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Featured

Article
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Deployable 3D architectures from wafer-fabricated precursors

Researchers show that standard chip-making techniques can transform flat patterns into stable, precisely curved 3D structures, enabling a new generation of functional 3D devices.

Yue Wang, Kelvin Shum & Tian Chen

Article
25 July 2026 | Open Access

Mechanosensory encoding of surface mechanics optimizes locomotion

Locomotion emerges from a constant dialogue between the body and the physical environment, requiring both frictional interactions and mechanosensation to coordinate movement. By combining experiments and theory, the authors show that classical gentle-touch receptor neurons in *C. elegans* sense dynamic surface friction during crawling, uncovering a previously unrecognized role for skin mechanoreceptors in proprioceptive locomotion control.

Aleksandra Pidde, Montserrat Porta-de-la-Riva & Michael Krieg

Article
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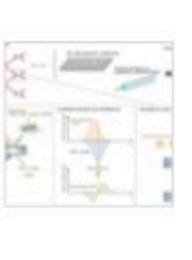
Hyperloss from coherent spatial-mode mixing in quantum-correlated networks



This study reveals hyperloss, a hidden decoherence mechanism in quantum optical networks where small laser-beam mismatches can completely destroy quantum enhancement, and shows that phase engineering can restore lost quantum correlations.

Stephan Grebien, Julian Gurs & Mikhail Korobko

Article
25 July 2026 | Open Access

Substituent-rebound skeletal editing for precise boron-to-carbon single-atom swapping

Developing methods that enable single-atom exchange within an aromatic scaffold, while preserving its peripheral substitution, represents an important but highly ambitious goal in synthesis. Here the authors present a boron-to-carbon swapping reaction via a substituent-rebound process, converting 1,2-benzazaborines into the corresponding quinolines.

Yan-Bo Li, Fu-Peng Wu & Frank Glorius

Article
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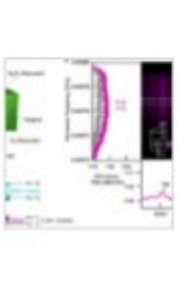
Goblet cells mechanically breach the epithelial barrier in gut homeostasis

This study shows that goblet cells physically compress neighboring intestinal cells, creating fractures in cell-cell junctions that weaken epithelial cohesion, increase gut permeability and reveal how tissue mechanics shape the gut barrier.

Justine Creff, Yuan He & Denis Krndija

Article
25 July 2026 | Open Access

Semiconductor room-temperature maser

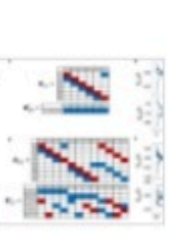


The first semiconductor maser in silicon carbide is demonstrated, achieving continuous-wave operation above room temperature with high gain, microwave mode cooling, and ultrasensitive magnetometry, enabling compact, scalable maser technologies.

Andreas Gottscholl, Maximilian Wagenhöfer & Andreas Sperlich

Article
25 July 2026 | Open Access

Phase locking and multistability in the topological Kuramoto model on cell complexes



Synchronization shapes systems from brains to power grids, often through group interactions. Here, authors develop a framework for oscillators on cell complexes, showing how topology organizes phase-locked states and why boundaries need at least five elements for multiple stable states to coexist.

Iva Bačić, Michael T. Schaub & Dirk Witthaut

Article
24 July 2026 | Open Access

Counteranion-mediated dynamic kinetic asymmetric fluorination to access sulfur-stereogenic center

The authors present a highly efficient strategy to synthesize sulfonimidoyl fluorides through dynamic kinetic asymmetric fluorination at mild reaction conditions. This one-pot process, involving sequential direct fluorination, hydrolysis, and asymmetric fluorination, delivers a wide range of enantioenriched S(VI) compounds with high enantioselectivities.

Zhihuang Chen, Wen-Yan Tong & Xiaodong Xiong

Article
24 July 2026 | Open Access

Finite-temperature toroidal moment amenable to direct observation in an $Fe_{10}Dy_{10}$ molecular ring

Toroidal magnetic states are difficult to prepare and detect in molecules. The authors show that near-infrared light can drive finite-temperature toroidal polarization in an $Fe_{10}Dy_{10}$ molecular ring, enabling magnetoelectric readout.

Alessandro Soncini, Kieran Hymas & Annie K. Powell

Article
24 July 2026 | Open Access

Microwave-field quantum metrology with inherent robustness against detection losses enabled by Rydberg interactions

Rydberg atoms provide both quantum metrological and computational applications, but despite the efforts, the combination of the two has not yet translated into practical applications. Here, the authors demonstrate a microwave-sensing protocol based on collective Rydberg states, where the interatomic interactions allow implementation of inherent error protection.

Stanisław Kurzyna, Bartosz Niewelt & Michał Parniak

Article
24 July 2026 | Open Access

Single-atom-engineered perovskite enables near-theoretical-rate hydroxyl radical electrogeneration

Electrochemical O2 activation enables in situ hydroxyl radical (•OH) production, offering a sustainable route for pollutant degradation. Here, the authors report a single-atom engineering strategy that delivers highly competitive •OH yields through a consecutive $3e^-$ oxygen reduction reaction.

Yaobin Wang, Chaoyue Xie & Min Liu

Article
24 July 2026 | Open Access

Nickel catalysis enables chemoselectivity in radiation chemistry

Ionizing radiation can drive useful chemical transformations, but uncontrolled radical generation often limits chemoselectivity. Here, the authors report a nickel-catalysed system that regulates radiation-generated radicals, enabling selective C–H arylation and stereoselective $C(sp^3)$–H functionalization.

Weiqiu Liang, Chengda Wu & Zhibo Liu

Article
24 July 2026 | Open Access

Dielectric stacking-engineered scalable reconfigurable transistor platform for adaptive logic circuits

Reconfigurable devices offer a promising strategy toward adaptable architectures to accommodate diverse computational demands. Zhu et al. report a van der Waals transistor with nonvolatile polarity control and multi-state memory, enabling logic-in-memory, Boolean functions, and ternary content-addressable memory.

Pengfei Zhu, Chi Zhang & Jianhua Zhang

Article
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Hydroxyl-Mediated SO_2 Promotion Enables Efficient NO_x Reduction by CO over IrIn/Beta under Oxygen-Rich Conditions

Removing NO_x from oxygen-rich industrial flue gas is difficult, especially with SO_2 present. An IrIn/Beta catalyst turns SO_2 into ammonium sulfate intermediates, promoting NO_x high removal under harsh simulated industrial conditions.

Yujie Yuan, Yixi Wang & Tingyu Zhu

Article
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A natural solution from caterpillar cuticles for flexible impact-resistant materials

Here, authors explore the energy dissipation mechanism in the cuticle of *Ostrinia furnacalis* (Asian corn borer) to identify key structural proteins, FCSP-1 and FCSP-2, which undergo liquid-liquid phase separation to form flexible, impact-resistant materials.

Fenghou Yuan, Shuaifei Hu & Tian Liu

Comment
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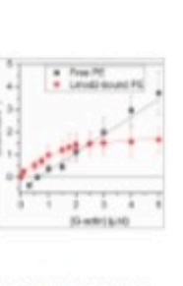
Leiomodin2 is a polymerase at the pointed ends of actin filaments



Biophysical and structural studies have found that leiomodin 2, a protein discovered in muscle cells, is the first example of a molecule that promotes the elongation of actin filaments at their slowly growing "pointed ends." This breakthrough will stimulate work to answer many puzzling questions about the mechanism of this process.

Thomas D. Pollard

Article
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Cost-effective abatement of industrial sources of nitrous oxide with methane for urgent climate mitigation

Cutting industrial nitrous oxide emissions is vital for climate and ozone protection, but current methods need high temperatures. A platinum catalyst converts 99.99% at 150 °C using methane and could cut treatment costs by 62%.

Yunshuo Wu, Rongrong Hong & Zhongbiao Wu

Article
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Ground-based radar unveils natural electron Bernstein waves in the ionosphere of Earth

Ground-based radar detection of electron Bernstein waves in Earth's ionosphere has long been predicted. Here, the authors show altitude-resolved observations of these waves with the Sanya Incoherent Scatter Radar, enabling plasma diagnostics.

Yonghui Wang, Xinan Yue & Chi Wang

Article
24 July 2026 | Open Access

Synthesis of ZIF-62 Glass and Solid-state Lithium Superconductor Composite Membranes for Electrodialytic Lithium Extraction

Here authors present a low-temperature membrane that combines a lithium superionic conductor with a metal-organic framework glass, enabling efficient lithium extraction from complex aqueous resources while avoiding the high-temperature processing required for conventional ceramic membranes.

Liang Feng, Shuhao An & Zhiping Lai

Article
23 July 2026 | Open Access

Discrete distributions are learnable from metastable samples

Algorithms sampling from thermal states of many-body systems often get stuck in restricted, metastable states. Here, authors prove that the true underlying models can nevertheless be accurately recovered from these trapped samples, establishing rigorous learning guarantees for discrete distributions.

Abhijith Jayakumar, Andrey Y. Lokhov & Marc Vuffray

Article
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Elucidation of the intrinsic electronic mechanism governing interfacial chemical bonding in metal-polymer hybrids

This study elucidates the intrinsic electronic mechanisms governing metal-polymer interfacial bonding, providing critical atomic-level insights to enhance the thermal and mechanical reliability of hybrid joints.

Yifan Liu, Jianhui Su & Xiaoguo Song

Article
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Dual-space visible light authentication toward high security physical unclonable function

Real and reciprocal space visible signals from polycrystalline self-assembly constitute high security optical keys for straightforward authentication that overcomes inherent counterbalance between authentication efficiency against security level.

Geon Gug Yang, Seong-Gyun Im & Sang Ouk Kim

Article
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Tunable yielding and emergent rheology in amorphous solids with active particle doping

It is known that well-annealed and ultrastable glasses tend to fail abruptly via shear-band formation, with brittle nature influenced by preparation history and loading conditions. Here, the authors report that doping such amorphous solids with active particles can dynamically control yielding behavior, leading to increased mechanical stability, rounded stress responses, and the emergence of multiple shear bands, governed by a universal interplay of shear rate, active force, and persistence time.

Rashmi Priya, Jürgen Horbach & Smarajit Karmakar

Article
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Few-femtosecond photoelectron spectroscopy reveals fundamental photodynamics of the carbon-carbon double bond in ethylene

The authors show that ultrafast nonadiabatic coupling transfers population from the optically excited $\pi\pi^*$ state to the $\pi\sigma^*$ state in ethylene within 10 fs using sub-4 fs time-resolved photoelectron spectroscopy and quantum dynamics simulations.

Arnab Sen, Simon P. Neville & Arnaud Rouzée

Article
23 July 2026 | Open Access

Wet-processed high-areal-capacity electrodes via transformative spandex–poly(acrylic acid) binder toward 450 Wh kg^{-1} lithium-ion batteries

High-areal-loading electrodes are needed for high-energy-density batteries. Here, the authors proposed a Spandex/PAA hybrid polymer binder that enables mechanically robust thick electrodes with fast lithium-ion transport in a conventional wet-processed system.

Bo Keun Park, Yoon Bo Shim & Ki Jae Kim

Article
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Scalable phase-change fibres with record thermo-mechanical properties for cooling textiles

Phase change materials are promising for thermal regulating materials, though it is challenging to embed them into fibres. Here the authors use a speed matching strategy to fabricate core-shell phase changing fibers for thermal regulating textiles.

Xiaolong Li, Qianyi Li & Tural Khudiyev

Article
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Kinetic inductance of few-layer $NbSe_2$ in the two-dimensional limit

The authors study the kinetic inductance of hBN-encapsulated superconducting 2H-$NbSe_2$ thin films using microwave techniques. The kinetic inductance scales inversely with the number of layers and exhibits a thickness-dependent crossover from clean- to dirty-limit behavior, with enhanced dirty limit contributions in the ultra-thin regime.

Sameia Zaman, Joel Î-j. Wang & William D. Oliver

Article
23 July 2026 | Open Access

Bioinspired porous metal-amino acid nanozymes enable multi-pathway treatment of atherosclerosis through anti-oxidation and pro-efferocytosis

Atherosclerosis is driven by chronic inflammation and persistent oxidative stress accompanied by cholesterol deposition in the intimal layer and impaired efferocytosis within plaques. Here, the authors report a copper-based nanozyme combining plaque-targeting, antioxidant and pro-efferocytosis effects to enable multilink intervention in atherosclerosis pathogenesis and inhibit plaque progression.

Sihui Shao, Wenqi Pan & Rong Wu

Article
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A fully integrated smart ring for daily biochemical monitoring

Commercial smart rings lack biochemical sensing. Here, the authors present a fully integrated ring that measures multiple chemical biomarkers from osmotically extracted sweat without iontophoresis, validated for daily analysis in both healthy and type 1 diabetic individuals.

Tamoghna Saha, Shichao Ding & Joseph Wang

Article
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A bioorthogonal nanoconcentrisome system for epigenetic and immunometabolic reprogramming of tissue regeneration in aged female rats

Stem cell therapies for tissue regeneration are often limited by instability, especially in aged tissues with impaired repair capacity. Here, the authors show that a S-adenosylmethionine-delivering stem cell-derived fusogenic vesicle system restores immune and stem cell function, significantly enhancing bone regeneration in aged female rats.

Lan Zhao, Zheyuan Zhang & Kaiyu Liang

Article
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Ultrafast reconfigurable topological-modulators-based photonic processing accelerator

This work demonstrates a non-volatile photonic computing chip based on topological modulators on a PZT platform. The chip achieves 110 GHz bandwidth, 266 TOPS/mm² compute density, and near-zero static power. A 16-channel chip delivers 1.92 TOPS throughput with over 94.5% accuracy for digit recognition and PDE solving.

Wenfeng Zhou, Xin Wang & Yong Zhang

Article
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Polyesterification-assisted interface engineering of carboxylate metal-organic frameworks membranes for selective gas separation

Precise control of interfaces is crucial for high-performance metal-organic framework membranes. Here, the authors use in-situ polyesterification to engineer carboxylate MOF-MOF interfaces, suppress defects and enable efficient gas separation.

Chao Ma, Ning Li & Jingwei Hou

Article
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Controllable patterning of magnetic bits with atomically sharp boundaries

The individual magnetic domains that encode information in magnetic memory have shrunk close to their thermodynamic limit. Here, Wang et al present a method of overcoming this challenge, by patterning ferrimagnetic bits at a nanometre scale, stabilized by an antiferromagnetic spacer all in a single material.

Qi Wang, Lei Jin & Xiaoyan Zhong

Article
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A programmable living force sensor fabricated with surface engineered microbial network

Engineered living materials have recently expanded into bioelectronics. Here, authors present a programmable living force sensor, fabricated using a surface engineered microbial network, and featuring a tuneable measuring range, rapid self-recovery, and insensitivity to stretching.

Si Shi, Changhong Wang & Baizhu Chen

Article
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Entanglement-enhanced learning of quantum processes at scale

The authors show that entanglement with noisy quantum memory can significantly speed up learning of quantum processes. With error mitigation, their method characterizes quantum noise at scale and outperforms entanglement-free approaches.

Alireza Seif, Senrui Chen & Zlatko K. Minev

Article
23 July 2026 | Open Access

Electronically coupled Co single atoms with Co-Pd alloy catalyst for high-performance rechargeable hydrazine-assisted Zn–Air batteries

Additive-assisted zinc-air batteries offer improved charging efficiency but require better catalysts. Here, authors demonstrate that co-hybridizing Co single atoms with a CoPd alloy in macroporous N-doped carbon enables efficient hydrazine-assisted battery performance.

Lijuan Ren, Xiuli Hu & Jianxin Geng

Article
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Structural inequality shapes the daily rhythm of stationarity and mobility

The authors model daily routines of rest and activity, revealing that majority-Black communities experience highly volatile schedules. This shows that temporal predictability is a fundamental yet overlooked dimension of social justice.

Zihao Tian, Chao Zhang & Qi R. Wang

Article
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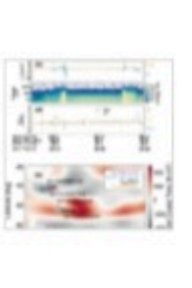
Miniature Dungey-like cycle at Mars



Magnetic flux and plasma circulations around a planet's dipole field and the associated auroral phenomenon are well studied at many planets. Here, the authors show how it works at Mars's crustal fields, adding an entry to the collection of auroral concepts.

Shaosui Xu, James P. McFadden & Shannon M. Curry

Article
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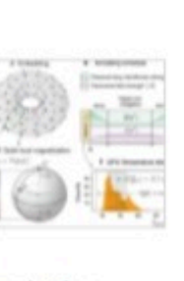
Versatile electronic phases enabled by intertwined multiple frustrations in an antiferromagnetic two-dimensional semimetal

Competing frustration channels in low-dimensional antiferromagnetic metals can generate diverse single-q and multi-q electronic phases. Here, the authors identify three competing antiferromagnetic charge-ordered states in $CeTe_3$.

Y. Fujisawa, P. Wu & Y. Okada

Article
23 July 2026 | Open Access

Finite-temperature criticality through quantum annealing



Resolving finite temperature critical behavior near phase transitions is computationally challenging. Here, the authors demonstrate that a carefully calibrated quantum annealer can accurately extract the critical temperature and universal exponents of the two dimensional Ising model at large system sizes.

Gianluca Teza, Francesco Campaioli & Oren Raz

Article
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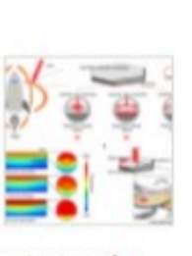
Nanofiber-like polar configurations enable ultrahigh energy storage in relaxor ferroelectrics via high-entropy design

Authors create nanofiber-like polar configurations in relaxor ferroelectrics via high-entropy design, achieving ultrahigh energy storage density (~19.3 J cm^{-3}) and efficiency (~95.2%) in multilayer ceramic capacitors.

Ning Liu, Aiwen Xie & Shaoming Dong

Article
23 July 2026 | Open Access

Anisotropic core–shell ceramic nanofibrous membrane with improved optical reflectivity and thermal insulation for high-energy laser protection



Ceramic nanofibers often struggle to reconcile optical reflectivity with thermal management. Here, the authors design a core-shell ceramic nanofiber membrane that achieves high laser shielding and directional heat dissipation

Huihuang Ma, Yikun Liu & Liangshun Zhang

Article
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High-power hybrid commutated converter for carbon-neutral power transmission

The study presents a high-power hybrid commutated converter system that combines forced and recovery-enhanced commutation to enable reliable, efficient long-distance transmission of renewable energy, validated at 120 kV/360 MW in real-world projects.

Chaoqun Xu, Zongze Wang & Rong Zeng

Article
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Minute-scale red phosphorescence in carbon nanodots

The authors design carbon nanodots with minute-scale red phosphorescence through combination of excited-state engineering and machine learning optimization, opening opportunities for low-energy optoelectronic devices.

Fan Ding, Fu-Kui Li & Kai-Kai Liu

Article
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Association-gated multiphoton activation of inert haloarenes via sequential electron donor–acceptor assembly

Extreme photoreduction is often limited by uncontrolled, diffusion-driven reactivity of highly energetic intermediates. Here, the authors report an association-gated photocatalytic strategy that assembles sequential donor-acceptor complexes to create confined reaction pockets, enabling selective activation of strong carbon–halogen bonds.

Kakeru Matsukuma, Masanori Tayu & Nozomi Saito

Article
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Stretchable and self-healing copper–iodide scintillator for conformal X-ray imaging and wearable radiation alerting

Flexible X-ray scintillators are promising for imaging and wearable devices, though it is challenging to optimize mechanical properties and scintillation efficiency. Here the authors integrate copper-iodide clusters in a fluorinated block copolymer to optimize these properties.

Yu Shen, Ting Pan & Wen-Yong Lai

Article
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Visualization of oxophilic regulation for alkaline hydrogen evolution on Ni-based electrocatalyst via multimodal operando approaches

Alkaline hydrogen production is hindered by sluggish kinetics and limited insight into how oxophilic sites evolve. Here, the authors uncover reversible reconstruction at nickel titania interfaces that creates four coordinated titanium sites for efficient water dissociation and hydroxyl adsorption.

Jiongchong Fang, Zuochao Chen & Guosong Zeng

Article
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A redox flow battery coupling energy storage and chemical manufacturing in a single device

Large-scale application of redox flow batteries is limited by its single profit model. Here, authors report an open loop flow battery with profitable potential, coupling energy storage with chemicals manufacturing in a single device.

Yucong Miao, Dawei Gao & Haohong Duan

Article
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Lone-pair-electron-governed gas-recognizable flexibility in a stable MOF for boosting C_3H_6/C_3H_8 separation via aqueous scalable synthesis

The introduction of nitrogen lone-pair-electrons in a hydrolytically stable MOF NJUBai5-bib enabling C_3H_6-recognizable gate-opening towards efficient C_3H_6/C_3H_8 separation and the scalable aqueous synthesis of it for environmentally friendly application.

Yuhang Liu, Zhiyong Lu & Junfeng Bai

Article
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Multispectral image fusion via heterogeneous integration of broadband image sensor and sub-Boltzmann Transistors on CMOS

Multispectral fusion imaging aids machine vision and medical diagnostics but often needs complex optics. Here, Devnath et al. demonstrate an ultra-efficient CMOS active-pixel imager with ultralow dark current that captures UV-to-NIR light and enables pixel-level fusion.

Anupom Devnath, Batyrbek Alimkhanuly & Seunghyun Lee

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