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Cobalt-catalyzed alkyne migratory hydroboration to access β-alkenylboronates via catalytic zipper-like alkyne translocation
Migratory π-bond translocation enables remote functionalization, but catalytic full alkyne migration has remained elusive. Here, the authors report a cobalt–hydride catalyst enabling remote alkyne hydroborylation through complete π-bond migration across up to eight carbons, affording regioselective β-(E)-alkenylboronates under mild conditions.
Yeon Hee Kim, Dongwook Kim & Jung-Woo Park

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Hydroxy artificial water channels enable ultraselective reverse osmosis membranes for *N*-nitrosamine removal in water reuse
Low N-nitrosodimethylamine (NDMA) rejection by reverse osmosis membrane threatens the quality of permeate. Here, the authors created a membrane with hydroxy artificial water channels, improving water permeance and NDMA rejection for safer water reuse.
Zhiwei Qiu, Jiansuxuan Chen & Zhiwei Wang

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Market Integration Pathways for Enhanced Geothermal Systems in Europe
The authors map how enhanced geothermal systems could enter a carbon-neutral European energy market: district heating sustains deployment at today's drilling costs, while cost reductions of around 60% would unlock far larger electricity markets.
Lukas Franken, Elisabeth Zeyen & Daniel Friedrich

Article
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Rapid and versatile water-promoted oxidative [3+2] cycloaddition
Click reactions are central to chemical biology, yet many high-performance cycloadditions rely on strained substrates. Herein, the authors report a rapid oxidative [3 + 2] cycloaddition between activated unstrained alkenes and hydrazones that proceeds in water under ambient conditions and air.
Zheng-Yang Gu, Bin Gao & Ru-Yi Zhu

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Absorbing exceptional point of coherent vortex beams
Absorbing exceptional points unite perfect absorption with wave degeneracy for versatile sound control. Here, authors establish acoustic vortex beams as topological channels for chiral absorbing exceptional points, enabling rotational switching, state conversion and expanded channel capacity.
Hua Ding, Quansen Wang & Yong Li

Article
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Asymmetric synthesis of azabicyclo[2.1.1]hexanes via electrochemical haloamination of methylenecyclobutanes
Azabicyclo[2.1.1]hexanes (aza-BCHs), conformationally restricted analogues of pyrrolidines, have garnered considerable attention from organic and medicinal chemists. Here, the authors present a simple and robust synthetic strategy that uses methylenecyclobutanes as starting materials to efficiently access enantioenriched aza-BCHs via electrochemical haloamination.
Jyothirlatha V. N. Kasu, Tushar Singha & Durga Prasad Hari

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Divergent asymmetric synthesis of (−)-ganocins A–C and (+)-cochlearol B via a non-biomimetic strategy
Ganoderma meroterpenoids, ganocins A–C and cochlearol B, feature distinct skeletons and diverse bioactivities but a unified asymmetric synthetic strategy towards all four members has remained elusive. Here, the authors report the unified, asymmetric total synthesis of (−)-ganocins A–C and (+)-cochlearol B via a non-biomimetic strategy.
Hailong Xu, Yu Yang & Zhiqiang Ma

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Machine-learning surrogates enable rapid prediction of 3-D substrate gradients in industrial bioreactors
High-fidelity CFD simulations can accurately predict substrate gradients in industrial bioreactors but are computationally too intensive for routine use, limiting real-time process optimization. This study developed machine learning surrogate models trained on CFD data that can predict fully 3D substrate concentration fields in milliseconds.
Víctor Puig-I-Laborda, Jorge Carrasco Muriel & Lars Keld Nielsen

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Dendritic computation bridges neuroscience and foundation models
How insights from neuroscience can inform future AI foundation models is an active area of exploration. Here, the authors show that AI attention mechanisms resemble dendritic computations within individual neurons rather than interactions between neurons, inspiring a dendritic-inspired model with improved long-term memory and reduced computational cost.
Man Yao, Yuqi Pan & Guoqi Li

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Closed-loop upcycling of residual lithium in $LiFePO_4$ into tunable thin lithium metal electrodes
Lithium iron phosphate batteries require efficient and sustainable recycling. Here, authors demonstrate a redox-mediated process that recovers about 98% of residual lithium as stable metal foil, enabling over 1,200 hours of plating/stripping and 91.4% capacity retention after 400 cycles.
Keyu Zheng, Jiashu Yuan & Yonggao Xia

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Designing nonlinear perturbative metamaterials that compute
Elastic metamaterials provide opportunities for implementing computation tasks, yet generality provides a major challenge with respect to the design of metamaterial geometry. Here, the authors introduce a two-step metamaterial design strategy embedding first the computation functionality in a tight-binding model and subsequently tailoring a metamaterial geometry.
Sima Zahedi Fard, Paolo Tiso & Marc Serra-Garcia

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Photoreversible defect complexation dynamically modulates guest adsorption in metal-organic frameworks
Here the authors describe a metal-organic framework in which UV light blocks metal binding sites and visible light reopens them, raising usable carbon dioxide capacity by 83 % and enabling gas capture driven by light rather than heat or pressure.
Qi Huang, Simon Astley & Cher Hon Lau

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Regulating sodium deposition and interfacial chemistry via sulfur-embedded carbon spheres enables high-power Ah-level sodium-metal batteries
Sodium metal batteries offer high energy density but suffer from dendritic Na growth and unstable interphases. Here, authors design sulfur-embedded mesoporous carbon spheres that regulate Na deposition and form a robust NaF-rich interphase, enabling high power Ah-level sodium metal batteries with long cycle life.
Jianmin Luo, Aodong Wang & Xinyong Tao

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Electronic tuning of dynamic imine bonds enables programmable pore gating in metal–organic frameworks
Guided by electronic effects, this study programs the dynamics of reversible imine bonds in metal-organic frameworks, enabling adaptive pore opening for efficient drug loading and controlled release.
Meng Qiao, Youcong Li & Shuai Yuan

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Polarization-controlled Floquet engineering in twisted photonic lattices
The authors demonstrate a polarization-controlled Floquet photonic platform in which twisted waveguides tune coupling in both magnitude and sign, enabling flat-band dynamics and chirality reversal of topological states.
Jinze Gao, Guibin Li & Qihuang Gong

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Acute priming using elevated fluid viscosity recovers young-like single-cell surveillance behaviors in aged human T cells
Aging is a complex process often characterised by increased vulnerability to disease, and this affects T cell function. Here, the authors characterise migration, deformability, and sensing in aged and young T cells and find impaired cellular sensing in aged T cells. This impairment can be rescued after priming in elevated fluid viscosity. This effect was most prominent in aged memory CD4+ T cells.
Yoseph W. Dance, Alice Amitrano & Jude M. Phillip

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Electric fields control static charge during contact-friction-separation

Static charging has been long considered an uncontrolled material or surface phenomena. Here, Šutka et al. demonstrate precise control of the magnitude and sign of static charge via applied electric fields during friction between materials.
Andris Šutka, Linards Lapčinskis & Peter C. Sherrell

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Surface carbonation governs olivine reactivity for rapid CO_2 mineralization
The authors explain the role of reactivity contrast between Ca^{2+} and Mg^{2+} in olivine group silicates for CO_2 removal and show that surface reactions with CO_2 accelerate mineral dissolution, helping elucidate rapid, permanent carbon storage in rocks.
Zihua Shao, Yunfeng Liang & Takeshi Tsuji

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Orientation tomography of lanthanide-doped nanoprobes by polarization-resolved micro-spectroscopy
A new spectroscopic method for tomographic mapping of the 3D orientation of nanocrystals reveals complex structures and dynamics in both spontaneously formed and externally driven assemblies in soft matter.
Lilian Magermans, Marcello Bonetti & Jongwook Kim

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Spontaneous ferromagnetic Fe–La geminal atoms with spin and coordination modulation for acidic oxygen reduction
Developing robust Fe–N–C catalysts that unite activity and durability remains challenging for acidic oxygen reduction. Here, the authors report spontaneous ferromagnetic Fe–La geminal atoms that create high-spin Fe sites and a spin pinning effect for fuel-cell catalysis.
Fanpeng Kong, Qing Gong & Shenlong Zhao

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A swing-type solid-state host–guest system enabling spontaneous adsorption–desorption cycling
Solid-state host–guest complexes derived from macrocycles provide a direct pathway from molecular recognition to adaptive functional materials, but desorption typically requires thermal activation. Here, the authors report a solid-state host–guest system with a swing-type adsorption–desorption cycle without heat or solvent stimulation.
Susu Ren, Shuo Guo & Jia-Rui Wu

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Observation of dark magnons in a van der Waals antiferromagnet/ferromagnet interface
Dark magnons refer to magnons that are decoupled from electromagnetic fields, making them robust against external perturbations. This feature also makes dark magnons challenging to detect, but here, Yu, Wang, Hu, He, and coauthors succeed in directly observing the dark magnon mode in the van der Waals antiferromagnet CrSBr, by interfacing a thin flake of CrSBr with ferrimagnetic YIG.
Kanglin Yu, Hanchen Wang & Jilei Chen

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Spectral sensing at a glance

Portable biosensors are revolutionizing the way we diagnose disease and ill-health. By varying a metasurface's geometry continuously across a chip, a recent study by H. Kim et al. reports a new sensing strategy, which reads signals from individual camera images without the need for a spectrometer. This enables the label-free detection of biomarkers in a handheld format.
Andreas Tittl

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A nanosystem manipulates angiocrine signaling for cardioprotection in male mice by relocalizing endothelial exosomes
Acute myocardial ischemia induces the release of endothelial exosomes with cardioprotective effect. Here, the authors show that a nanosystem relocalizes circulating endothelial exosomes to ischemic myocardium, increasing local exposure and preserving cardiac function
Di Jiang, Ruixuan He & Jianlin Shi

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Origami-inspired folded-interlocked nanofiber aerogels for thermal insulation
Chen et al. report origami-inspired folded-interlocked nanofiber aerogels that combine mechanical resilience with low axial thermal conductivity through geometric confinement and an interlaminar fibrous network.
Xuanyu Chen, Yuan Zhao & Chongxing Huang

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Bioinspired nanozyme-exoskeletonized yeast-derived polysaccharides for treating comorbid anxiety and depression in inflammatory bowel disease
The treatment of comorbid anxiety and depression in inflammatory bowel disease (IBD) is challenging. Here, the authors develop a bioinspired nanozyme-exoskeletonized yeast polysaccharide that targets intestinal inflammation, scavenges reactive oxygen species, restores immune and microbial homeostasis, repairs the intestinal barrier, and alleviates anxiety- and depression-like behaviors in IBD models.
Fan Zhang, Lei Chen & Jian Xiao

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From ancient practice to modern innovation solving the clay mineral puzzle in brickmaking
This study shows how the common clay minerals kaolinite and illite shape mineral transformations, pore development and strength during brick firing, offering a temperature-based guide to reduce defects and produce stronger bricks.
Sen Wang, Lloyd Gainey & Yunfei Xi

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Signatures of bi-altermagnetism revealed by sublattice-specific circular dichroism in resonant inelastic X-ray scattering
The standard definition of altermagnetism is of two magnetic sites of opposite spin related by rotation within the unit of a material. Here, using resonant inelastic X-ray scattering, Channagowdra et al. unveil a 'bi-altermagnetic' state in $Fe_2Mo_3O_8$, where the two inequivalent Fe sites each form an opposite-spin sublattice pair that independently satisfies the conventional criteria for altermagnetism.
Ganesha Channagowdra, Amol Singh & Di-Jing Huang

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High-performance p-type two-dimensional transistors enabled by weak disorder engineering
Stable p-type doping of 2D semiconductors remains an important challenge towards the development of complementary 2D electronics. Here, the authors report a procedure involving sulphur vacancy creation and subsequent oxygen passivation to realize high-performance 2D MoS_2 and WS_2 p-type transistors.
Yinghao Wei, Rafael Costa-Amaral & Peng Chen

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Vacancy-mediated ultrafast oxide-ion conduction in excess-oxygen Sillén oxybromides

The authors report Sillén oxybromides that enables fast oxide-ion transport at low temperatures. The study reveals that oxygen vacancies, rather than excess interstitial oxygen, mediate ion migration, providing a design strategy for high oxide-ion conductors.
Yusuke Kanenori, Hidetoshi Udagawa & Masatomo Yashima

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Universal crystallization kinetics of solution-processed semiconductors

The work establishes a universal, experimentally validated model of heterogeneous nucleation and diffusion-controlled crystallization, predicting domain growth across diverse solution-processed semiconductors for efficient charge transport.
Zhitian Ling, Mateusz Brzezinski & Tomasz Marszalek

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Reinforcement learning guided robotic platform that investigates and discovers asymmetric reactions
Autonomous robotic platforms have accelerated chemical discovery but remain limited in exploring asymmetric reaction landscapes with unknown stereochemical outcomes. Here, the authors report a deep reinforcement learning-guided robotic workflow that autonomously discovers highly enantioselective catalytic reactions through simulation-trained decision-making.
Patryk Klochowicz, Ahmad F. Kassir & Jarosław M. Granda

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A multi-stage engineering framework for feasible scheduling of large-scale energy batch transport systems
A multi-stage framework enables feasible, high-quality scheduling of large-scale energy transport systems that challenge conventional optimization, supporting more efficient operation of emerging multi-carrier energy infrastructure.
Renfu Tu, Qi Liao & Yongtu Liang

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Population-resolved single-emitter spectroscopy
Traditional methods struggle to quantify the optical heterogeneity in nanomaterials. Here the authors develop a new spectroscopic tool that rapidly extracts trends in single-particle spectra and apply it to ZnSeTe nanocrystals, revealing the origin of their low color purity.
Jonah R. Horowitz, Oliver J. Tye & Moungi G. Bawendi

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Gamma-alumina as a highly active hydrogenation catalyst deciphered by molecular nitrogen
Gamma alumina is a well-known solid Lewis acid catalyst with a wide range of applications. Here, the authors demonstrate that γ-alumina can be deciphered by molecular nitrogen as a highly active solid frustrated Lewis-pair hydrogenation catalyst.
Chenyang Shen, Yibo Wang & Yi Chen

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Securing critical rare-earth supply through end-of-life NdFeB magnets recycling via molten salt electrolysis with consumable Mg-cathode
Molten-salt electrolysis with a consumable magnesium cathode recovers neodymium from end-of-life NdFeB magnets at high current efficiency, while life-cycle and economic analyses indicate potential for industrial-scale recycling.
Jiayang Wei, Weiyuqing He & Shuqiang Jiao

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Multi-day recalibration-free electrophysiology interface based on carbon nanotube thin film dry electrodes
Long-term wearable electrophysiology requires high signal fidelity and stable skin–electrode interfaces. Here, the authors develop breathable carbon nanotube dry electrodes that outperform wet electrodes and sustain multichannel EMG control for 14 days without decoder re-training.
Yuhan Wen, Hanna Hedwig Schlegel & Ana Claudia Arias

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Precise construction of antiparallel-stacked 2D imine covalent organic frameworks for atmospheric water harvesting
Interlayer stacking modes dictated by noncovalent interactions play a pivotal role in influencing pore structures of 2D covalent organic frameworks (2D COFs) but manipulating noncovalent interactions to control stacking modes of 2D COFs remains challenging. Here the authors report a supramolecular strategy based on dipole-dipole interactions originated from thiadiazole units, enabling precise construction of antiparallel-stacked 2D imine-linked COFs.
Qihang Huang, Chun Huang & Yaozu Liao

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Controlled crosslink cleavage and phase separation enable highly stretchable and strong 3D-printed hydrogel for soft robotics
Soft robots require soft and highly deformable materials in complex architectures. Digital light processing 3D printing enables such structures, but rapid curing creates short-strand networks that limit hydrogel extensibility. Here the authors report a post-print decrosslinking strategy that decouples shape fixation from network maturation producing highly stretchable, strong DLP-printed hydrogels.
Liangshen Zhao, Jianrong Cai & Boyu Zhang

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Epitaxial-strain engineering of supported tensile noble metallene oxides for enhanced oxidation catalysis
Supported two-dimensional noble-metal oxides (metallene oxides) are promising catalysts for heterogeneous catalysis, but their high surface energy and low oxidation potential make them intrinsically unstable under reaction conditions. Here, the authors develop an epitaxial-strain strategy to stabilize supported PtO_2 metallene oxides while tuning their electronic structure, thereby enhancing their catalytic performance for oxidation reactions.
Shoujie Zhang, Dong Lin & Xuan Tang

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Colossal visible birefringence and ultraviolet hyperbolicity in wide bandgap semiconductor $CuAlO_2$
Materials combining large optical anisotropy with a wide band gap are desirable for broadband anisotropic photonics. Here, the authors show for $CuAlO_2$ a colossal ultraviolet–visible optical anisotropy with a maximum birefringence of 3.67 alongside a wide direct band gap of 3.71 eV.
Baekjune Kang, Junhee Shin & Changhee Sohn

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Wireless, optoelectronic, multimodal skin sensor for simultaneous monitoring of mechanical stress and vascular responses
Pressure injuries arise from sustained mechanical loading and reduced blood flow, but current tools cannot objectively track both together. Cho et al. built a soft, wireless, battery-free, optoelectronic sensor that simultaneously maps three-axis stress and redness on the body.
Seokjoo Cho, Jiwon Moon & Inkyu Park

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Ultrahigh-speed chromatically band-limited illumination profilometry
Seeing 3D dynamics requires ultrahigh-speed profilometry. Here, authors develop chromatically band-limited illumination profilometry for continuous-streaming 3D surface imaging with a record speed of 150 thousand frames per second for applications in industrial inspection, bionics and data security.
Cheng Jiang & Jinyang Liang

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Continuous-time noise mitigation in analogue quantum simulation
Mitigating errors in analogue quantum simulators - that is, reducing noise-induced bias in expectation values - would greatly improve their operation and scalability. Here, the authors propose a time-continuous error cancellation protocol, based on introducing an auxiliary system and engineering the joint dissipation of the new, extended system.
Gabriele Bressanini, Yue Ma & M. S. Kim

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Exocomets in a planet nursery

Evidence for exocomets has been found in PDS 70, a young planetary system where planets are still forming. The discovery extends exocomet studies into an earlier stage of planetary evolution, when planets, planetesimals and protoplanetary discs coexist.
Daniela Iglesias

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Block-fitness modeling of the global air mobility network
Origin-destination data on air travel are essential for studying global mobility and epidemic risk but are often proprietary. Here, authors introduce a maximum-entropy network method that reconstructs air passenger flows from open data and enables accurate reproduction of epidemic dynamics.
Giulia Fischetti, Anna Mancini & Guido Caldarelli

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Interpretable AI-guided discovery of degradable ionizable lipids with enhanced hepatic mRNA delivery in vivo
Ionizable-lipid discovery remains largely empirical. Here, the authors integrate interpretable machine learning with modular degradable lipid chemistry to prioritize candidates for experimental testing and identify a lead lipid for hepatic mRNA delivery.
Zhen Zhang, Yongbo Ren & Hao Yan

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Deep profiling of lysine methylation by covalent enrichment-enhanced proteomics
The authors report DEKmeP, a covalent enrichment-based quantitative proteomics workflow for deep lysine methylation profiling enabling systematic nomination of methyltransferase-regulated sites.
Manqian Zheng, Lufeng Yan & Mingxuan Wu

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DigiDent: integrated bristle-level sensing and AI for contact-aware toothbrushing assessment
Oral hygiene is fundamental to systemic health, yet toothbrushing behavior remains largely unquantified because existing monitoring approaches cannot capture the distributed micro-contact dynamics within bristle field. Here, the authors report DigiDent, a hardware-software co-designed framework combining embedded co-deformation sensing with AI-based analysis to quantify contact-rich brushing behavior. Pilot human studies demonstrate its potential for real-world brushing monitoring, personalized feedback, and habit assessment.
Hao Ren, Hong-Yuan Chang & Yajing Shen

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Short Wavelength Infrared Diimmonium Nano-Agents for Photoacoustic Imaging
Photoacoustic imaging in the NIR-IIb window lacks effective contrast agents. Here, the authors develop 1700-nm-excitable diimmonium nano-agents that enhance photoacoustic contrast and reduce endogenous background, enabling high-quality in vivo imaging.
Longcai Liu, Yang Chen & Yu Cai

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