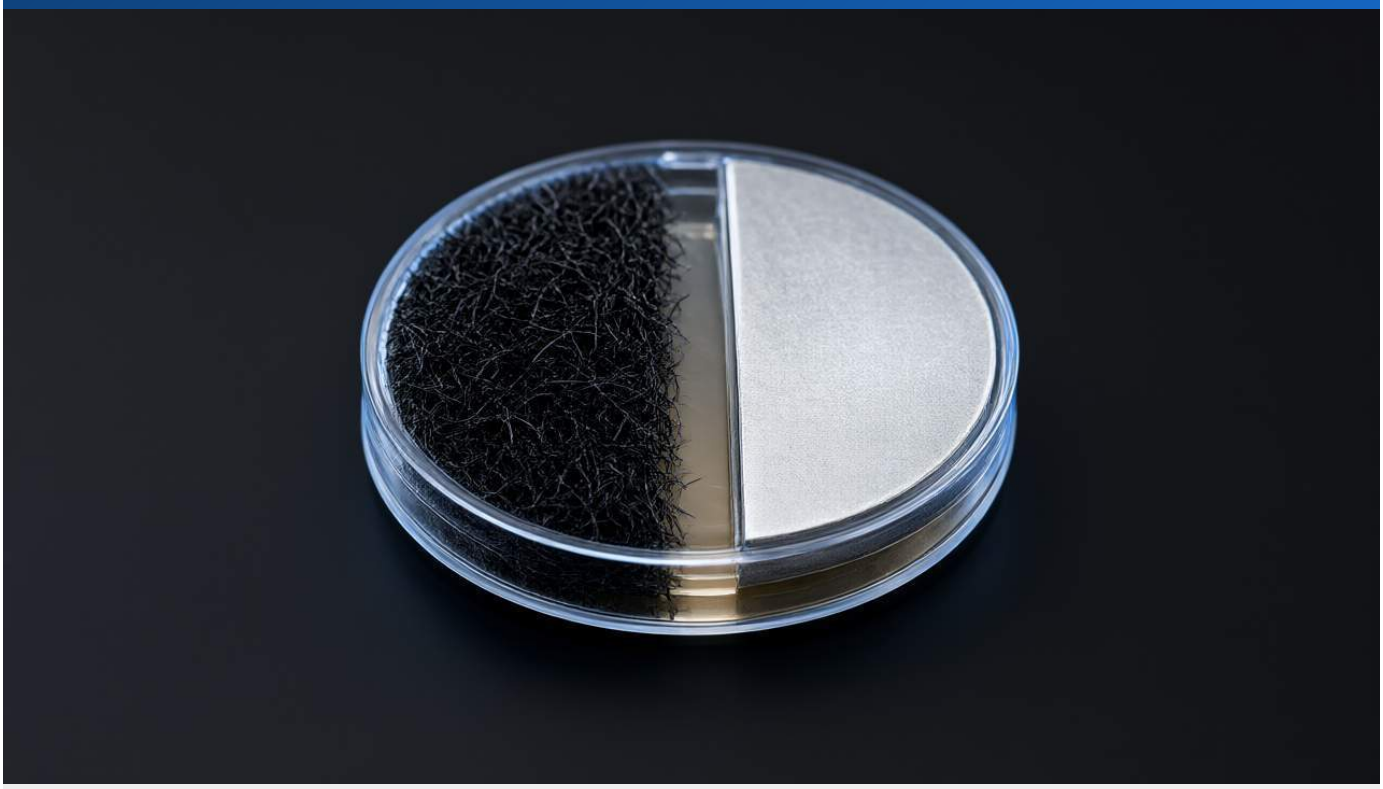
Significance & Outlook

The ability of HX1 LNPs to deliver genetic material across intact CNS barriers suggests a significant advancement for preventive and therapeutic treatments. By leveraging a scaffold derived from a known CNS-active drug, this rational design approach establishes a viable pathway for the delivery of complex payloads, including CRISPR components, to the brain in both rodent and primate models.

Source: https://doi.org/10.1038/s41565-026-02326-7

#03 Aqueous Zinc-Iodine Batteries: Hydroxyl-CNT Cathode for 10,000+ Cycles

Published November 05, 2026 XenoSpectrum



OVERVIEW

Researchers have developed a hydroxyl-modified carbon nanotube (CNT) cathode that suppresses the "shuttle effect" in aqueous zinc-iodine batteries. The modified cathode enabled a battery to retain 89.34% of its capacity after 10,000 cycles at 1 A/g, significantly extending the lifespan of water-based energy storage.

IN DEPTH

Key Findings

A study published in *Science China Chemistry* (DOI: 10.1007/s11426-026-3487-0) demonstrates that modifying carbon nanotubes with hydroxyl groups (–OH) drastically improves the cycle life of aqueous zinc-iodine batteries. In small-cell testing at 1 A/g, the battery delivered an initial reversible capacity of 175.5 mAh/g and retained 89.34% of that capacity after more than 10,000 cycles, a test period exceeding 3,500 hours. Furthermore, at a higher current density of 10 A/g, the cell showed an initial capacity of 120 mAh/g and reached 93,400 cycles.

Technical Details

The research team used density functional theory (DFT) to determine which functional groups best capture polyiodide ions. They compared pristine CNTs against those functionalized with carboxyl (–COOH), amino (–NH2), and hydroxyl (–OH) groups. The DFT calculations identified the hydroxyl group as having the strongest adsorption affinity, with a calculated adsorption energy of −7.42 eV and an interaction energy of −5.69 eV for triiodide ions (I3−).

Based on these results, the team fabricated a hydroxyl-functionalized free-standing carbon nanotube sheet electrode (SSCC-OH). This cathode features a specific surface area of approximately 1,005 m2/g. The combination of this high surface area and the three-dimensional nanotube structure provides both chemical adsorption and physical confinement of the iodine species.

Background & Context

Aqueous zinc batteries are viewed as safer alternatives to lithium-ion batteries because they utilize non-flammable water-based electrolytes. However, zinc-iodine variants suffer from the "shuttle effect," where polyiodide ions dissolve into the electrolyte and migrate to the zinc anode. This causes self-discharge, anode corrosion, and loss of active material. While previous attempts to mitigate this involved using microporous carbon or adding heteroatoms, a systematic design principle for selecting the most effective surface functional groups had not been established.

Significance & Outlook

By focusing on the surface chemistry of the cathode rather than modifying the anode, this approach provides a pathway to stable, long-term operation for large-scale storage and home battery systems. The ability to maintain high capacity over tens of thousands of cycles addresses a primary barrier to the practical application of aqueous zinc-iodine technology.

Source: https://xenospectrum.com/en/functionalized-cnt-aqueous-zinc-iodine-battery/

Collected: November 07, 2026 | Automated Research System (AI)

#04 EF-SCN Method: Hanyang University's 2D Semiconductor Nucleation Control

Published November 06, 2026 Mirage News South Korea



OVERVIEW

Researchers at Hanyang University have developed etching-flux-mediated single-centred nucleation (EF-SCN) to precisely control crystal formation in 2D semiconductors. The method achieved a single-crystal yield exceeding 99% across a 2-centimetre substrate, enabling the production of high-performance transistors with consistent electron mobility.

IN DEPTH

Key Findings

Professor Woo-Hee Kim and colleagues have introduced a method called etching-flux-mediated single-centred nucleation (EF-SCN) that allows for the precise placement and growth of two-dimensional (2D) semiconductor crystals. Using this technique, the team produced molybdenum disulfide (MoS2) crystals approximately 8 micrometers across and single-crystal films that filled 10-micrometre growth regions. On a 2-centimetre substrate, the process demonstrated a single-crystal yield of over 99%.

Technical Details

The EF-SCN process utilizes metal-organic chemical vapor deposition on patterned substrates. The researchers surrounded growth regions with an oxide barrier—specifically hafnium oxide (HfO2)—which releases oxygen when heated to 750°C. This oxygen etches material near the pattern boundaries, suppressing nucleation at the edges and forcing a single crystal to form at the center, which then expands outwards.

- **Temperature Optimization:** By replacing HfO2 with zirconium dioxide, the team reduced the required crystallization temperature, enabling the growth of triangular single-crystal MoS2 domains at temperatures as low as 430°C.
- **Growth Control:** The flow rate of diethyl sulfide regulates the number of nuclei, while the molybdenum precursor flow rate determines the extent of crystal growth.
- **Device Performance:** Field-effect transistors fabricated via EF-SCN achieved a field-effect mobility of up to 117 cm2 V-1s-1. Four transistors integrated within a single crystal showed only 7.8% variation in electron mobility.

Background & Context

In semiconductor manufacturing, nucleation determines where and how crystals grow. Conventional area-selective growth methods often fail to reliably control nucleation within designated regions, hindering the production of large single crystals and precisely aligned structures necessary for next-generation electronic devices.

Significance & Outlook

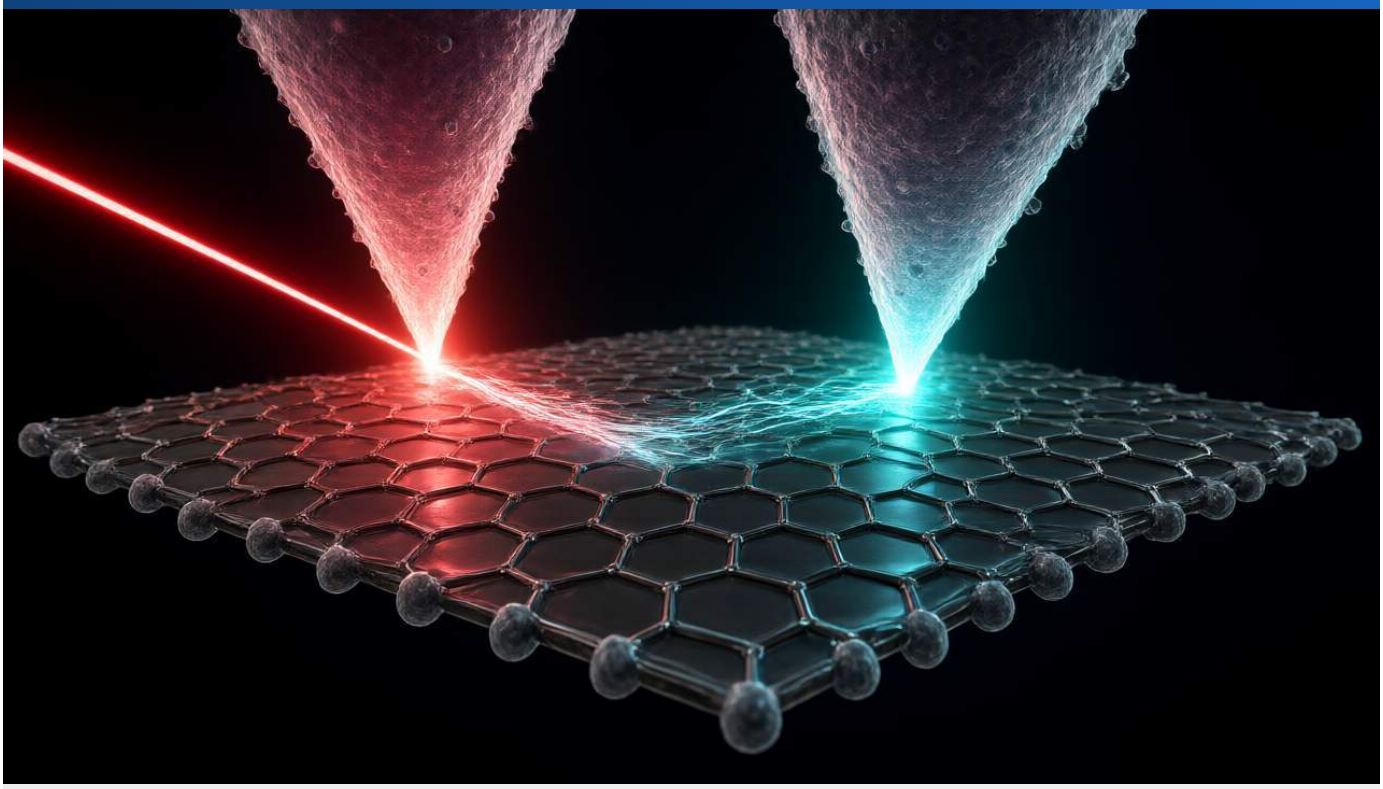
The EF-SCN method provides a general framework for programming nucleation position and crystal geometry. By enabling highly reproducible single-crystal growth and the creation of line-shaped channels for transistor integration, this approach facilitates the construction of denser electronic circuits with more consistent performance.

Source: https://www.miragenews.com/hanyang-researchers-control-where-semiconductor-1773269/

Collected: November 07, 2026 | Automated Research System (AI)

#05 Graphene Quantum Tunneling: Attosecond Imaging of Electron Motion

Published November 01, 2026 Graphene-Info Germany



OVERVIEW

Researchers have directly imaged light-driven quantum tunneling of electrons in graphene using a new technique with attosecond precision. The method tracks electron motion across the first Brillouin zone, identifying optical phonon scattering as the primary limit for coherent control in lightwave electronics.

IN DEPTH

Key Findings

A research team from the University of Regensburg, Philipps University of Marburg, Forschungszentrum Jülich, the Jülich Aachen Research Alliance (JARA), and RWTH Aachen University has achieved the first direct imaging of electrons crossing the energy gap in graphene. The team observed Landau-Zener-Majorana tunneling, where electrons jump from the valence band to the conduction band while moving through an avoided crossing in the band structure. The researchers reported tunneling probabilities reaching up to 100%.

Technical Details

The imaging technique utilizes a combination of a phase-stable, few-cycle mid-infrared pulse to drive electrons and an extreme ultraviolet probe pulse. A photoemission momentum microscope was employed to record the energy and momentum of every emitted electron. This approach provides several technical advantages over previous subcycle photoemission experiments:

- Increased accessible momentum area by more than two orders of magnitude.
- Increased usable field strengths by one order of magnitude.
- Ability to track motion across the entire first Brillouin zone.

The experiments were conducted using epitaxial monolayer graphene grown on silicon carbide at Jülich, utilizing a rotated (0°) orientation. The electric field accelerated electrons along graphene's Dirac cone, stretching the electron distribution into an ellipse along the field direction.

Background & Context

The study specifically quantifies the factors limiting coherent control in these materials. The mean scattering time for electrons was measured at approximately 9 fs. Simulations conducted by the team indicate that scattering with optical phonons is the fastest channel for redistributing momentum, occurring more rapidly than electron-electron scattering.

Significance & Outlook

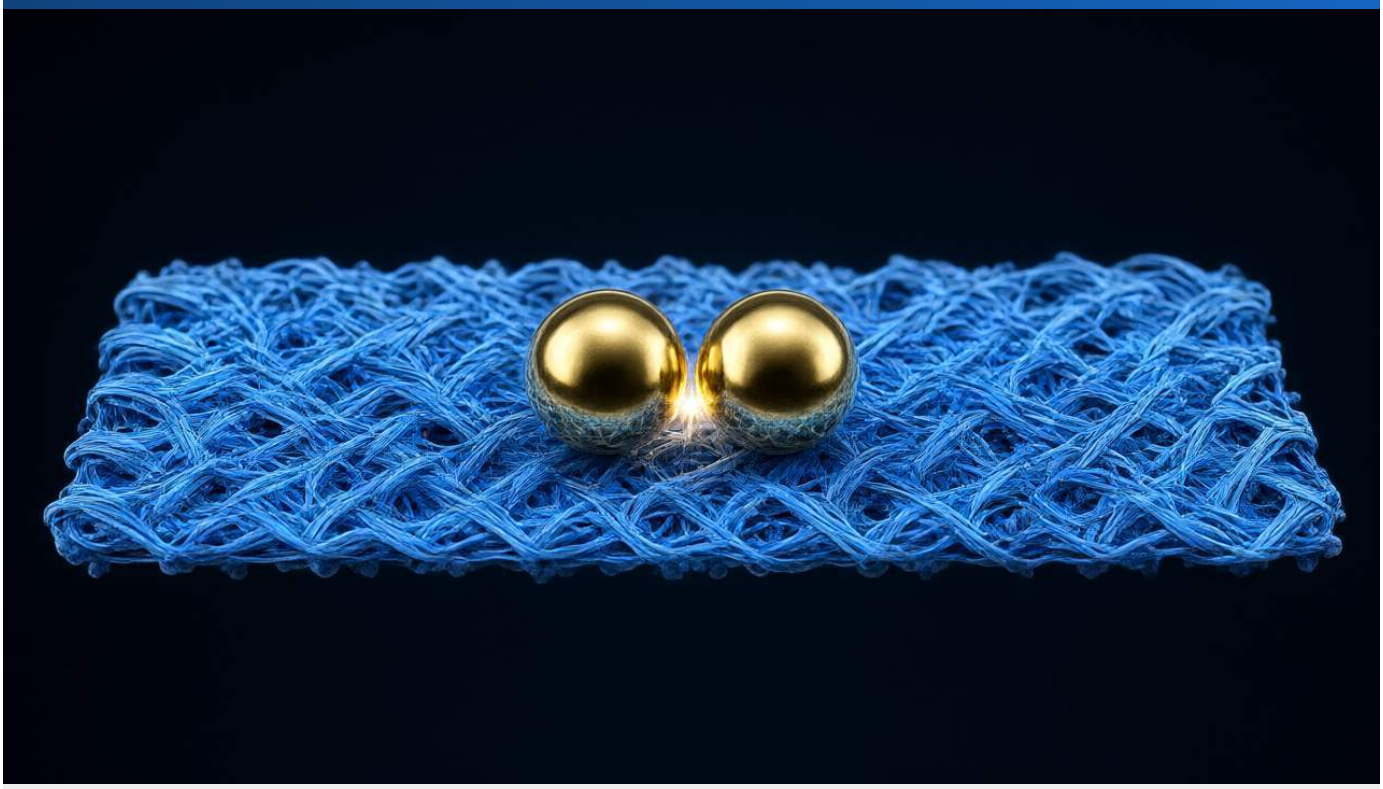
These results establish the time and length scales necessary for the development of lightwave electronics, where oscillating light fields control electrons directly instead of using voltages. According to Giacomo Inzani of the University of Regensburg, the ability to follow electron movement through a material's energy landscape in real time is a significant advancement that can be applied to other quantum materials.

Source: https://www.graphene-info.com/new-technique-films-light-driven-quantum-tunneling-electrons-graphene

Collected: November 07, 2026 | Automated Research System (AI)

#06 DNA Origami Optical Circuits: Korea University's 70-Molecule Sensor

Published October 30, 2026 인더스트리뉴스 (Industry News) South Korea



OVERVIEW

Researchers at Korea University have developed an optical nanocircuit using DNA origami to precisely position gold nanoparticles, enabling the detection of optical signals from approximately 70 dye molecules. This approach requires roughly 100 times fewer molecules than single gold nanoparticle structures to achieve similar signal levels, offering a path toward ultra-sensitive optical sensors.

IN DEPTH

Key Findings

A research team led by Professor Seung-woo Lee from Korea University's KU-KIST Graduate School and Department of Convergence Energy Engineering has successfully implemented an optical nanocircuit using "DNA origami" technology. The team demonstrated that by precisely arranging gold nanoparticles, they could detect optical signals from approximately 70 dye molecules (YOYO-3). In comparison, a single gold nanoparticle structure required approximately 6,400 dye molecules to produce a similar signal level.

Technical Details

The team utilized the base-pairing properties of DNA to create a hollow cylindrical nanostructure with a diameter of approximately 30 nanometers and a height of approximately 20 nanometers, constructed from three layers of DNA. Smooth gold nanoparticles were then attached to specific positions on this structure, with dye molecules bound to the DNA and placed between the particles.

The researchers also tested a circuit consisting of three gold nanoparticles of different sizes. This configuration resulted in a more distinct light resonance. The resonance quality factor (Q), which measures the clarity of the resonance response to specific wavelengths of light, was approximately 19.2—significantly higher than the 4 to 10 range observed in similar existing gold nanoparticle structures.

Background & Context

When gold nanoparticles are placed in close proximity, the electric field of light concentrates in the narrow gap between them. Placing dye molecules in this gap strengthens the interaction between light and the molecules, allowing for the observation of minute optical signals. However, because the response changes drastically with slight variations in particle shape or spacing, precise structural control has been a primary technical challenge.

Significance & Outlook

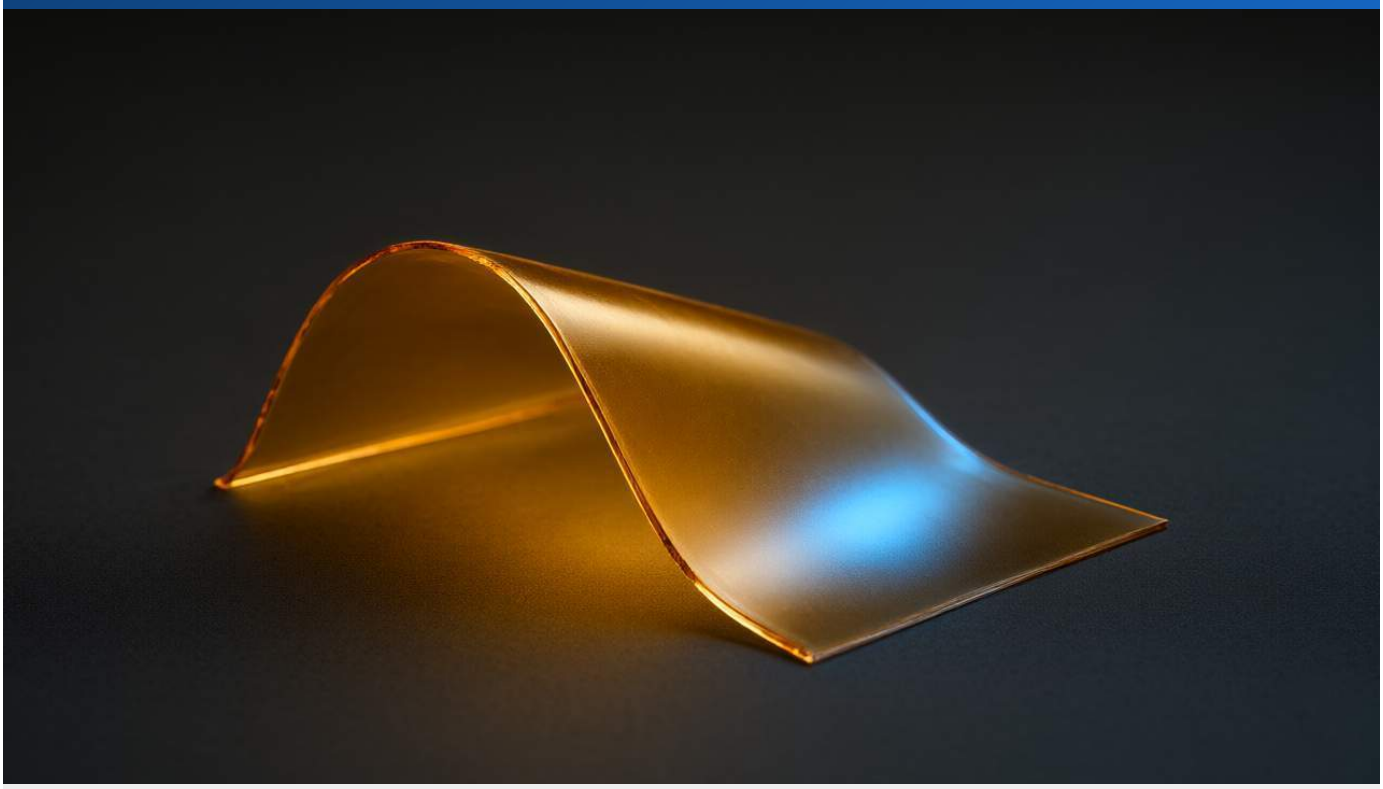
This research, conducted in collaboration with Professor William Si of Harvard University and Professor Shelley Wickham of the University of Sydney, demonstrates that DNA structures can be used to control the positioning of nanoparticles and molecules to modulate light resonance and molecular signals. The findings are expected to be applied to optical sensors for analyzing small quantities of molecules and studies on light-molecule interactions. The study was published online in *Science Advances* on October 7 and supported by the Ministry of Science and ICT, the Ministry of Health and Welfare (KUCRF), the Australian Research Council (ARC), and Korea University.

Source: https://www.industrynews.co.kr/news/articleView.html?idxno=88618

Collected: November 07, 2026 | Automated Research System (AI)

#07 Aramid Nano-fiber Films: Heat Dissipation and EMI Shielding Specs

Published November 03, 2026 국제뉴스 (Gukje News) South Korea



OVERVIEW

Researchers at Korea National University of Transportation have developed an ultra-thin composite film using decomposed and recombined Kevlar fibers. The material achieves over 99.999% electromagnetic interference (EMI) shielding and maintains 95% performance after 10,000 bending cycles.

IN DEPTH

Key Findings

A research team led by Professor Kim Seong-ryong from the Department of Nano Chemical Materials Engineering at Korea National University of Transportation has successfully fabricated an ultra-thin composite film. The film integrates high-performance heat dissipation, electromagnetic wave shielding, and mechanical durability. Notably, the film blocks more than 99.999% of external electromagnetic waves at a thickness comparable to a human hair and retains approximately 95% of its initial performance after 10,000 repeated bending tests.

Technical Details

To overcome traditional trade-offs between strength and flexibility, the team focused on improving the alignment and bonding methods of aramid (Kevlar) nano-fibers rather than increasing additive content. The researchers addressed a common issue where using water for film reconstitution caused rapid bonding and non-uniform structures.

- **Process Optimization:** The team replaced water with a mixed solution of acetic acid and alcohol to control the coagulation speed of the nano-fibers. This allowed for gradual bonding and sufficient alignment, resulting in a denser and more uniform internal structure.
- **Performance Gains:** This method improved heat transfer performance by more than twofold compared to existing methods, without the need for additional additives, while also enhancing mechanical strength.
- **Multifunctional Composite:** By incorporating graphene nanoplatelets, the team produced a multifunctional composite film that simultaneously increases thermal conductivity, strength, and toughness.

Background & Context

The study was conducted as an international collaboration involving the CRANN Institute at Trinity College Dublin in Ireland and the Pontifical Catholic University of Peru (PUCP). The project received funding through the Mid-Career Researcher Support Program of the National Research Foundation of Korea and the Small and Medium Business Technology Innovation Development Project of the Ministry of SMEs and Startups. The results were published online in the journal *Advanced Composites and Hybrid Materials*.

Significance & Outlook

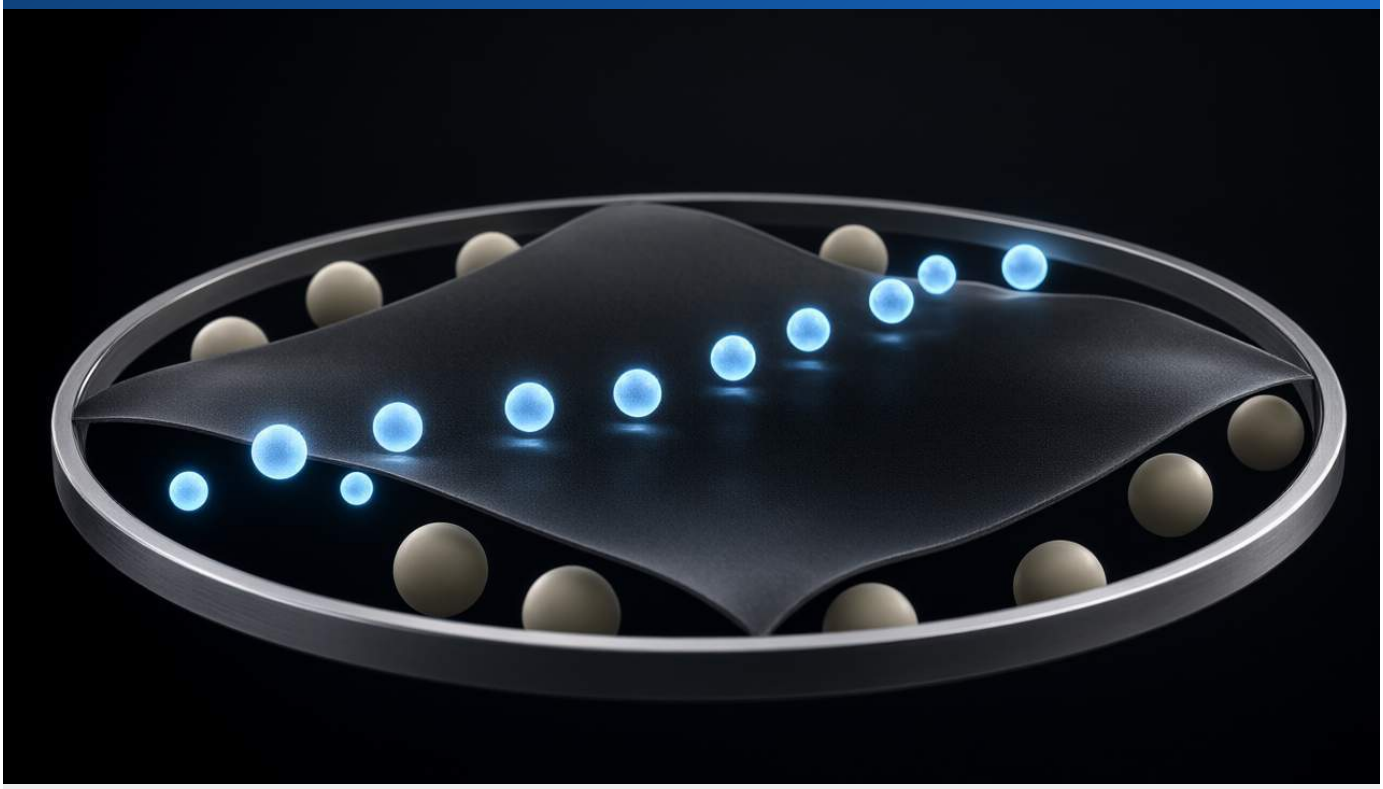
Professor Kim Seong-ryong stated that the research provides a new material design method to secure both thermal conductivity and strength by controlling the bonding time between fibers. Researcher Muhammad Yasir added that this molecular-level structural design approach enables the development of various other high-performance composite materials.

Source: https://www.gukjenews.com/news/articleView.html?idxno=3740665

Collected: November 07, 2026 | Automated Research System (AI)

#08 Graphene-Amorphous Carbon Membranes: 2nm Carbon Sieve Specs

Published October 31, 2026 搜狐 China



OVERVIEW

Researchers at Tianjin University have developed a molecular-level ultra-thin carbon membrane with a thickness as low as 2nm for carbon capture. The membrane achieves high mechanical strength and precise sub-nanometer pores, enabling superior CO2 separation from flue gas, synthesis gas, and natural gas.

IN DEPTH

Key Findings

A research team led by Jiang Zhongyi and He Guangwei at Tianjin University has developed a molecular-level ultra-thin carbon membrane that reaches a thickness of approximately 2nm. This material overcomes the traditional trade-off between thickness, precision sieving, and mechanical strength. The membrane demonstrates high CO2 separation performance across various gas mixtures, including CO2-N2, H2-CO2, and CO2-CH4.

Technical Details

The team utilized a strategy of graphene-guided polymer transformation rather than traditional graphene drilling. By assembling polymers on a graphene surface and applying heat treatment, they leveraged a "super-spreading effect" to grow a precise amorphous carbon sieve layer. This creates a dual-layer heterostructure where graphene serves as the load-bearing skeleton and the amorphous carbon layer passivates defects and homogenizes stress.

- **Mechanical Properties:** The membrane achieves a Young's modulus of 27GPa and a breaking strength exceeding 10GPa.
- **Structural Discovery:** Using aberration-corrected electron microscopy, the team observed that the pores in these molecular-level carbon membranes are primarily near-circular, contradicting the long-held industry belief that carbon molecular sieve pores are "slit-shaped."

Background and Context

The research was published in *Nature Sustainability* on October 23, following a separate achievement in *Nature Energy* on October 7 regarding COF all-organic mixed matrix membranes. The project was a collaborative effort involving Tianjin University, Nanjing Industrial University (Jin Wanqin and Zhao Jing teams), the Swiss Federal Institute of Technology Lausanne (Kumar V. Agrawal team), and Fudan University (Zeng Yuwen team). The work was supported by the National Natural Science Foundation and the School of Chemical Engineering at Tianjin University.

Significance and Outlook

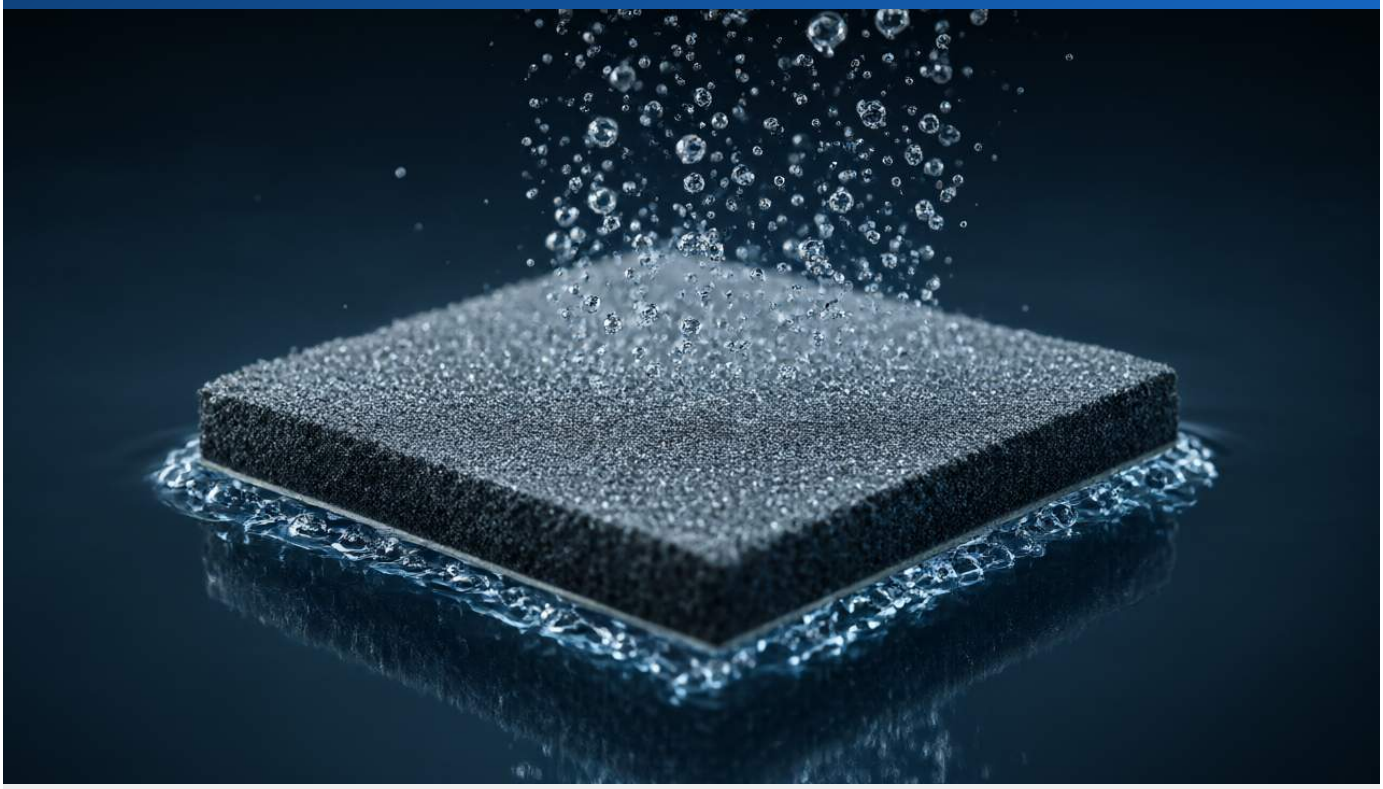
By reducing the membrane to a molecular-level thickness while maintaining high mechanical stability, the team has created a highly permeable and selective filter. This breakthrough provides a new pathway for carbon capture from industrial sources and offers a new characterization method for understanding the real pore structures of carbon molecular sieve membranes.

Source: https://www.sohu.com/a/1095400840_355396

Collected: November 07, 2026 | Automated Research System (AI)

#09 IBS Hydrogen Catalyst: Platinum Use Cut by 63% via Reticular Coordination

Published November 02, 2026 The Korea Herald South Korea



OVERVIEW

Researchers from the Institute for Basic Science (IBS) and partner universities have developed a high-density platinum catalyst that reduces platinum consumption by 63% compared to commercial alternatives. By achieving a platinum content of 14.9% while maintaining atomic-level dispersion, the team significantly improved the durability and stability of hydrogen production devices.

IN DEPTH

Key Findings

A joint research team led by the Institute for Basic Science (IBS) has synthesized a next-generation catalyst for hydrogen production that reduces platinum usage by 63% relative to conventional commercial catalysts. When integrated into a proton exchange membrane water electrolysis device, the catalyst operated stably for 500 hours. Notably, the rate of voltage increase—a primary metric for performance degradation—was reduced to approximately one-quarter that of existing commercial catalysts.

Technical Details

The team employed a "reticular coordination" strategy to overcome the limitations of traditional single-atom catalysts, which typically require platinum content to remain below 1% to prevent atomic clustering. The synthesis process involved the following steps:

- **Pre-design:** Using metal-organic frameworks to fix individual platinum atoms into a cerium-oxygen lattice.
- **Conversion:** Applying heat treatment to convert the structure into ceria (cerium oxide).
- **Result:** A high-density catalyst with 14.9% platinum content dispersed at the atomic level.

The catalyst demonstrated high thermal stability, suppressing particle growth even after treatment at 300 to 500 degrees Celsius in a hydrogen environment, due to strong bonding with the ceria substrate.

Background and Context

Platinum is essential for hydrogen production and automotive exhaust purification due to its high performance, but its high cost limits economic viability. While single-atom catalysts aim to reduce costs, increasing the metal content usually leads to clustering, which degrades both stability and efficiency.

Significance and Outlook

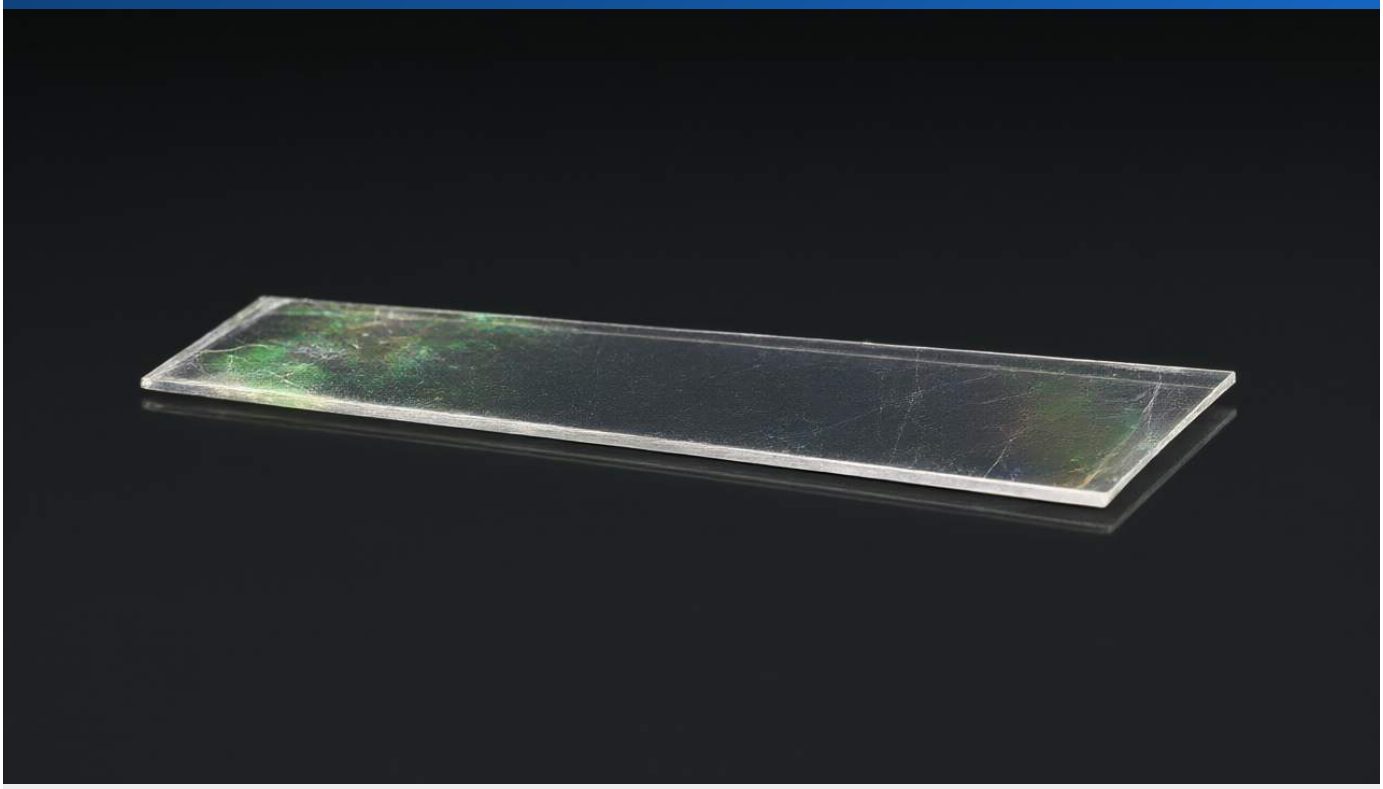
This synthesis strategy is expected to be applicable to other precious metals, including rhodium and iridium. The research team plans to test the technology in high-temperature environments, specifically for three-way catalytic converters and dry methane reforming (converting methane and carbon dioxide into hydrogen and carbon monoxide). The findings were published on October 22 in *Nature Synthesis*.

Source: https://biz.heraldcorp.com/article/10922985

Collected: November 07, 2026 | Automated Research System (AI)

#10 2D Metal Oxides: Single-Atomic-Layer Fabrication via MOX

Published October 29, 2026 Nature Materials



OVERVIEW

Researchers have achieved the controlled fabrication of free-standing two-dimensional metal oxides (MO) at the single-atomic-layer limit, including CrO, ErO, and BiO. This process utilizes electron-beam-induced dehalogenation of layered metal oxyhalides (MOX) to create stable, single-crystalline domains. The breakthrough enables the creation of moiré superlattices and heterostructures with pronounced excitonic responses.

IN DEPTH

Key Findings

The study reports the successful fabrication of diverse free-standing two-dimensional metal oxides (MO) down to the single-atomic-layer limit. Using monolayer CrO as a representative system, the researchers produced free-standing single-crystalline domains exceeding 104 nm2 and demonstrated the ability to perform controllable patterning at the micrometre scale.

Technical Details

The fabrication process relies on the electron-beam-induced dehalogenation of layered metal oxyhalides (MOX). Specifically, the transformation from CrOCl to CrO is driven by ionization-driven halogen selective removal and subsequent lattice relaxation. This conversion mechanism is potentially extendable to other metal oxyhalides.

Density functional theory (DFT) was employed to verify the stability of the resulting materials. The analysis confirms both the thermodynamic and kinetic stability of free-standing monolayer CrO and predicts a Néel antiferromagnetic order below 230 K.

Background & Context

Two-dimensional metal oxides provide a versatile platform for exploring quantum phenomena and functionalities that differ from their bulk counterparts. While advances in synthesizing ultrathin oxides have been made previously, achieving controlled fabrication at the single-atomic-layer limit has remained a formidable challenge until this development.

Significance & Outlook

This fabrication approach allows for the creation of complex architectures, including:

- MOX–MO lateral heterostructures.
- Aligned and twisted metal oxide bilayers.

These structures exhibit pronounced excitonic responses characterized by an unusually large exciton binding energy. The work opens new opportunities for the study of two-dimensional metal oxide monolayers, heterostructures, and moiré superlattices, facilitating the exploration of emergent excitonic phenomena in low-dimensional oxides.

Source: https://doi.org/10.1038/s41563-026-02793-2

Collected: November 07, 2026 | Automated Research System (AI)

#11 BNNT Ceramic Fiber: KIST's 99% Neutron-Shielding Specs

Published November 03, 2026 The Herald Business South Korea



OVERVIEW

Researchers at the Korea Institute of Science and Technology (KIST) have developed a flexible ceramic thread based on boron nitride nanotubes (BNNTs) that blocks approximately 99 percent of thermal neutrons. The material combines high tensile strength and heat resistance with the flexibility of ordinary fabric, enabling radiation protection for high-movement areas of spacesuits.

IN DEPTH

Key Findings

A research team led by Kim Dae-yoon at the KIST Space Composite Materials Research Center has created the world's first ceramic fiber capable of being tied in knots while maintaining high radiation-shielding performance. A fabric thickness of 1.62 millimeters blocks roughly 99 percent of thermal neutrons, which the researchers state is the best thermal-neutron shielding performance globally.

Technical Details

The fiber is based on boron nitride nanotubes (BNNTs), chosen for the exceptional neutron-absorbing properties of boron. To overcome the tendency of BNNTs to clump and fracture, the team developed a manufacturing technique that uniformly mixes BNNTs with carbon nanotubes and aligns them in a single direction via a narrow nozzle. This process achieved a BNNT content of approximately 80 percent.

The resulting material exhibits the following specifications:

- Tensile strength: Greater than 1 gigapascal
- Thermal stability: Above 1,000 degrees Celsius
- Thickness: 1.62 millimeters (for 99% thermal neutron blocking)
- Production scale: Over 3.5 kilometers of fiber produced using standard industrial weaving equipment for flat and cylindrical fabrics

Background and Context

Secondary neutrons, produced when high-energy radiation hits spacecraft hulls, pose significant risks to astronaut health and electronic equipment. Previous shielding materials were either too heavy or too rigid for use in flexible equipment. Because the KIST manufacturing process utilizes existing fiber equipment without requiring specialized machinery, it is positioned for large-area production and commercialization.

Significance and Outlook

The flexibility of the ceramic thread allows it to be applied to high-movement joints such as elbows and knees in spacesuits, with the option to stack multiple layers to increase shielding. Beyond lunar exploration and long-duration space missions, potential applications include spacecraft interiors, crewed habitats, nuclear facilities, and radiation treatment rooms. The team plans to verify long-term stability using CubeSats or space station external exposure platforms to accelerate the development of an independent Korean spacesuit.

Source: https://biz.heraldcorp.com/article/10923919

Collected: November 07, 2026 | Automated Research System (AI)