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Free Access Ultra-Durable Information-Encoded Anti-Counterfeiting Self-Assembled Nanocrystal Labels (Advanced Optical Materials 11/2026)

Taha Haddadiflam, Farzan Shabani, Mustafa Kalay, Ahsan Khaligh, Evren Mutlugun, Mustafa Serdar Ortes, Hilmi Volkan Demir

e70988 | First Published: 20 March 2026

This article relates to: ...

Chip Security To protect semiconductor chips, an information-encoded label is designed, fabricated, and transferred onto an electronic chip. In this label, colloidal quantum wells with ultra-low emission bandwidth were utilized. Each color bar represents a specific information. The nanoparticles are randomly distributed on the boundaries of the color bars, making the information secure and undecipherable. More details can be found in the Research Article by Hilmi Volkan Demir and co-workers (DOI: 10.1002/adom.202502884).

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Back Cover Free Access Aligned Single-Walled Carbon Nanotubes Film Chiral Metasurfaces for Terahertz Polarization Sensing (Advanced Optical Materials 11/2026)

Xiangdong Chen, Yue Wang, Xiang Zhang, Peng Shen, Fei Fan, Shengliang Chang

e70985 | First Published: 20 March 2026

This article relates to: ...

Aligned Single-Walled Carbon Nanotube Films This work reports a chiral terahertz metasurface based on water-level aligned single-walled carbon nanotube films, made by controllable vacuum filtration. Chiral effects are realized by etching symmetrical patterns, simplifying cumbersome chiral fabrication. With high biocompatibility and anisotropy-enabled design freedom, it enables sensitive chiral biomolecule detection via polarization sensing, overcoming traditional enantiomer distinction limits. More details can be found in the Research Article by Yue Wang and co-workers (DOI:10.1002/adom.202501993)

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PERSPECTIVE

Open Access Do's and Don'ts When Visiting Circularly Polarized Luminescence

Nahel G. Ueda, Sandra Higuet-Lago, Carlos M. Cruz, Sara P. Morcillo, Luis Skarnez de Cienfuegos, Víctor Blanco, Araceli G. Campaña, María Ribagorda, Della Miguel, Juan M. Cueva

e03265 | First Published: 27 February 2026



This perspective presents our insights into the principles, challenges, and opportunities of circularly polarized luminescence (CPL). Highlighting key concepts such as the dissymmetry factor (g_{lum}) and molecular design strategies, we discuss advances in CPL efficiency, emerging NIR emitters, solid-state applications, and the growing role of theory and AI in shaping future research.

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Research Article

Open Access Ultra-Durable Information-Encoded Anti-Counterfeiting Self-Assembled Nanocrystal Labels

Taha Haddadiflam, Farzan Shabani, Mustafa Kalay, Ahsan Khaligh, Evren Mutlugun, Mustafa Serdar Ortes, Hilmi Volkan Demir

e02884 | First Published: 28 November 2025

This article relates to: ...

Ultra-durable cost-effective information-encoded anti-counterfeiting labels are fabricated to secure semiconductor chips. A novel method is used to self-assemble colloidal quantum wells (CQWs) into color bars. Information can be encoded spatially, spectrally, and opto-spatially. The randomness in the boundaries of the stripes makes the labels unique and hard to replicate. These labels have high stability against high temperature, humidity, and ultraviolet (UV) exposure.

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Full Access Aligned Single-Walled Carbon Nanotubes Film Chiral Metasurfaces for Terahertz Polarization Sensing

Xiangdong Chen, Yue Wang, Xiang Zhang, Peng Shen, Fei Fan, Shengliang Chang

e01993 | First Published: 30 December 2025

This article relates to: ...

In this work, highly aligned single-walled carbon nanotube (SWCNT) films are reproducibly fabricated using a groove-assisted method. For the first time, these aligned films are applied to terahertz polarization sensing, providing a completely new approach to the design of chiral metasurfaces. This polarization sensing method enables both quantitative detection of enantiomers and qualitative discrimination between different molecular configurations.

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RESEARCH ARTICLE

Full Access Probing In-Plane Chiral Phonon Modes and Anisotropy in Layered MoO₂

Ravindra Kumar, Prahad Kanti Barman, Subhendu Mishra, Abhishek K. Singh, M. S. Ramachandra Rao

e03591 | First Published: 12 March 2026

Lattice vibrations carrying real or pseudo angular momentum manifest as helicity reversal in helicity-resolved Raman spectroscopy and are identified as chiral phonons enabled by improper symmetry operations. This work reveals chiral phonons in MoO₂ originating from the breakdown of joint rotational-translational symmetry, accompanied by a giant frequency shift in the cross-polarized scattering channel.

Abstract Full text PDF References Request permissions

Full Access Bicarbazole Derived High Triplet Energy P-Type Host for Blue Thermally Activated Delayed Fluorescence Organic Light-Emitting Diodes

Chayoon Lee, Jangho Moon, Thini Batagoda, Donghee Nam, Jun Yeob Lee

e03438 | First Published: 25 February 2026

New p-type host materials based on a 9,9'-diphenyl-9H-9H,3,3'-bicarbazole (BPCz) core by introducing bulky blocking groups at the 2-position of the BPCz core to control the intermolecular distance between host molecules are developed. This structural modification induces steric hindrance, which suppresses intermolecular interactions and enables the material to maintain a high triplet energy.

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Full Access Anisotropic Coherent Propagation of Sub-Terahertz Magnons in Antiferromagnetic α-Fe₂O₃

Ziyang Li, Shanshan Hu, Honglan Dai, Zhong Shi, Shaohai Chen, Yaowen Liu, Zongqin Zhang

e03604 | First Published: 22 February 2026

Understanding high-frequency magnon transport is a central challenge in antiferromagnetic magnonics. Using antiferromagnetic α-Fe₂O₃, this work reveals anisotropic propagation of sub-terahertz magnons with ultrahigh velocities, tunable via temperature and magnetic fields. These findings deepen fundamental understanding of sub-terahertz coherent magnon propagation and provide a solid experimental foundation for ultrafast, low-dissipation magnonic device design.

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Full Access Boosting Intrinsic Chirality of One-dimensional Perovskite Single Crystals via Extended Cation Conjugation

Wanning Li, Yuhua Kechzhebayeva, Kai Gu, Mahwish Shaheen, Yongyou Zhang, Sergey Makarov, Yu Chen, Haizheng Zhong

e03313 | First Published: 19 February 2026

Extending conjugation length of the organic cation is found that can intensify the inorganic framework torsion and regulate the band-edge configuration through improved hydrogen bonding and π -electron interactions, therefore strengthening the intrinsic chirality of 1D hybrid perovskite single crystals.

Abstract Full text PDF References Request permissions

Open Access Design of Molecular Lanthanide-Based Quantum Light Sources for On-Chip Integration

Shiva Bonafello, Rodolfo Alessandro Nesta Silva, Dimitrije Mara, Fabio Travanca, Marcia Peretti, Marco Saccone, Matteo Melegari, Luciano Marchiò, Luca Pilla, Giovanni Battista Giovenzana, Flavia Artizzu

e03824 | First Published: 22 February 2026

Rigid lanthanide complexes with a tetra-podal tris-benzimidazole ligand exhibit narrow, well-resolved visible/NIR emission profiles suitable for quantum photonics. The Eu^{3+} complex features an exceptionally sharp ${}^5\text{D}_0 \rightarrow {}^7\text{F}_5$ transition enabled by an LMCT mechanism that suppresses inhomogeneous broadening. These favorable spectroscopic properties are retained in polymer hosts, highlighting their potential as integrable on-chip quantum light sources.

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Full Access Significant Birefringence Enhancement via Cs⁺ Alloying in Layered Perovskites: Synergistic Alignment of Organic Cations and Inorganic Framework

Wenqiang Huang, Jie Zhou, Yiqing Song, Luyangeng Zhu, Ji Qi, Kaijie Xie, Yanqiang Li, Yang Zhou, Zhiyong Bai, Junhua Luo, Sangen Zhao

e03839 | First Published: 25 February 2026

Chemical alloying of layered metal-halide perovskites converts T₂PbBr₄(ET⁺ + C₁₂H₁₇N)₂ into T₂Cs_{1-x}Pb_xBr₄, rotating the (PbBr₄)²⁻ lattice and aligning n-conjugated T²⁺ cations. This synergistic reorganization boosts birefringence up to 23-fold to 0.238550 nm, the largest amplification yet reported, charting a deterministic path toward ultracompact polarization-control photonics.

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Full Access A Copper(I)-Carbene Complex With High Quantum Yield for White Light Emitting Application

Subramanyam Kalkavani, Gopendra Mudali, Sibani Mund, Kumar Siddhant, Anushi Rawat, Kobayashi Masamitsu, Francesc Ribesert, Federico Coratti, Osamu Tsudumi, Sivakumar Vaidyanathan, Ganesan Prabusankar

e03640 | First Published: 25 February 2026

A novel dinuclear copper(I) λ -heterocyclic carbene complex demonstrates high photoluminescence quantum yield (PQY = 84%) and greenish-blue emission at 497 nm. The material enables efficient solid-state light emission and fabrication of hybrid white LED (WLED), featuring excellent optical properties and thermal stability for advanced optoelectronic applications.

Abstract Full text PDF References Request permissions

Full Access Phosphorescent Carbon Dots Confined in Al₂O₃ With Broad Excitation Range

Zheng Zhang, Jinkun Liu, Jueran Cao, Zhun Ran, Yuyi Li, Xuejie Zhang, Jianle Zhuang, Chaofan Hu

e03439 | First Published: 28 February 2026

C₆₀Al₂O₃ was synthesized through a N and O co-doping strategy, which endows the material with broad absorption excitation range from 254 to 503 nm. The composite materials exhibit a special excitation-dependent phosphorescence due to the presence of multiple emission centers, which can display different after-glow colors under excitation at different wavelengths.

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Open Access Phase-Sensitive Engineering of Optical Disordered Materials Using Heterogeneous Networks

Seungmok Youn, Kunwoo Park, Ikbeom Lee, Gtae Lee, Namkyoo Park, Sunkyu Yu

e03499 | First Published: 25 February 2026

Networks provide an insightful framework for describing complex interactions. Here, we develop heterogeneous network modeling of light scattering to engineer multiphase random heterogeneous materials. We devise multiphase network decomposition, separating intra- and inter-phase wave interferences. Our results show that the directionality of higher-order multiphase networks governs phase anisotropy, thereby providing a systematic recipe for engineering multiphase optical materials.

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Open Access A New Mechanism Enabling Micron Scale Electron-Hole Synchronized Recombination in Bulk Halide Perovskites

Noan Veber, Roman Y. Li, Eduard A. Podshivalov, Betty Shamaev, Saar Shaek, Emma H. Mattassa, Salma Lalwani, Rotem Y. Slavberg, Kobi Cohen, Menpina Liu, Pavel A. Frantsuzov, Yehonadav Bekenstein

e71076 | First Published: 25 February 2026

This work reports the first observation of long-range synchronized photoluminescence blinking in vapor-grown, fully inorganic CsPbBr₃ microcrystals, extending over 10 μm . The observations contrast supertrap-based models and link blinking to rich growth conditions. A new mechanism is established, in which hole diffusion mediates collective electron-hole recombination, reshaping understanding of carrier dynamics in halide perovskites.

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Full Access Visible-Light-Driven Heteroaryl Azo Switches with High-Efficiency Photoisomerization for Advanced Photochromic Systems

Shural Lv, Yuang Zhang, Shufen Zhang, Bingtao Tang

e03223 | First Published: 25 February 2026

Azo photochromes based on a pyrazole design address the need for visible-light responsiveness and high photoisomerization yields. They achieve efficient (>90%) and nearly quantitative (>90%) bidirectional photoisomerization upon 405 and 532 nm irradiation. Their well-balanced performance, excellent fatigue resistance, and facile synthesis enable robust and scalable light-responsive systems with great application potential.

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Full Access Enhancing External Quantum Efficiency of Non-Doped Deep-Blue OLEDs by Optimizing Hybridized Local and Charge-Transfer States

Kanglei Li, Ling Lin, Huihui Li, Yichao Chen, Changhao Ruan, Hailin Gan, Dehui Yang, Yue Yu, Dongge Ma, Lei Ying

e03305 | First Published: 22 February 2026

Two chrysen-based emitters CPbCN and CPbCN were developed through precise tuning of donor-core interactions to modulate charge-transfer character. The enhanced contribution of charge-transfer in CPbCN increased spin-orbit coupling and high-lying reverse intersystem crossing process, enabling an impressive high external quantum efficiency of 14.40% of a non-doped OLED, associated with deep blue emission peaked 416 nm and the CIE coordinates of (0.160, 0.043).

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Full Access High-Precision, Large-Bandwidth, Multimode Nonvolatile Photonic Neural Network Based on Charge-Metastable Surface

Shengyu Zhou, Hansi Ma, Huan Yuan, Te Du, Huan Chen, Yuehua Deng, Jiagu Wu, Zhaojian Zhang, Junbo Yang

e02670 | First Published: 25 February 2026

By combining phase-change materials with inverse design, this paper presents a photonic neural network based on a programmable power splitter. This splitter features high precision (exceeding 9-bits) a large bandwidth (140 nm), and the capability to process two input modes (TE and TM). In the construction of the photonic neural network, higher-order modes are introduced to expand its physical scale.

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Full Access Ga-Doped SnO₂ Electron Transport Layer with Tunable Mobility and Conductivity for High-Performance Inverted Quantum Dot Light-Emitting Diodes

Chen Lin, Mengxin Liu, Yuhua Liu, Xin Su, Xian Shi, Daocheng Pan

e02968 | First Published: 25 February 2026

The mobility and conductivity of Ga-doped SnO₂ nanocrystals can be tuned over two orders of magnitude by varying Ga-doping level. This p-type doping strategy effectively suppresses excessive electron transport, thereby promoting balanced charge injection within the QLED. As a result, red-emitting QLED incorporating 3.5% Ga-doped SnO₂ nanocrystals achieve a peak EQE of 20.04%.

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