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Article
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Photonic-based thermally tunable dual ultraviolet with room temperature daylight visibility

Intense dual-color ultraviolet luminescence is beneficial for the development of optoelectronics and challenging to achieve without toxicity elements. Here, the authors report the use of Pr3+ and Ce3+ in a fluoride host to realize dual-color ultraviolet luminescence with thermal stability.

Yuanyuan Cao, Lucas Pilloud, Ji Zhou [+]

Article
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In situ ionline preservation enables solution-phase polymerization with precise enthalpies for continuous resource recovery from wastes

Catalyst-fueling fusion solvents enable in-solution preservation of polymeric products. The study shows a fluid-based, continuous recycling process that is able to control phase polymerization, thermodynamics during scaling and melting recovery processes.

Yan Wei, Yuchen Ge, Zhongqian Song

Article
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A probabilistic forecasting framework for neighbourhood-level disaggregation of electric vehicle consumption scenarios

Electric vehicles (EVs) research frequently neglects local EV charging behavior with regional scenarios as the primary analysis unit. Here, the authors develop and successfully validate the electricity demand

Isaac Thomas, Yuming Shi, Lidiya Mangan

Article
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Generative flow model on distance geometry for predicting transition states of chemical reactions

Transition state (TS) structure prediction is challenging. A generative flow model is developed to predict transition states. Isomer TS ZINC is proposed to achieve high structural accuracy and better generalizability than Gaussian-based approaches.

Chang Liu, Yuliang Ma, Yi Pan Xue

Article
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Generation of ultra-broadband frequency comb in strongly bistable nonlinear magnonic resonator

Nonlinear magnonic resonators are subject to intense investigation recently, and high nonlinearities, dissipation and large tunable are crucial. Here, the authors demonstrate double-resonator-coupled magnonic resonator with a large nonlinear coefficient beyond the high-Kerr energy change, triggering large tunable spectral broadening.

Yi Li, Wei Zhang, Vasyl G. Baryakhtar

Article
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Open-tube identification of anion effect on lithium nucleation and growth via in situ transmission electron microscopy

Lithium metal batteries face challenges with dendritic growth. Here, authors report the anion effect on lithium nucleation and growth via in situ transmission electron microscopy, providing a design principle for suppressing dendrites and enabling stable lithium deposition.

Yingze Cui, Wen Zhang, Ji Zhou [+]

Article
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Enhanced fragmentation of water droplets upon leidenfrost states

Water droplets become less adapted to intense investigation recently, and high-jet velocities, dissipation and large tunable are crucial. Here, the authors demonstrate double-resonator-coupled magnonic resonator with a large nonlinear coefficient beyond the high-Kerr energy change, triggering large tunable spectral broadening.

Yi Li, Wei Zhang, Vasyl G. Baryakhtar

Article
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Quasi-single-crystalline solidification of a bismuth nanocrystal

Metal solidification is usually subject to intense investigation recently, and high-jet velocities, dissipation and large tunable are crucial. Here, the authors demonstrate double-resonator-coupled magnonic resonator with a large nonlinear coefficient beyond the high-Kerr energy change, triggering large tunable spectral broadening.

Yi Li, Wei Zhang, Vasyl G. Baryakhtar

Article
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Annealing of ex-reactor lattice in van der Waals magnet via field modulation

This work demonstrates field-driven annealing of skyrmion lattice in van der Waals Fe3GaTe2 nanoflakes, which paves the way for controlling the skyrmion lattice in van der Waals magnets at room temperature through a novel defect modulation strategy.

Jingyan Zhang, Yilian Bi, Ai Du

Article
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Electrochemical artificial humification for sustainable waste biomass valorization and soil remediation

Here, a new ecosystem of soil-like processing is generated at an unlimited 100 million-scale. Electrochemical artificial humification (EAH) is developed to convert biomass into humic-like concentrated microbial composting humic-like substances, and associated with plant-beneficial growth-promoting and stress-regulation functions. Here, the authors develop an electrochemical artificial humification (EAH) to convert biomass into humic-like substances, and associated with plant-beneficial growth-promoting and stress-regulation functions.

Junshan Cai, Lipeng Lai & Yuyue Liu

Article
12 July 2022 | Open Access

Synthesis of functionalized hydrosilanes via rhenium-catalyzed hydrosylation and hydrogenation of Cp^*_2-Si bonds to silacyclohexanes

The direct and selective transition-metal-catalyzed hydrosilylation of alkenes is a powerful synthetic process for delivering unique reactivity patterns and material properties. Herein, the authors report a rhenium-catalyzed hydrosilylation of alkenes with Cp^*_2-Si bonds to silacyclohexanes.

Yuanjing Cheng, Wang Zhang & Jiaqiang Ma

Article
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Robust bulk silicon carbide polymorphs sintered from collapsed hollow microporous structure

Researchers synthesize dense, bulk SiC isosteres by short-process sintering of hollow microporous SiC powders. The resulting bulk SiC isosteres have high grain boundary density and property-demonstrating high mechanical and thermal strength.

Hongxiang Zou, Yi Chou & Bart Kim

Article
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Covalently bonded polymer-metal-organic framework semiconductive membranes for flexible X-ray detection

Liang et al. present flexible semiconductive pMOF membranes created by copolymerizing metal-organic framework nanoparticles with polymer ligands. The membranes are used to detect X-rays through a novel indirect mechanism by electrons with tunneling energy transferred between nanoparticles.

Chengyi Liang, Liwei Cheng, Yi Shuai, Wang

Article
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Mid-infrared soundshot spectral imaging via nonlinear radial dispersion

Mid-infrared spectral imaging is coupled with 0-band upconversion single-pixel detection to demonstrate high-sensitivity, high-speed hyperspectral imaging with wavelengths far out into mid-infrared mapping and 3D sensing.

Yaoran Zhang, Yue Zhaohang & Yaoqing Yang

Article
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Single-atom substitution endows K_4Ni_2 reactivity from cofactor biogenesis to stereoselective sulfoxidation

By mapping a single-atom active site within a biomolecule to enable the reaction from its natural function to a new one, the authors show how to engineer new reactivities, including new-to-nature stereoselective complex enzymatic pathways.

Wen-Yuan Huang, Jie Wang, Ke Liu

Article
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Pair density modulation from memristic superconductivity in systems with intra-unit-cell symmetry breaking

The pairing potential plays a fundamental role in the quantum description of superconductivity. In unbiased maps of the two-based superconductor $Ta_2Pd_3Te_5$, The Nichelson's concept of the pairing potential is extended to the case of pairing potential in systems with broken point group symmetry.

Yi-Hsin Tuan, Jingyuan Wang & Nandini A. Lee

Article
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Unravelling the mechanistic origins of efficiency and stereoselectivity in EDA-mediated photocatalysis

The authors use femtosecond and picosecond transient absorption spectroscopy to investigate a photocatalytic system, and provide a rationale for the origins of efficiency and stereoselectivity in these reactions.

Hongchao Yu, Yuanyuan Cao & Yonghong Yu

Article
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Adaptive k-NN graph model

This work is a synchronously inverse regulation classification. Here, authors introduce an adaptive graph based KNN framework using VNNA and pre-processed using k-shift computation to training data, which can be applied to various machine learning and data mining tasks.

Yuan Li, Yuning Qu & Shihong Zhang

Article
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Dual-phase eutectic ceramics with improved hardness and toughness via nano-coherent high-entropy oxides

Researchers have developed a new concept by introducing nano-coherent high-entropy oxides into dual-phase eutectic ceramics, which can simultaneously improve the hardness and toughness of ceramics.

Jie Zhou, Xuefei Liu, Yuanyuan Cao & Yonghong Yu

Article
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Rethinking the use of deep learning methods for photovoltaic power forecasting

The study analyses how to combine historical power data with weather forecasts for solar power forecasting. The authors show that simple models can outperform deep learning models and that the best performance is obtained when the models depend on power only on the most direct

Yuqi Zhang, Yuanyuan Zhang & Wei Zhang

Article
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Large-scale integrated nanoelectronic chaos for machine learning acceleration

Researchers demonstrate an integrated optoelectronic chaos engine that generates massively parallel, high-dimensional chaotic signals and accelerates machine learning tasks by about two orders of magnitude, offering a promising route to a petahertz computer.

Zhongqi Tan, Zhedal Zhang & Zhihong Yao

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A highly switchable ion channel filter for composite motion decoupling

Ruggedized bilevel intercalation of polymer chains provide to greatly enhance filter mechanics, and the resulting composite filter exhibits excellent mechanical sensing and decoupling motion and mechanical motions due to ruggedized bilevel intercalation.

Zhangchang Li, Wen Wang & Chang Hun

Article
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Surpassing homochiral assemblies in chiroptical activity through enantiomeric imbalance

Here, the authors report a chiroptical activity of homochiral assemblies, their chiroptical signals are typically smaller than those of enantiomeric ones. Here, the authors report that enantiomeric imbalance can surpass the chiroptical activity beyond that of homochiral assemblies.

Min Wen, Xiuqiu Wang & Hongkun Xu

Article
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Multiscale structural engineering enables superior energy storage in intergranular tungsten bronze relaxor ferroelectrics

Here, the authors report a multiscale structural engineering strategy to design intergranular tungsten bronze relaxor ferroelectrics with superior energy storage performance. Specifically, the authors develop a new type of BiFeO3-Ba(Zn1/3Nb2/3)O3-based ceramics.

Yuqin Zhang, Yuanyuan Zhang & Yang Li

Article
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K$^+$-free mica-assisted epitaxy of Ni-based chalcogenide and oxychalcogenide single crystals

A mica-based epitaxial growth approach has been developed for synthesizing Ni-based chalcogenide and oxychalcogenide single crystals with a thickness down to the monolayer limit. Here, the authors report the growth of over-sized Ni-based chalcogenide and oxychalcogenide crystals on K$^+$-free fluorophlogopite mica substrates via a vapor-solid epitaxial growth mechanism.

Yongji Gong, Yuanyuan Zhang & Yang Li

Article
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Late-stage generation of ^{14}C/^{18}F-radiolabelled ynine oxidoarylation of peptides

Researchers have developed a new method for the late-stage generation of ^{14}C/^{18}F-radiolabelled ynine oxidoarylation of peptides, which could be used for drug development at the target identification level. This method has been successfully applied to the synthesis of ^{14}C/^{18}F-labelled peptides and ^{18}F-labelled ynine oxidoarylation and complex peptide-conjugated fluorophores and molecular probes.

Shiqi Zhang, Yuanyuan Zhang & Yang Li

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Thermochemical Treatment of Wastewater Residual Solids for Global Mitigation of Emerging Contaminants

The authors show that wastewater residual solids act as concentrated reservoirs of emerging contaminants, and thermochemical treatment can destroy these contaminants and recover energy and nutrients.

Sarah Feng & James L. Cizdziel

Article
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Catalytic asymmetric formal nucleophilic C-2 substitution of indoles via C-2 umpolung toward 2,2′-bisindolic arylpropanoids

Here, the authors report a catalytic asymmetric formal nucleophilic C-2 substitution of indoles via C-2 umpolung reaction toward 2,2′-bisindolic arylpropanoids. The reaction of 3-indolylmethanols with indoles, enabling their catalytic asymmetric formal nucleophilic C-2 substitution of indoles via C-2 umpolung reaction toward 2,2′-bisindolic arylpropanoids.

Chang-Yue Han, Wen-Ting Ye & Ying-Chun

Article
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Convergence to and convergence control dependent performance of enhanced sampling methods across biological complexity

Enhanced sampling molecular dynamics methods are widely used to explore biomolecular systems. Here, the authors report a convergence control dependent performance of enhanced sampling methods across biological complexity and an ensemble-across biological complexity and an ensemble-across biological complexity and an ensemble-based approach to improve convergence and accuracy of free energy calculations.

Chenqiang Gao, Yuning Zhuang & Yuan Zhang

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Direct Asymmetric α-C Conjugate Addition of Aminomethylbenzoquinone Enabled by Carbonyl Imidate Double Organocatalysis

Direct asymmetric α-C conjugate addition of aminomethylbenzoquinone is successfully achieved via carbonyl imidate double organocatalysis. Here, the authors report the direct asymmetric α-C conjugate addition of NH$_2$-substituted benzoquinone to α,β-unsaturated carbonyl imidate via double organocatalysis.

Yongwei Ji, Xiaoqiang Yu & Wenjun Yang

Article
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On-chip nonlinearly nonlinear photodetector

Nonlinear light detection is an ideal photodetector can enable advanced functions, but devices remain challenging to realize in integrated photonics. Here, the authors report a nonlinear photodetector realized on a waveguide that current-and light-dependent nonlinear photodetection.

Yu Zhang, Xiaoqing Chen & Junmin Gan

Article
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Self-filtering monolithic organic-PbS quantum dot photodetector for visible and short-wave infrared detective vision in low light

Dual-mode photodetectors are developed for visible and short-wave infrared detection. The authors report a self-filtering monolithic organic-PbS quantum dot photodetector with high dynamic linear response sensitivity and accuracy, enabling high-quality imaging under dual light.

Changhyeon Kim, Seonho Yu, Jung Ho Kim & Eunji

Article
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Layer-by-layer self-assembled thin-film composite polyamide membranes for enhanced CO2/N2 separation

Enhanced sampling molecular dynamics methods are widely used to explore biomolecular systems. Here, the authors report a convergence control dependent performance of enhanced sampling methods across biological complexity and an ensemble-across biological complexity and an ensemble-across biological complexity and an ensemble-based approach to improve convergence and accuracy of free energy calculations.

Yuanyuan Cao, Yuning Zhuang & Yuan Zhang

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Tunable magnons in a dual-gated 2D antiferromagnet

The 2D antiferromagnet CrPS4 holds tunable in-plane magnetic anisotropy. Here, the authors report the tunable magnons in a dual-gated 2D antiferromagnet. Here, the authors report the gate-tuned evolution of the magnons via the antiferromagnetic spin-flop transitions.

Hao Wu, Yuanyuan Zhang & Wei Zhang

Article
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Hot exciton dissociation in graphene nanoribbons

Using momentum spectroscopy, the authors directly measure the momentum of hot excitons after photon absorption in graphene nanoribbons, with anisotropic exciton energy. Hilton Angle (HA) is found to be a key factor for hot exciton dissociation and transfer.

Yuanyuan Zhao, Yuyue Liu & Yan Zhang

Perspective
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Influence of protein aggregates, extracellular vesicles, and viruses on therapeutic protein batch variability and its process control analytics

Engineering cargo-specific CMV impacts a deep understanding of the protein concept as for fluid dynamics. Here, the authors report a deep understanding of the protein concept as for fluid dynamics, composition and size analysis of different samples in a deep flow analysis field platform technique.

Babak Kashyap, Alexander M. Mooney & Andreas Mahlknecht

Article
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Light-triggered oxygen redox activity at the edge of cobalt oxyhydroxide for superior water oxidation

Here, the authors report a light-triggered oxygen redox activity at the edge of cobalt oxyhydroxide for superior water oxidation. Here, the authors report a light-triggered oxygen redox activity by enabling direct oxygen redox activity at the edge of cobalt oxyhydroxide for superior water oxidation.

Wu Zhang, Yuqin Zhang & Junmin Gan

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Coordinatively improving polymeric phosphorescence lifetime and quantum yield via triplet exciton modulation

Here, the authors report a coordinatively improving polymeric phosphorescence lifetime and quantum yield via triplet exciton modulation. Here, the authors report a coordinatively improving polymeric phosphorescence lifetime and quantum yield and also controlling its efficiency generation and quenching of triplet excitons for flexible phosphorescence.

Yuanyuan Zhang & Junmin Gan & Wei Zhang

Article
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In situ ceramic nanoparticle assembly within wood microstructure for strong, tough, and resilient ceramic wood

Artificial wood-like materials are developed by in situ assembly of ceramic nanoparticles within wood microstructure. The ceramic wood exhibits high strength, toughness, and resilience, enabling high-strength wooden wood composites with good fire resistance and thermal insulation.

Mingzhi Yan, Yuyue Liu & Yan Li

Article
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Solvent-assisted crumbling in strategy enables improved triboelectric nanogenerator output

This study demonstrates that melting-assisted crumbling in strategy enables improved triboelectric nanogenerator output. Here, the authors report a solvent-assisted crumbling in strategy enables improved triboelectric nanogenerator output.

Yan Zhao, Wei Yu & Yan Li

Article
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Investigating and inhibiting carbody-slip can generation for practical low-temperature and fast Li-ion batteries

Carbody-slip can generation is a major challenge for practical low-temperature and fast Li-ion batteries. Here, the authors report a carbody-slip can generation that severely limits Arrhenius behavior stability. Here, the authors report a carbody-slip can generation that severely limits Arrhenius behavior stability, enhancing low-temperature and fast-charging performance and enabling a 3-Ah pouch cell that delivers 80% capacity retention after 1,000 cycles.

Yuanmeng Chen, Wuyang Yan & Wang Ling

Article
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Switchable adhesion of phase transition outcrough with integrated machine learning-enhanced intelligent adhesion control

This study demonstrates switchable and reversible adhesion, through integrated machine learning-enhanced intelligent adhesion control. Here, the authors report a switchable adhesion of phase transition outcrough with integrated machine learning-enhanced intelligent adhesion control.

Yuanyuan Zhang & Junmin Gan & Wei Zhang

Article
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Layer-by-layer shear-densification for multiscale hierarchical alignment in bulk hydrogels

Here, the authors report a layer-by-layer shear-densification for multiscale hierarchical alignment in bulk hydrogels. Here, the authors report a layer-by-layer shear-densification for multiscale hierarchical alignment in bulk hydrogels.

Yan Wang, Yuanyuan Zhang & Yan Li

Article
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Nanocrew engineered fibers for proactive prevention of wear particle-induced osteolysis

Traditional strategies to address wear-induced osteolysis largely focus on reducing wear debris generation. Here, the authors report a nanocrew engineered fibers for proactive prevention of wear particle-induced osteolysis by enabling in-situ hydrogen-based scavenging of wear debris.

Qingni Liu, Yanyu Zhao & Yan Wei

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Designing effective single molecule electromagnets with radially π-conjugated carbon structures

Here, the authors report a design strategy for single-molecule magnets with radially π-conjugated carbon structures. Here, the authors report a design strategy for single-molecule magnets with radially π-conjugated carbon structures.

Wenchao Yin, Richard Kaplan & Lothar Veltenhaus

Article
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Wideband diode-engineered reputable fluoropolymer elastomer for flexible perovskite solar cell with excellent thermal mechanical cycling endurance

Here, the authors report a wideband diode-engineered reputable fluoropolymer elastomer for flexible perovskite solar cell with excellent thermal mechanical cycling endurance. Here, the authors report a wideband diode-engineered reputable fluoropolymer elastomer for flexible perovskite solar cell with excellent thermal mechanical cycling endurance.

Yuanyuan Zhang, Yuyue Liu & Yan Zhang

Article
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Integrating microbial cell factory with new-to-nature biocatalysis for de novo biosynthesis of a monoterpene nanocellulose

Microbial cell factories are a powerful tool for synthesizing value-added chemicals. Here, the authors report a microbial cell factory with new-to-nature biocatalysis for de novo biosynthesis of a monoterpene nanocellulose. Here, the authors report a microbial cell factory with new-to-nature biocatalysis for de novo biosynthesis of a monoterpene nanocellulose.

Yuanyuan Zhang & Junmin Gan & Wei Zhang

Article
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Low-hygroscopic solvents enable ambient blade coating of efficient perovskite solar cells

Here, the authors report a low-hygroscopic solvents enable ambient blade coating of efficient perovskite solar cells. Here, the authors report a low-hygroscopic solvents enable ambient blade coating of efficient perovskite solar cells.

Yuanyuan Zhang & Junmin Gan & Wei Zhang

Article
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Current induced creation and dynamics of embedded magnetic skyrmion bags

This study reports the all-electrical creation and manipulation of magnetic skyrmion bags at zero magnetic field in a synthetic antiferromagnetic multilayer with perpendicular magnetic anisotropy.

Yuanyuan Zhang, Yuyue Liu & Yan Zhang

Article
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Thermal decoupled solvolysis enables kosmotrope solar cells with 21.5 certified efficiency

Here, the authors report a thermal decoupled solvolysis enables kosmotrope solar cells with 21.5 certified efficiency. Here, the authors report a thermal decoupled solvolysis enables kosmotrope solar cells with 21.5 certified efficiency.

Yuanyuan Zhang & Junmin Gan & Wei Zhang

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Digitally-encoded dual-narrowband photodetectors for secure optical wireless communication
Ultra-narrowband photodetectors with digitally-encoded dual-narrowband spectral response enable spectral filtering with encrypted light signal processing for secure communication.
Hongyu Zhang, Shengxiang Xiao, Yongbo Yuan

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Decoding MnO$_2$ redox chemistry from mechanistic ambiguity to device principles for aqueous Zn ion batteries
A full mechanistic picture of manganese dioxide cathodes in aqueous zinc ion batteries remains elusive. Here, the authors report a unified mechanism that encompasses the complete redox process and show how the mechanistic insight informs electrode design for stable aqueous batteries.
Yuan Wang, Gaohuang Jiang & Yiyue Xiaoke

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Atomically confined insertion for 2D strain and polarization engineered GaN electronics
A type-doping GaN/AlN power device performance, citing atomically confined insertion, the authors report a GaN/AlN/GaN heterostructure with a 2D electron gas channel and demonstrate that the heterostructure and superlattice is used to create new 2D functional applications.
Yuanhong Yu, Qiliang Wang & Yong Cai

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Integrated iron-down and bottom-up proteomics enables precise characterization of proteoforms within the protein corona
Characterization of proteoforms within the protein corona is needed to advance diagnostic and therapeutic applications. Here, the authors combining two spectrometry based top-down and bottom-up proteomics approaches to characterize proteoforms within the protein corona.
Krystal Vasquez-Kennedy, Kaylyn Yan & Liangliang Sun

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Stabilizing 'acoming-overpitch' propeller for high-speed railways
The authors report a stabilizing, energy-saving propeller for railways to address the issues of aerodynamic drag and noise. Inspired by the owl's wing, the propeller has a leading-edge serration and a trailing-edge flow-control fence with a bionic configuration.
Xiaowei Hu, Yanyu Zhang & Guanming Xiao

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Detection and countermeasure integrated framework against false data injection attacks in multi-area coupled power systems
The study proposes a framework for detection and countermeasure of false data injection attacks in multi-area power systems. Assuming state estimation, reducing false alarms and stabilizing grid frequency.
Jiangbiao He, Lei Xi & Yue Chen

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Hybrid acoustic metamaterial platforms enabling multiscale bandgaps responsive for distortion-free wrenchable displays
This study presents a hybrid acoustic elastomer platform that enables multiscale bandgaps responsive to mechanical deformation. The platform can be used for stage effects audio engineering applications and wrenchable displays.
Yun Lai, Yuhao Kang & Zhengyou Liu

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Nanometre precision terahertz interferometry for battery electrode metrology
This study discusses a breakthrough in the field of lithium ion battery (LIB) metrology, demonstrating the first use of terahertz interferometry to measure the thickness of battery electrodes with nanometre precision and micrometre probing frequency under ambient conditions. First manufacturing.
Xuanlin Wang, Jiaoyuan Wu & Yaxing Jia Wan

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Interfacial proton-electron donor synergy enables sustainable redox electrochromic via dual-ion reactions
Organic/inorganic electrochromic materials can potentially be a friend by accumulating proton-electron donors. Here, the authors report a dual-ion electrochromic device that can be powered by a solar panel and a photodetector for battery-free and smart-window for high-efficiency solar protection.
Shuo Wang, Ning Zhao & Jia Ma

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Decoupling electron transfer defines a quantitative kinetic framework for oxygen evolution catalysis
The oxygen evolution reaction (OER) is a key reaction in energy storage is limited by difficulty in measuring mechanistic kinetic rates. Here, the authors report a framework that quantifies the oxygen evolution step and guides catalyst design.
Xiaoyu Zhang, Junming Cao & Junhua Hao

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Imaging of a van der Waals spin orbit torque system using spin ensembles in hBN
Recently hBN has seen a rise in usage, but has been demonstrated to use the van der Waals magnetic material Fe$_3$GeTe$_2$ (FGT) as a spin orbit torque source. Here, the authors report Yuanbo Zhang, Zhou, and Guoqiao Hugo the current induced spin orbit torque switching in the van der Waals heterostructure.
Xi Zhang, Jingcheng Zhou & Yuanbo Zhang

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Efficient and durable light alkane oxidation over sintered Pt catalysts
Metal oxides that are active, when their particles grow, to dispersion is usually maximized. This study reports a sintered Pt catalyst that has the highest operating and thermal light alkane oxidation.
Yuan Ping, Yang Yang & Wang Gu

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Self-powered dual electrode hydrogen production using a composite ion exchange membrane
Membrane limitations constrain the performance of all-solid hybrid electrochemical system. Here, the authors report a composite membrane that enables the use of both acid and alkaline electrolytes and improves acid and alkaline efficiency with efficient electricity and hydrogen production.
Yuan Liu, Chenghao Jin & Lei Jiang

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Ordered nanoplastic-elastomer networks resolve conflict between softness and stability
Soft materials often fail through crack through instability, but overcoming this instability requires a trade-off between softness and stability. Here, the authors report a soft, tough, and stable material based on ordered nanoplastic-elastomer network that shows stable stiffening while retaining small elastic softness.
Lei Wang, Changhao Lin & Yingwu Luo

Article
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Cryoelastic and cryochromic organic crystals
Cryochromic luminescent organic crystals are used in photonics and sensing technologies, but the mechanical properties of these materials are rarely considered. Here, the authors report a series of cryochromic crystals with unusual cryoelastic elasticity at low temperature while exhibiting distinct thermochromism responses.
Jinchong Wang, Chenlong Liu & Hongyu Zhang

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Machine learning-enhanced design of carbon nanotube solar composting circuits for monolithic unidermal systems
The high-performance processing capability is constrained by the physical properties of carbon nanotubes (CNTs). Here, the authors report a machine learning-enhanced design of CNT circuits with high flexibility. It validated as a flexible edge computing system that integrates sensing and processing.
Weihang Liu, Li Wang & Yanbin Hao

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Mechanically adaptive crack resistance hydrogels based on single-induced macroscopic phase separation and bioinspired lateral energy dissipation
Achieving a combination of stiffness extensibility and resistance to crack propagation in hydrogels is challenging. Here, the authors report a mechanically adaptive hydrogel with tunable mechanical properties and favorable properties by combining polymer and small molecules.
Mengxin Gong, Zhongwei Wang & Jie Qian

Article
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Single-atom photocatalyst for click reaction
Copper(I)-catalyzed azide alkyne cycloaddition is one of the most widely used click chemistry reactions. Here, the authors report a single-atom photocatalyst for click reaction with high activity and photostability. Experimental results coupling the above-mentioned single-atom photocatalyst with a photoredox catalyst can realize the click reaction of azides and alkynes to synthesize 1,4-disubstituted 1,2,3-triazoles with different heterogeneous cycloaddition with high conversion and yield.
Chong Cheng, Qiliang Shi & Jie Jiayuan Liu

Article
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A ligand-Controlled Oxidant-Free Cu(II)/(III) Catalyst Synthesis of Benzosydnobutenones via [2 + 2] Annulation
Benzosydnobutenones are the synthesis of highly oxidant-promoted decarboxylative annulation of benzosydnones with alkynes. However, the reaction is limited to the use of stoichiometric amounts of oxidants. Here, the authors report a ligand-controlled oxidant-free Cu(II)/(III) catalyst synthesis of benzosydnobutenones via [2 + 2] annulation.
Rongliang Gao, Yunhua Wang & Xichuk Gaoxiao

Article
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A generalist biomedical vision-language model via multi-CLIP knowledge distillation
Here, the authors report a generalist biomedical vision-language model trained with multi-level knowledge distillation to improve performance across heterogeneous medical imaging modalities.
Xiaosong Wang, Zhiyong Lu & Xiaosong Wang

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Fibronectin electrochemical sensors for continuous dose-tissue lactate monitoring in critical care
Lactate is a key metabolite, but monitoring it in critical care remains a roadblock monitoring. Here, the authors report a fibronectin electrochemical sensor that enables continuous lactate monitoring in human lymph, epilepsy and septic shock.
Chen Yu, Yuanhong Gong & Lan Yin

Article
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Scaling two-dimensional semiconductor nanosheets for high-performance electronics
3D semiconductors are promising candidates to overcome the short channel effects and the thickness-limited scaling of 2D transistors that have been fully characterized. Here, the authors demonstrate the scaling of 2D semiconductor nanosheets for high-performance electronics and integrated circuits.
Yuan Liu, Chen Wang, Ying & Zhiyong Zhang

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Phenolic compound-mediated covalent crosslinking as a universal mechanism for cellulose deactivation during lignocellulose saccharification
Cellulose is a recalcitrant structure in lignocellulose and disconnects but is often limited by cellulose enzyme adsorption. Here, the authors report a universal mechanism that is the phenolic compounds (PC)-mediated covalent cross linking of cellulases, leading to their deactivation and the inhibition of cellulose hydrolysis by coupled PC-mediated inhibition.
Bi Yan Hu, Yuan Chen & Yingang Feng

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Fluorescence localization and tracking imaging with a spectral-splitting perovskite single-pixel detector
A PD-based, a perovskite-based single-pixel imaging system is developed that simultaneously captures spectral and spatial information of the target. The system enables high-resolution imaging and fluorescence tracking in the confocal imaging applications.
Yuanhong Gong, Yuanhong Zhang & Yuan Chen

Article
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Minimizing galvanic corrosion for durable anodic less aqueous zinc batteries
Anode less aqueous zinc batteries promise safe, energy dense storage but are limited by zinc loss. Here, the authors report a galvanic corrosion mechanism and show that the addition of a corrosion inhibitor passivates parasitic electron transfer and promotes dense zinc deposition to improve reversibility.
Yuanlong Zhao, Xiaohan Zhang & Cheng Yang

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Photoinduced Ni-Bonding EDA complex-enabled cluterial editing of furans to pyridazines
Optimal editing enables direct structural reorganization of molecular frameworks, providing a powerful strategy for rapid exploration of chemical space. A ring-editing reaction that converts furans into pyridazines is reported. The reaction proceeds via a photochemical energy-transfer mechanism that enhances the photochemically sensitive pyridazine without external photocatalysts.
Yuan Tang, Pengyun Gao & Wen Li

Article
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Overcoming the thermo-reductive nulse limit for a full-spectrum Hertz linewidth microcomb
High-coil-performance low-noise microcombs are crucial for future measurement and coherent communications. Yet traditional self-injection locking is limited by thermo-reflective noise that results in a fundamental linewidth limit. Here, the authors report a thermo-reductive noise cancellation scheme to create self-generated ultra-low-noise microcombs, a 3D-printed microresonator.
Chao Zhou, Xuefei Miao & Tian Tang

Article
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Capture, storage, and re-use of liquid hydrogen fuel-off for aviation and aerospace applications
Liquid hydrogen is a promising fuel for aviation because of safety concerns. Here and Blessing et al investigate the potential ways of capturing, storing and re-using these losses in aviation and aerospace applications.
Ying Zhang, Lubin Gaoxi & Hanna Kouang

Article
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Flexural dimensional mobility defines intrinsic van der Waals elastic limits in the interplanar direction
Solving a dispute from the book Xu van der Waals, here the authors show that flexural phonon dispersion can be used to measure the interplanar shear properties of 2D materials, providing their unexpectedly low intrinsic. Jan Van Waals books.
Yihui Zhang, Shengxi Liu & Yang Li

Article
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Divergent C2 functionalization of N-Heteroarenes via aminophosphoranylation
Selective functionalization of the N-heteroarene is challenging due to its aromatic stability and multiple reactive sites. Among different systems of distinct derivatives. Here, the authors report a divergent C2 functionalization of N-heteroarenes via aminophosphoranylation, affording functionalized pyridine and pyridone.
Lei Huang, Yuanhong Zhang & Chao Hu

Article
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Exciton dispersion fine structures and deep-ultraviolet optical conductivity of boron-nitride two-dimensional h-BN
The authors use momentum-resolved electron energy loss spectroscopy to reveal the exciton dispersion fine structures and deep-ultraviolet optical conductivity of h-BN.
Yichao Zhang, Mathieu Kociak & Francesca Wenzel

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Electron psychography reveals correlated lattice vibrations at atomic resolution

The authors propose a method that extends conventional electron psychography to reveal correlated lattice vibrations at atomic resolution. Here, the authors report a method that is widely used to directly analyze the response of defects in crystals to external perturbations or to measure the anharmonic traits for the crystal, probing its physical response.
Knut Christian Thorkild Bjerglund Holt & Christoph T. Koch

Article
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PIP$_2$ activation of the cardiac I$_{K1}$ potassium channel
PIP$_2$ is an all-signalling molecule that controls gating of the I$_{K1}$ channel underlying heart rhythm. Here the authors report the cryo-EM structure of the human I$_{K1}$ channel in the presence of PIP$_2$ and the I$_{K1}$ specific activator quercetin (QUE) bound.
Lu Zhao, Zhaojie Su & Jianmin Cui

Article
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Synthesis of bundle cuspidynes as an emergent class of cuspidynes architecture
Cuspidynes are a class of cuspidynes prepared by their reinforcement. Here, the authors synthesized cuspidynes with a bundle architecture, which exhibited a high cuspidyne content and a high cuspidyne density. Cuspidynes with a bundle architecture exhibited a high cuspidyne content and a high cuspidyne density.
Yuki Kamimura, Shinsuke Kawagoe & Takashi Kamimura

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A city's behavior as a model of collision avoidance behavior in human drivers

Optimal driving behavior is a key to understanding the human behavior. Here, the authors report a collision avoidance with a model, which is a model of human driving behavior that can be used to study driving behavior in human drivers.
Lukas F. Arbenser, Alexi Gaoxi & Andrea Sgambini

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Individual locomotor bias drives counterclockwise motion in pedestrian crowds
Counterclockwise motion has been documented in human gatherings. The authors show that counterclockwise motion is driven by individual locomotor bias and not by crowd interactions.
Nicholas Gale, Timothy Chandler & Ben Campbell

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Nondestructive removal of superhydrophobic coatings by an electric switch
Extensive efforts have been made to enhance the durability of superhydrophobic coatings by adhesives, but the nondestructive removal of these coatings is rarely reported. Here, the authors report a superhydrophobic coating that can be removed non-destructively by an electrical switch.
Shuangnan Huang, Qilin Yan & Zhenlin Wang

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Photoelectrocatalytic self-cross-coupling enabling carbon chain elongation
A tandem green-and-efficient carbon chain elongation protocols, this study reports a photoelectrocatalytic system enabling radical-mediated self-cross-coupling reactions.
Yuan Yao, Zhaojiang Xu & Jiagang Hua

Article
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Intermetallic charge redistribution restructures the oxygen-bound intermediate network for efficient ethylene electrosynthesis
Tuning active sites for Cu-based catalysts requires delicate local control intermediate binding. Here, the authors report a Cu-based intermetallic catalyst that restructures the oxygen-bound intermediate through orbital interactions, enabling efficient ethylene production from dilute carbon dioxide.
Jianmin Hu, Mengjie Liu & Yuchen Liu

Review Article
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Passive subambient cooling and atmospheric water nexus
Rising global temperatures drive demand for sustainable cooling and water solutions. Here, the authors review the passive subambient cooling and atmospheric water technologies to address heat and water stress in a warming climate.
Yuanhong Wang, Yuchen Yang & Yaoxiang Gao

Article
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Lanyonol: Unsolvated cuprous oxides (I^{2000}) 4-cubic nitrate-to-ammonia electrochemistry at 2 A cm^{-2}
Cuprous oxide (Cu$_2$O) is a promising catalyst for nitrate reduction to ammonia but the performance at industrial current densities. Here, the authors report Cu$_2$O in-situ like reactors along the Pourbaix thermodynamic pathway, maintaining 100% stability at 1 A cm^{-2} under 1000 h operation.
Yu Yang, Wen Li & Jie Jiang

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Highly sensitive X-ray responsive molecular switches
X-ray triggered molecular switches are promising for control of the X-ray dose and the flux. Though it is challenging to meet the simultaneous needs for a low radiodose. Here the authors design a molecular switch that can be triggered by low-energy hard X-rays.
Yongbiao Yi Gaoxiao Wei & Yuhong Wei

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Merging bioinspired biocatalysis with supramolecular photocatalysis for Michaelis-CO$_2$-reduction to enol-precursors
A bioinspired pre-incubation strategy enriches reactive species within a cytochrome c-rich protein cage, enabling the photocatalytic reduction of CO$_2$ and the C-H activation. Corresponding to enol-precursors.
Wei Hu, Lukas F. Arbenser & Chunying Duan

Article
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Ammonia mediated electrocatalytic adsorption synthesis of paired subnanoclusters with enhanced hydrogen evolution performance
Subnanoclusters have great potential for alkaline hydrogen evolution, yet achieving precise control is challenging. Here, The authors report a bioinspired ammonia-mediated strategy to fabricate tunable paired subnanoclusters exhibiting good fuel cell performance and long-term durability.
Xiaoxiao Li, Wei Zhang & Yong Lei

Article
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Neutral chiral bidentate tellurium triazole for enantioselective non-covalent chalcogen bonding catalysis
Chalcogen bonding has garnered significant interest in the field of non-covalent catalysis, primarily focusing on cationic chalcogen bonding. Here, the authors report a neutral chiral bidentate catalyst inspired by the chirality and reactivity of the tellurium. Here, the authors report the design and synthesis of a neutral chiral bidentate tellurium triazole.
Lady Maxwell, Santos Ortiz & Olga Garcia Mancheño

Article
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Uniform nanoporous zirconia composite membrane enabling high performance alkaline water electrolysis
Alkaline water electrolysis is a promising technology for hydrogen production and gas blending. Utilizing efficiency is alkaline water electrolysis. Here, the authors report a uniform nanoporous zirconia composite membrane with strong stability, and alkaline electrolysis.
Zhenlong Wang, Yuanhong Gong & Yuan Chen

Article
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Facet heterojunction achieved by high work function Au$_{1-x}$Ag$_x$ alloy contacts for high performance p-type WSe$_2$ transistors
The fabrication of p-type contacts for 2D semiconductors is limited by the high work function. Here, the authors report a facet heterojunction achieved by high work function Au$_{1-x}$Ag$_x$ alloy contacts control strategy using a high work function Au$_{1-x}$Ag$_x$ alloy to achieve facet-level engineering to realize high performance p-type WSe$_2$ transistors.
Wenjing Li, Yiyu Xia & Lain-Jong Li

Article
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Sulfur engineered rhenium single atoms on borides for tunable syngas and lactic acid co-production
Single-atom catalysts (SACs) are promising for electrochemical catalysis reconstruction strategy, researchers have reported a Re SAC on a Co$_2$B nanosheet (Re$_1$-Co$_2$B) for C–C bond cleavage coupling under 0.25 V RHE, and together a bulk yield of 99.8%.
Weihong Gao, Qiliang Liu & Yuanhong Gao

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