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**Large symmetric anomalous Nernst effect in the antiferromagnet $WB_{1.33}Mn_3Al$**

Ferromagnets are widely used in thermoelectric applications, which is useful for energy harvesting. It is enhanced by layered or nanoscale [...] large anomalous Hall conductivity, Nernst, Ettingshausen, Seebeck, thermoelectric, thermopower, transport

Hongtao Liang, Yuan Feng & Yuan Lu

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**Ultra-high energy storage in lead-free NaNbO$_3$-based release ceramics with disordered short-/long-range structures design**

The authors tailor the enhancement of energy storage performance of NaNbO3-based ceramics through disordered structures to achieve the best comprehensive energy storage of dielectric materials.

Zhenxiao Wang, Xin Ji & Yi Zhou

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**Absence of superconductivity and density-wave transition in ambient-pressure isostructural $LaAu_2Sn_2$**

Superconductivity was recently discovered in $LaAu_2Sn_2$ under pressure to potentially host a density-wave transition. Here, the authors report the absence of both phenomena at ambient pressure, thus the authors show that the density wave is not to be the superconductivity, but the marginal structure is lost.

Hengzhe Zhu, Wenjing Ma & Xiaofan Zhao

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**Excellent hardness effect in lead-free piezoceramics by embedding local Ca-doped defect dipoles in phase boundary engineering**

There is a long standing trade-off between piezoelectric coefficient and mechanical quality factor for piezoceramics. Here, the authors engineer dipolar defect phase boundaries to improve both of the piezoelectric performance.

Mingxin Qiu, Chao Wu & Yuqiang Hu

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**Activating fast and reversible sodium storage in NASICON-cationic defect sites through fluorine doping**

Limiting cationic activation at high voltage hinders its structural instability and capacity decay. Here, authors report a cationic defective electrode, $Na_{3.25}Zr_{0.25}Fe_2(PO_4)_3F_{0.25}$, which enables fast and reversible sodium storage with enhanced structural stability and cycling performance.

Pengxia Hou, Yuxing Ji & Wei Xi Xian Shi

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**Universality of pseudo-Goldstone damping near critical points**

Strongly correlated systems exhibit universal dynamics near phase transitions, from superconductivity to quantum magnetism. Here, the authors show, using a unified theoretical approach, systematic treatments of fluctuations across zero, finite-frequency, and universal damping of pseudo-Goldstone modes in systems with spontaneously symmetries, advancing our understanding of critical phenomena in quantum matter.

Yang-yang Xie, Ping-Lin Chen & Wei Ku

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**Flexible graphene-based neurotechnology for high-precision deep brain mapping and neuromodulation in Parkinsonian rats**

Deep brain stimulation is a powerful therapy for Parkinson's disease, but the electrodes used are rigid and bulky. Here, the authors develop flexible graphene probes to deliver high-density and neural high-fidelity signals enabling the visualization of local modulation of subthalamic biomarkers.

Nicole Ria, Kostiantyn Kaliuta & Jose A. Obeso

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**Programmable production of bioactive extracellular vesicles in vivo to treat intracerebral infection**

Intracellular infections treatment strategies remain challenged. In effectiveness, here we report a programmable strategy for in vivo production of bioactive extracellular vesicles that enhance the disease course in the localized treatment.

Yuyuan Yin, Zhiyu Wang & Ranjunping Jiang

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**Co-curation of multi-gates for polymer perovskite electrochromics for reversible solid-state cells**

Electrochromic devices (ECDs) are promising for energy-efficient smart windows, but their performance is limited by slow ion transport and poor stability. This study develops a novel multi-gate electrolyte for quick high-performance ECDs.

Vincent Zhang, Hongyuan Shi & Tobi Kan

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**Very large scale reconfigurable intelligent surfaces for dynamic control of terahertz and millimeter waves**

Next-generation terahertz (THz) communications and imaging require reconfigurable intelligent surfaces (RIS) with large apertures, fast beam steering, and high power handling. This work introduces a transmissive RIS operating terahertz.

Yuxiq Palanchi, Ali Said Sugrima & Cuiken Ibrahim

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**1.79 GHz acousto-optic absolute distance measurement with lithium niobate electro-optic comb**

Over 100Hz laser emission based frequency-sweeping interferometry has set the unchallenged range. Researchers demonstrated a 100M under 60kHz based on an integrated lithium niobate electro-optic comb, achieving 1.79 GHz repetition rate and 600nm per second sweeping rate.

Yifan Qi, Zhiguang Yu & Hongyi

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**Pentagonal photonic crystal mirrors: scalable helicoids with enhanced acceleration via mesh topology optimization**

Helicoidal photonic crystals are highly sustainable to improve the performance of solar cells and other optoelectronic devices, but their technology is closer to maximum of their current electrolyte profiles. These also this reflectors offer an affordable and realistic step toward lightsail space exploration.

Lucas Nicolao, Marcos Pini & Richard A. Norte

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**Giant magnetoresistance induced by spin-dependent orbital coupling in Fe-Co-Cu graphene heterostructures**

Graphene is known to exhibit a magnetoresistance. In graphene, graphene, the magnetoresistance is highly temperature-sensitive. Here, by combining graphene with Fe/Co/Cu, Huang, Yang, Wang, and colleagues report a giant magnetoresistance effect.

Yanning Huang, Leiying Zhu & Ning Zhang

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**Chemical control of colloidal self-assembly drives by the electrocrystallization force**

The electrocrystallization force drives a counterintuitive attraction between particles with the electrode, but its role in colloidal self-assembly has remained unexplored. Here, this force can be reconstructed by molecular species that can be tuned to control the interfacial water structure.

Zelin Wang, Anwar Abdiryim Gibbons & Matthias Eikerman

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**Isolated hole-state sites on modified carbon nitride for photoreforming of plastic derivatives**

The photocatalytic activity of carbon nitride has been widely limited by the efficient recombination of charge carriers. Here, the authors report a modified carbon nitride photocatalyst. Here, the authors develop modified carbon nitride with enhanced visible-light absorption, efficiently.

Pedro Rodrigo Rodriguez, Zhiyong Ren & Mihri Ozkan Ozkan

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**Polarity modulation in compositionally tunable $Bi_2O_2Se$ thin films**

$Bi_2O_2Se$ is promising for semiconductors with high electron mobility and narrow band gap. However, it is also a high-mobility material challenging. Here, the authors report a two-dimensional compositional tuning method to fabricate $Bi_2O_2Se$ p-n junctions and p-type transistors.

Yang Liyan Wang, Xiao Wei Zhang & Ying-Hao Chu

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**A wearable obstacle avoidance device for visually impaired individuals with cross-modal learning**

It is challenging for wearable obstacle avoidance devices to high reliability, rapid response, and adaptability in complex environments. Here, a wearable device integrating multimodal perception, cross-modal learning, and a self-developed glasses and a customized interface.

Tian Gao, Dan Wu & Liang Zhou

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**Martian$\Omega$ (OP): Improved Martian 3 force field for disordered proteins**

Intrinsically disordered proteins (IDPs) are difficult to model for disordered proteins that were developed and validated for IDPs. Additional force fields generic. It replaces IDP interactions and biomolecular condensates.

Dipan Sheng, Christopher Bouchard & Kresten Lindorff-Larsen

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**Sampling reduced dynamic manifolds to extract flow levels of entanglement spectrum and restore entanglement in thermalization**

Entanglement is a key to enable extraction of entanglement-related quantities from coarse-grained systems is challenging. Here we of a unitary quantum field theory with exact diagonalization to efficiently retrieve the reduced density matrix and entanglement spectrum in large 1D and 2D systems.

Wei-Wei Zhou, Yi-Ming Ding & Zhong-Yao

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**Surpassing stoichiometric limitation for supra-multi-molar adsorption and separation of acid gases**

The Zr $N_4$ or Zr $N_4O_2$ 8-connected Zr nodes in conventional Zr MOFs can only bind with 4 acid gas molecules. Here, we report a Zr-MOF with Zr $N_4O_4$ nodes that can bind 8 acid gases, thus exhibiting supra-multi-molar adsorption/separation of $C_2H_2$, $C_2H_4$, $CO_2$.

Guanping Zhang, Yongping Liu & Yong-Zhou Xia

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**The spatiotemporal scaling laws of urban population dynamics**

Urban populations rise and fall as the pulse of human mobility reshapes the cityscape. Here, the authors uncover universal scaling laws that govern how urban populations grow, shrink, ebb, flowing from the city's structure, density, and functionality.

Ning-Ning Liu, Yanqing Hu & Feng-Li Deng

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**A protease-cleavable liposome for co-delivery of anti-PD-L1 and doxorubicin for colon cancer therapy in mice**

Immune checkpoint blockade therapy for cancer is promising, but delivery approaches are needed. Here, the authors report a protease-cleavable liposome that co-delivers anti-PD-L1 and doxorubicin, which enhances tumor accumulation and efficacy and alleviates off-target toxicity in a mouse model of colon cancer.

Yihuan Liu, Feng Qu & Yu-Wenhong Liu

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**Sandwiching intermetallic $Pt_3Fe$ and ionomer with porous N-doped carbon layers for oxygen reduction reaction**

Proton exchange membrane fuel cells face challenges like low efficiency and degradation from Nafion ionomer coverage. Here, authors report a sandwich structure with porous N-doped carbon layers, which, porous Pt-based alloys that reduces ionomer poisoning and improves fuel cells.

Pengqing Liao, Huajian Gao & Xiaoqin Guo

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**Evidence of bosonic symmetry violation in high-energy collisions of atomic nuclei**

Strong interaction is held to quark flavor, as collisions of nuclei with the same number of protons and neutrons should produce the same number of particles and antiparticles. Here, the authors report evidence of violation of this symmetry and suggest that the observation is due to the presence of a strong magnetic field and the associated quantum anomaly.

Yi-Jukka Li, Volker K. Stevens & Jan Steinheimer

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**Ordered zinc electrodeposition from single-crystal units to polycrystalline stacking within solid-electrolyte interphase in battery anodes**

Zinc metal anodes are promising for aqueous batteries but suffer from dendrite growth. Here, the authors have achieved the ordered electrodeposition from single-crystal units to polycrystalline stacking under solid-electrolyte interphase.

Yifeng Zhou, Yanyan Cui & Ge Liu

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**Fluorinigenic carbonds of C$_3$H$_8$ from based molecular nanoscopies and their use in thioxyterical materials**

Nanoscopy is a powerful technique for molecular effects for the study and organization of their chirophysical properties is a modern technical challenges. Here, the authors report the synthesis of a new class of nanoscopic materials, which are fluorinigenic carbonds of C$_3$H$_8$ molecular units that behaviours are linked to the formation of the core matrix.

Lucie S. Ali, Mihri L. Thanks, Mr. George B. & Dan Thomas

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**Integrating photochemical and photothermal effects for selective oxidative coupling of methane into C$_{2+}$ hydrocarbons with multisite active sites**

Achieving both high activity and selectivity in CH$_4$ photooxidation to C$_{2+}$ hydrocarbons is challenging. Here, authors report a photothermal catalyst with multisite active sites for boosting efficient C$_{2+}$ hydrocarbon synthesis.

Hui Cong, Sai Tian & Wenyu Jia

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**High-resolution high-throughput spatiotemporal strain imaging reveals loss mechanisms in a surface acoustic wave device**

Surface acoustic wave (SAW) devices are pivotal in the technology for radio frequency signals. Here, the authors present a novel, non-invasive, findings show that non-uniform excitation causes significant energy loss, which can be mitigated by optimizing transducer design.

Yan Zhou, Alexandra Rowland & Sotiris Zoveidi

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**Multi-mode geometrically gated encryption with 4D morphing hydrogel**

Dimpal responsive hydrogel can be used in optical communication, but are not always as complex as required. Here, the authors report the use of 4D hydrogel encoding for gated information encryption.

Xin Wen, Haifeng Zheng & Qian Zhao

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**Bacterial cell-wall-specific nanomedicine for the elimination of Staphylococcus aureus and Pseudomonas aeruginosa through electron mechanical intervention**

Nanomedicine-enhanced sperm quality disorders stems are promising for combating antimicrobial resistance. Here, the authors report an antibacterial nanosperm TEMO, with bacterial cell wall activity. Here, the authors report an antibacterial nanosperm TEMO, with bacterial cell wall activity, which exhibits broad-spectrum antibacterial effect against S. aureus and P. aeruginosa.

Yanling Zhu, Xu Yu & Jianbin Qiu

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**Estimation of energy efficiency of heat pumps in residential buildings using real-operation data**

Heat pumps are essential for sustainable heating but their performance varies widely. Here, authors analyze data from 1826 systems, revealing that 77% of all cases work inefficiently, with 20% operating at more than twice the expected electricity. This can be largely avoided, highlighting the need for optimization.

Tobias Brandenstein, Jaqlin Hoffarth & Thorsten Summ

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**Dynamic modulation of electron redistribution at the heterogeneous interface via bi-oxide hydroxides between acidic oxygen reduction reaction**

Proton exchange membrane water electrolysis (PEMWE) is the main exchange electrocatalysts. Here, the authors develop a mesoporous amorphous Ir-Co-Ni-Ru-Ta-Ti high-entropy oxide and promotes the polarization of *O intermediate via dynamic e.c interface electron redistribution.

Minhuan Liu, Fei Lin & Yun Wei

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**Generation of spatiotemporal acoustic vortices with arbitrarily oriented orbital angular momentum**

Acoustic vortices with orbital angular momentum (OAM) have potential applications in acoustics. Here, the authors report the generation of spatiotemporal acoustic vortices with arbitrarily oriented OAM.

Wenqi Cui, Hao Qi & Jian-Hong Chen

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**Data-driven energy management for electric vehicles using online reinforcement learning**

Energy management technologies for electric vehicles rely mostly on manual design and simulations. Existing real-world applications. Here, authors introduce a data-driven online reinforcement learning framework that optimizes energy consumption and system degradation jointly, demonstrating improved energy efficiency and adaptability.

Yong Wang, Xuyin Bai & Hongliang Dai

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**No-induced lattice changes to enhance corrosion resistance of $Al_{0.3}CoCrFeNi_2Nb_{0.5}$ high-entropy alloys**

The AlCoCrFeNi high-entropy alloy exhibits superior corrosion resistance due to a stable passive film. However, its performance can be further enhanced. Addition of Nb2 alloys to form a stable $Nb_2O_5$ film passivation film on the surface.

Ruihan Yu, Qingjun Ni & Dehe Tsuyang

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**Deep reinforcement learning can promote sustainable human behaviour in a common-good resource problem**

Human behaviour often overexploits shared resources. Here, the authors investigate the emergence of sustainable behaviour in a common-good resource problem using deep reinforcement learning. Agents learn sustainable harvesting strategies, which can be promoted by dynamically adjusting resource allocations based on the current state of the system. Our findings suggest that sustainable behaviour can emerge from simple reward structures, offering potential insights into policy and governance mechanisms for managing real-world shared resources.

Raphael Koster, Marcus Pan & Christopher Summerfield

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**Spatiotemporal computations in the insect celestial compass**

Insects navigate over the navigation, a neuropil part of the central complex of the brain. A process that remains poorly understood. This study proposes a model of how oscillatory dynamics in the CPU4 cell layer drive heading in locations that can position in the sky, accurately tracking celestial cues.

Dunjiefei Wanlong & Barbara Webb

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**Dynamic doping and interphase stabilization for cobalt-free and high-voltage Lithium-metal batteries**

Cobalt-free rich-nickel layered oxide cathodes suffer from the dissolution and interfacial instability at high voltages. Here, authors report a dynamic doping strategy that enables stable cathode operation, extending the lifespan of lithium-metal batteries.

Zhang Yao, Yingchi Xu & Wenbo Sun

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**Dynamic and asymmetric colloidal molecules**

Colloidal molecules (CMs) are artificial clusters that possess molecular-like geometries and symmetries. Here, the authors report a dynamic CM that can switch between different states of CMs, illustrating how their angular symmetry evolves through a process of continuous symmetry breaking.

Huang Yang, Qiang Gao & Ning Tao

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**Linearization degree of Fe single atom site maximizates polysulfide behavior in sodium sulfur batteries**

Sodium-sulfur batteries performance is determined by the shuttling and degradation of Fe species. Herein, sodium-polysulfur generation and electronic descriptors coordination, demonstrating that Fe single atoms with high activity to regulate highly active and robust positive electrode for Na-S batteries.

Wenyang Zeng, Zhenshuang Wen & Wenbin Hu

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**Broad detection of high-efficiency phosphor in glass films for laser-driven light sources**

Laser-driven light sources (LDLS) require phosphor glass films, but conventional screening is slow. Here, authors report a high-throughput method that combines droplet microfluidics and machine learning to rapidly identify and optimize high-performance phosphor glass films.

Mingzhi Wang, Hong Li & Yuanchang Wang

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**Fast segmentation and multiplexing imaging of organelles in live cells**

Live-cell imaging of organelles is limited by imaging method, identifying and segmenting dense and super-resolution microscopy enables simultaneous tracking of up to 10 organelles in live cells, revealing their dynamic interactions across diverse biological systems.

Wei Ji, Jiaqi Huang & Qi Zhang Ma

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**Fluorinated amorphous halides with improved ionic conduction and stability for all-solid-state sodium-ion batteries**

Halide solid-state batteries using halide electrolytes face the trade-off between ionic conductivity and electrochemical stability. Here, authors design fluorinated amorphous sodium halides as battery electrolytes that overcome this trade-off, enabling high-performance all-solid-state batteries.

Meng Wei, Rong Xu & Yi-Shan Yan

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**Atomically dispersed cerium on copper tailors interfacial water structure for efficient CO-to-acetate electrosynthesis**

Electrochemical CO reduction to acetate (CO$_2$RA) has been limited by poor selectivity. Here, we report a cerium single-atom-modulated copper catalyst, which cerium atoms tailor the interfacial water structure and boost CO$_2$RA selectivity and energy efficiency.

Wei Wang, Yang Zhi Zhang & Jie Ma

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**Ultrafast thermo-optical control of spins in a 2D van der Waals semiconductor**

Controlling spin dynamics in 2D materials holds its highly attractive. Here, authors demonstrate ultrafast optical control of spin dynamics in a 2D van der Waals semiconductor, and show how the anisotropic transport can be harnessed for ultrafast, optically induced control of spin dynamics in 2D materials.

Shaoru Chakraborty, Susan Mishra & Rahul S. Sasmal

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**A standalone bismuth nanosheet-silicon artificial leaf achieving 6.4% efficiency for hydrogen production**

A BiVO$_4$ photocathode with oxygen evolution reaction was developed and coupled with a silicon photovoltaic cell to form a standalone artificial leaf device for solar-driven hydrogen efficiency of 6.4% for solar water splitting with >100 h of stability.

Ruiyuan Liu, Shi Wang & Zongyan Wang

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**Ultrafast thermo-optical control of spins in a 2D van der Waals semiconductor**

Controlling spin dynamics in 2D materials holds its highly attractive. Here, authors demonstrate ultrafast optical control of spin dynamics in a 2D van der Waals semiconductor, and show how the anisotropic transport can be harnessed for ultrafast, optically induced control of spin dynamics in 2D materials.

Shaoru Chakraborty, Susan Mishra & Rahul S. Sasmal

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