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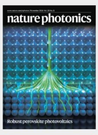

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Robust perovskite photovoltaics

The creation of vertical polymerized nanolinks (green lines), which penetrate both the perovskite (tetrahedra) and charge transfer layer (spheres), improves the mechanical integrity and stability of perovskite solar cells, resulting in improved resilience to heat, light and moisture.

See Guo et al.

Image: Yuanyuan Zhou, Pengfei Guo, Wenjian Yu, Hong Kong University of Science and Technology. Cover design: Bethany Vukomanovic

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Workhorse solid-state lasers reinvented

Miniature versions of famous bulk solid-state sources, notably titanium-sapphire and Nd:YAG lasers, have now become a reality. This advance has been made possible through collaborative efforts from material science, heterogeneous integration and fabrication technologies.

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Infrared polymer boasts high index and transparency

A bifunctional cyano-substitution synthetic strategy yields an all-organic polymer with a record-breaking refractive index of 2.53 at 750 nm, combining high infrared transparency with mechanical flexibility and solution-processability.

Yutong Zhou, Kai Zhang & Bai Yang

News & Views
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Measuring hard X-ray attosecond pulses

The generation and characterization of high-power X-ray attosecond pulses is a challenging research frontier in free-electron laser science. Now, researchers at the Linac Coherent Light Source have demonstrated experimental confirmation and measurement of hard X-ray pulses reaching 100-attosecond durations.

Gianluca Geloni & Marc Guetg

News & Views
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Optical control stabilizes cold-atom comagnetometry

The use of tailored laser fields improves the coherence times of two co-trapped ytterbium isotopes, resulting in the rejection of magnetic-field noise by more than thirty-thousand-fold, opening the way to improved comagnetometry.

Mark Limes

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Light-switch for nerve cells

Oliver Graydon

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Femtosecond lasers drive nanostructuring and green applications

From ultra-precise nanofabrication to sustainable use cases, femtosecond lasers continue to expand their application potential.

Giampaolo Pitruzzello

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Review Articles

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Solution-processed nano-LEDs for next-generation optoelectronic technologies

This Review covers recent advances in quantum dots and perovskite nano-LEDs, discusses the challenge of balancing efficiency, stability and full-colour integration, and highlights potential future applications.

Wenqiang Yang, Aobo Ren ... Deying Luo

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Inverted phosphorescent OLEDs with plasmon coupling from quantum dot interlayers for enhanced efficiency

The introduction of a layer of quantum dots reduces plasmonic losses in organic light-emitting diodes.

Thi Thuy Truong, Hai Truyen Dang ... Jang Hyuk Kwon

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X-ray-driven Hanbury Brown and Twiss spectroscopy

Photon bunching is observed in the scintillation process upon excitation by X-rays. The photon intensity correlation function is measured by using Hanbury Brown and Twiss interferometry to extract the light yield and emission lifetime in scintillator materials.

Shaul Katznelson, Noam Kasten ... Ido Kaminer

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Microchip Nd:YAG laser with master-oscillator–power-amplifier architecture

This work reports an integrated $Nd:Y_3Al_5O_{12}$ laser–amplifier system based on a microchip master-oscillator–power-amplifier architecture. A double-resonant microring seed with a 2.9 μW threshold is combined with waveguide amplifiers, enabling continuous-wave output powers exceeding 12 dBm.

Yu Guo, Yubo Wang ... Hong X. Tang

Article
29 Sept 2026

Trans-interface engineering for reliable perovskite solar cells with reproducible stability

Trans-interface engineering (TIE) is used to create vertically aligned soft nanolinks across perovskite and charge-transport layers, simultaneously enhancing interfacial reliability and charge transfer. The TIE-enabled perovskite solar cells achieved a certified power conversion efficiency of 26.67% and enhanced operational stability with high reproducibility.

Pengfei Guo, Wenjian Yu ... Yuanyuan Zhou

Article
20 Oct 2026

Experimental demonstration of attosecond hard X-ray pulses

Researchers experimentally demonstrate attosecond pulse generation in the hard X-ray regime with a free-electron laser. The confirmation is enabled via the measurement of amplified spontaneous emission from 3*d* transition metals. Pulse durations are in the range of 100 as to 400 as.

Ichiro Inoue, River Robles ... Agostino Marinelli

Article
27 Aug 2026

Fluid motion and crystallization control enable air-processed fully screen-printed perovskite solar cells

Solvent engineering optimizes fluid motion and crystallization in fully screen-printed perovskite solar cells, resulting in devices with a certified power conversion efficiency of 21.86%, 90.5% of which is maintained after 2,000 h of operation.

Changshun Chen, Qing Yao ... Wei Huang

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Intrinsic backward emission of coherent Raman photons from homogeneous media

Backscattered coherent Raman microscopy brings new opportunities.

Jitendra Nath Acharyya, Gina Benni ... Sandro Heuke

Article
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Intermolecular decoupling of C_{60} suppresses interfacial recombination in perovskite solar cells

Interfacial recombination in perovskite solar cells is mitigated through a vapour-phase molecular passivation method using trialkylamines, disrupting C_{60} packing. This approach results in a power conversion efficiency of up to 27.2% while maintaining stability.

Tao Wang, Ran Luo ... Yi Hou

Article
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Ultra-wideband electrically tuned mid-infrared on-chip parametric oscillator

A thin-film lithium niobate integrated optical parametric oscillator converts a fixed near-infrared pump into 22 THz of electrically tunable mid-infrared light, achieving both broad wavelength coverage and mode-hop-free fine-tuning.

Alexander Y. Hwang, Hubert S. Stokowski ... Amir H. Safavi-Naeini

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Integrated electro-optic circulator on thin-film lithium niobate for bidirectional optical fibre transmission

A thin-film lithium niobate integrated circulator with peak isolation up to 37 dB and a broad transmission bandwidth supports bidirectional transmission through single-mode fibre at 800G standard throughput.

Charles St-Arnault, Charles Laperle ... David V. Plant

Article
25 Sept 2026

Dangling-bond-free, chemically anisotropic semiconductors for ultrahigh-resolution X-ray imaging

Zero-dimensional structured materials are proposed to eliminate dangling bonds in all crystallographic directions while driving one-dimensional columnar crystal growth without compromising electronic isotropy. An X-ray scintillator based on zero-dimensional structured $Cs_3UO_2Cl_4$ exhibits a spatial resolution of 34 lp mm^{-1}.

Jiaqi Liu, Mingquan Liao ... Guangda Niu

Article
10 Sept 2026

All-organic polymer with large refractive index in the near-infrared

An organic polymer with a large refractive index and excellent transparency in the infrared regime could bring new opportunities for imaging.

Hongbin Chen, Jianrong Guo ... Chaobin He

Article
17 Aug 2026

Cold-atom comagnetometry via optical control of spin states

A cold-atom comagnetometer based on the nuclear spins of ^{171}Yb and ^{179}Yb is demonstrated. A spin coherence time of 60 s is achieved for both isotopes. The ^{171}Yb–^{179}Yb ratio of nuclear magnetic moments is determined as −0.726076(3) with a 4-ppm precision.

J.-L. Zhang, W.-T. Luo ... Z.-T. Lu

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