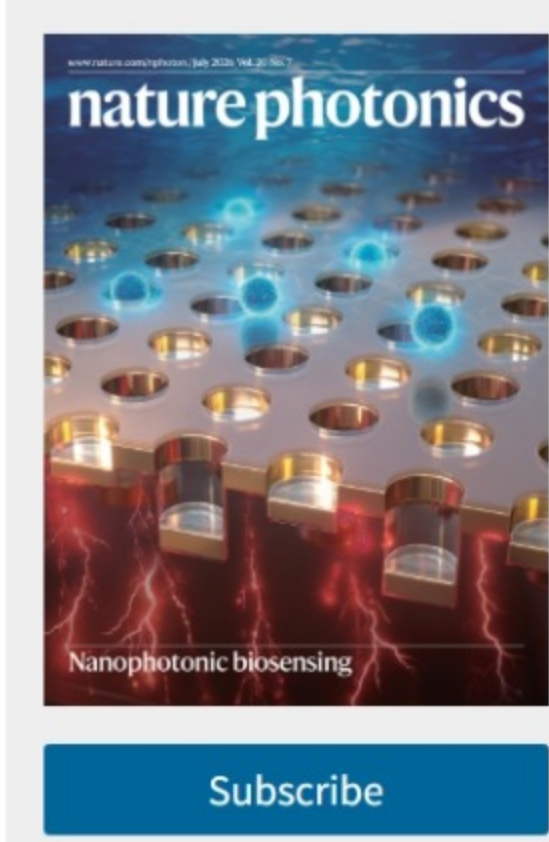




Nanophotonic biosensing

An artistic rendering of a bound-state-in-the-continuum metasurface for ultrasensitive biosensing. Subtle refractive-index variations induced by biological markers are transformed into pronounced radiative Q-factor modulation, producing amplified intensity responses in the strong-coupling regime. Fabricated by aluminium-based lithography on 8-inch wafers, the metasurface provides a miniature platform for the detection of ultralow concentrations of small extracellular vesicles for clinical lung cancer diagnostics.

See [Sun et al.](#)

Image: Jiacheng Sun, Westlake University. Cover design: Bethany Vukomanovic

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News & Views

News & Views
02 Jul 2026

Organic cocrystals offer record photothermal conversion

Polar cocrystals made from two centrosymmetric components use quantum coherent beating to enhance photothermal conversion, setting a new high temperature for organic solids exposed to laser light.

Rong-Ran Liang & Xin Zhao

Advertisement

News & Views
02 Jul 2026

Harnessing loss for Q-modulated biosensors

A new nanophotonic sensing strategy converts even subtle refractive-index changes into large intensity variations via radiative Q-factor modulation. Implemented in a bound-state-in-the-continuum (BIC) metasurface, the concept enables ultrasensitive and scalable biosensing of only a few tens of tumour extracellular vesicles within 15 minutes.

Yohan Lee & Andreas Tittl

News & Views
02 Jul 2026

Visualizing optical anisotropy

A non-interferometric imaging framework enables quantitative 3D reconstruction of full dielectric tensors, opening a practical route to volumetric optical measurement of biaxial anisotropy in complex materials and biological structures.

Han Wang & Peng Xi

News & Views
02 Jul 2026

Relativistic light springs come into focus

Ultrafast spatio-temporal shaping of ultra-intense laser pulses is an important yet challenging goal. Now, researchers have synthesized light into a spring-like form, at relativistic intensities. The advance may provide control over the angular momentum degrees of freedom of matter at relativistic intensity, leading to previously unexplored forms of laser–plasma interactions in the laboratory.

Jorge Vieira

News & Views
02 Jul 2026

Optical shaping of nanoplasma shockwaves

Jacopo Fregoni

News & Views
02 Jul 2026

Self-localization aids multiphoton imaging

Giampaolo Pitruzzello

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Meeting Reports

Meeting Report
02 Jul 2026

Chiral interactions inspire investigation

A novel spectroscopic method using the interaction between light and matter via chirality was reported at the Japan Society of Applied Physics Spring Meeting.

Noriaki Horiuchi

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Articles

Article

05 May 2026

Wide-band millimetre-wave synthesizer using microresonator-soliton photomixing

Using a chip-based dual microresonator-soliton source with a high-speed photodetector, the authors demonstrate a CMOS-compatible generator of tunable millimetre-wave signals with low phase noise.

Jizhao Zang, Travis C. Briles ... Scott B. Papp

Article

Open Access
18 May 2026

Structural exciton localization drives efficient solid-state sensitized triplet fusion upconversion

An absolute photon upconversion efficiency of 8.2% is demonstrated using a liquid triplet fusion medium that behaves as solid on excitonic timescales. The findings may drive higher efficiencies in nanoscale solid-state photochemical upconversion devices.

Thilini Ishwara, Damon M. de Clercq ... Timothy W. Schmidt

Article

Open Access
25 May 2026

Giant trion modulation in scalable monolayer MoS₂ via plasmonic HfN gates

The authors demonstrate efficient trion modulation in MoS₂ enabled by plasmonic HfN gates. A photoluminescence modulation depth of ~24% was achieved over large tunable surface areas.

Tzu-Yu Peng, Cheng-Han Lin ... Yu-Jung Lu

Article

21 Apr 2026

Incoherent dielectric tensor tomography for quantitative three-dimensional measurement of biaxial anisotropy

The internal structure of biological samples and polycrystalline materials is visualized using incoherent dielectric tensor tomography. Through angular and polarization modulation, the method detects submicrometre optical anisotropic features—such as biaxial symmetry—that are not accessible with the coherent counterpart.

Juheon Lee, Yeon Wook Kim ... YongKeun Park

Article

19 May 2026

Free-space twin-field quantum key distribution

By developing frequency locking and time synchronization between independent ultrastable lasers and atomic clocks, twin-field quantum key distribution is demonstrated over 14.2-km turbulent free-space channels, with a secure key rate exceeding the repeaterless capacity bound.

Yu-Huai Li, Ting Zeng ... Jian-Wei Pan

Article

20 May 2026

Electrically programmable circularly polarized three-dimensional display

A co-assembled nanorod/nanowire layer enables red, green and blue circularly polarized LEDs with dissymmetry factors as high as 1.54. In a 64-pixel prototype display, the brightness between different polarizations can be distinguished by the naked eye.

Wenyan Yao, Xuekang Yang ... Zhiyong Tang

Article

28 Apr 2026

Narrow-bandgap acceptors with suppressed exciton thermalization loss for highly efficient perovskite–organic tandem solar cells

A new series of narrow-bandgap acceptors exploiting the heavy-atom effect enables organic solar cells with a power conversion efficiency of 20.7% and 1-cm² perovskite–organic tandem devices with a certified power conversion efficiency of 27.5%.

Haozhe He, Zhenrong Jia ... Yongfang Li

Article

04 Jun 2026

Quantum coherent beating in polar disubphthalocyanine–fullerene cocrystals for ultrafast photothermal conversion

Quantum coherent beating and ultrafast energy transfer have been observed in a polar disubphthalocyanine–fullerene cocrystal. The temperature reached 228 °C within 5 s following 0.5 W cm^{−2} laser irradiation, and an equilibrium temperature of 242 °C was achieved, which is higher than those of many other organic solids.

Yong Chen, Yu Zhang ... Cheng Zhang

Article

07 May 2026

A metropolitan-scale multiplexed quantum repeater with Bell non-locality

Time-division multiplexing in a metropolitan-scale quantum repeater is demonstrated. Heralded entanglement between remote quantum memories is implemented over a distance of 14.5 km, generating a Bell state with a fidelity of 78.6% with a Bell inequality violation of $S = 2.22$.

Tian-Xiang Zhu, Chao Zhang ... Guang-Can Guo

Article

13 May 2026

Ultrasensitive biosensing by radiative Q-factor modulation in strongly coupled three-dimensional bound-state-in-the-continuum metasurfaces

A Q-modulated refractometric sensing mechanism implemented in a bound-state-in-the-continuum metasurface enables the detection of lung cancer extracellular vesicles with a limit of detection down to 24 aM and high clinical diagnostic accuracy in human serum.

Jiacheng Sun, Fajun Li ... Liaocong Wen

Article

28 Apr 2026

Low-noise microwaves from free-running frequency combs and electrical feed-forward phase noise compensation

Electrical feed-forward used for noise compensation in microwave signal generation provides low phase noise and timing jitter while easing the requirements of the optical frequency comb divider.

Takuma Nakamura, William Groman ... Franklyn Quinlan

Article

01 Jun 2026

Ternary self-assembled molecular contact for ambient-processed perovskite/silicon tandem solar cells

A new ternary self-assembled molecular contact enables the fabrication of perovskite solar cells in ambient conditions, with perovskite/silicon tandem devices achieving a power conversion efficiency of 31.72%.

Gwisu Kim, Adi Prasetyo ... Sang Il Seok

Article

26 Jun 2026

Spatiotemporal shaping of broadband helical light pulses at relativistic intensities

Researchers demonstrate the generation of helical intensity wavepackets at relativistic intensities, reaching peak values above 1.4×10^{18} W cm^{−2}. Controlled spatiotemporal orbital angular momentum, in a geometry compatible with large-scale laser facilities, is realized.

Andrew Longman, Danny Attiyah ... Franklin Dollar

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Amendments & Corrections

Author Correction
16 Jun 2026

Author Correction: Single-shot terahertz-field-driven X-ray streak camera

Ulrike Fröhling, Marek Wieland ... Markus Drescher

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