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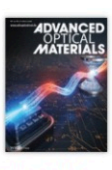

Advanced Optical Materials: Volume 14, Issue 21

5 June 2026

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Cover Picture

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From Strain to Pressure: Atomically Resolved Mechanisms of Stress Dissipation in Emissive, Elastically Deformable Molecular Crystals Under Ambient and High Pressure (Advanced Optical Materials 21/2026)

Arif H. Dar, Vikram C. Joshi, Alexandra Longcake, Tamador Alkhidir, Ayat Al Nimer, Praveen B. Managutti, Shamraiz H. Talib, Jaime Viegas, Michael R. Probert, Changquan C. Sun, Sharmarke Mohamed

e71249 | First Published: 04 June 2026

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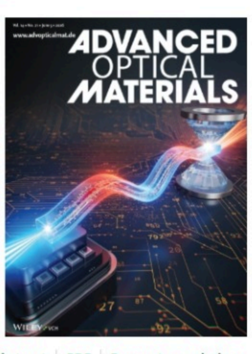

High-Pressure Crystallography
The cover features a multifunctional molecular crystal that exhibits emission, elastic bending, optical waveguiding, and remarkable resilience under high pressure. The reported work uncovers, with atomic precision, the mechanisms of stress-dissipation during elastic bending at ambient pressure and hydrostatic compression up to 3.63 GPa. The work also illustrates how computation-guided design can accelerate the discovery of pressure-resilient, elastically deformable molecular optical waveguides for future photonic technologies. More details can be found in the Research Article by Michael R. Probert, Changquan C. Sun, Sharmarke Mohamed, and co-workers (DOI: 10.1002/adom.202503637).

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e71272 | First Published: 04 June 2026

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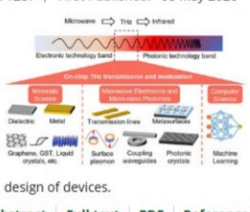
REVIEW

Full Access

On-Chip Terahertz Optoelectronic Transmission-Modulators

Jitao Li, Kai-Da Xu, Maoqing Guo, Lvyi Zhong, Zimou Huang, Zhenhai Wu

e71287 | First Published: 08 May 2026



On-chip THz technology not only integrates microwave electronics and micro-nano photonics methods, but also incorporates advanced material science and computer science, giving rise to multiple research directions, including: on-chip THz dielectric waveguides, metal transmission lines, surface plasmon transmission, photonic crystal systems, time-domain systems, dynamic modulation, THz coupling between free-space and on-chip, THz-to-optical conversion, and inverse design of devices.

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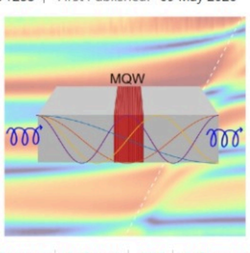
RESEARCH ARTICLE

Open Access

Multi-Mode Deep Strong Coupling in a Multi Quantum Well Fabry–Perot Cavity

Lucy Hale, Johan Andberger, Ethan Koskas, Frieder Lindel, Mattias Beck, Giacomo Scalari, Jérôme Faist

e71288 | First Published: 09 May 2026



Multi-mode deep-strong coupling is demonstrated in a 166-well heterostructure that acts as a Fabry–Perot cavity. Even cavity modes couple strongly to the cyclotron resonance, producing large vacuum Rabi splittings and a rich polaritonic spectrum captured by a full Hopfield model. The system shows light-matter decoupling even at low frequencies and offers promise for chiral photonic applications.

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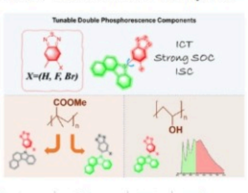
Tunable Double Phosphorescence Components From a Single Organic Molecule: Benzo[c][1,2,5]Thiadiazole Works as Both Electron Acceptor and Phosphorescence Emitting Center

Liming Lin, Xingda Zhang, Tianya Zhang, Yanjun Zhao, Lijuan Bu, Jingyuan Zhou, Zhimin Ma, Mingxing Chen, Yan Guan, Zhiyong Ma

e71290 | First Published: 09 May 2026



A single organic molecule affords a tunable double phosphorescence system with green and red emission components, where polymer matrix rigidity modulates molecular conformation and inter-unit electron transfer to enable selective phosphorescence expression, time-dependent room-temperature afterglow color switching, and halogen-tunable phosphorescence properties.

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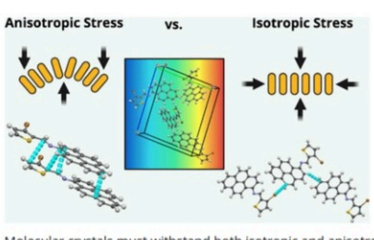
From Strain to Pressure: Atomically Resolved Mechanisms of Stress Dissipation in Emissive, Elastically Deformable Molecular Crystals Under Ambient and High Pressure

Arif H. Dar, Vikram C. Joshi, Alexandra Longcake, Tamador Alkhidir, Ayat Al Nimer, Praveen B. Managutti, Shamraiz H. Talib, Jaime Viegas, Michael R. Probert, Changquan C. Sun, Sharmarke Mohamed

e03637 | First Published: 06 April 2026

This article relates to:



Molecular crystals must withstand both isotropic and anisotropic stress to function in flexible optoelectronics and high-pressure devices. In situ high-pressure single-crystal X-ray diffraction coupled with DFT-D computations reveal how an emissive molecular crystal with interdigitated packing bends elastically at ambient-pressure and remains crystalline to 3.63 GPa, establishing a "beam-and-joint" design principle for the discovery of other multifunctional molecular crystals.

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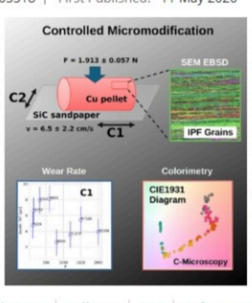
Colorimetry and Tribology of Ultrapure Copper Surface Micromodification

Aleksandra Szczupak, Grzegorz Cios, Benedykt R. Jany

e03518 | First Published: 11 May 2026



Controlled mechanical micromodification of copper creates microgrooves, altering local optical properties like color and reflectance through multiple reflections at microscale. Modification along copper crystallographic grains yields change in wear rate by factor of two, related to single-grain and multi-grain abrasion regime changes. To realize colorization over large areas, grooves with parameters from this study could be patterned across macroregions.

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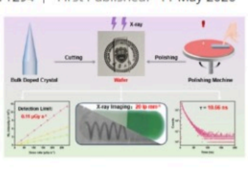
High-Quality Organic Doped Anthracene Crystal Wafer Scintillators for High-Resolution X-Ray Imaging

Yin Liu, Xue Li, Ziqi Ma, Xinqi Xu, Rui Shi, Shengli Zhu, Zhenduo Cui, Zhaoyang Li, Wence Xu, Zhonghui Gao, Jiamin Zhu, Yanqin Liang, Hui Jiang

e71294 | First Published: 11 May 2026



To overcome the performance constraints of powder-based organic scintillators in polymer matrices, this study synthesized high-quality doped anthracene crystals using molecular doping. These crystals were processed into transparent wafers, which exhibited significantly enhanced radioluminescence. The chrysene-doped wafer achieved a spatial resolution of 20 lp mm^{-1}, a decay lifetime of 10.66 ns, and a detection limit of 0.11 μGy s^{-1}.

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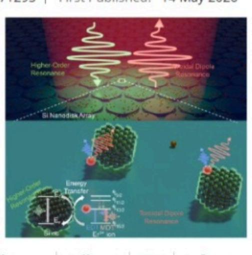
Tailoring Electric and Magnetic Dipole Emission of Er^{3+} Ions via Toroidal Dipole Resonance of Si Nanodisk Hexagonal Array

Keisuke Moriasa, Daiki Yabuguchi, Hiroshi Sugimoto, Minoru Fujii

e71295 | First Published: 14 May 2026



Hexagonal arrays of silicon nanodisks are proposed to control 1.5 μm emission of Er^{3+} ions. Toroidal dipole resonance of the nanodisk array generates accessible magnetic hot spots at the surface, leading to enhanced and highly directional magnetic dipole emission along the surface-normal direction via the magnetic Purcell effect.

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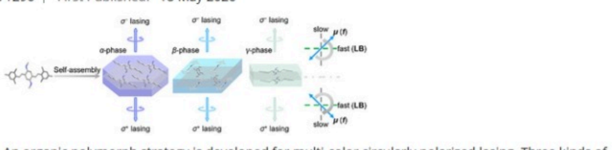
Polymorphic Organic Microcrystals for Multi-Color Circularly Polarized Laser Emission

Shizhe Ren, Zhonghao Zhou, Fanxing Meng, Bo Peng, Xinyu Dong, Zehua He, Yifan Zhou, Kun Hu, Weiyi Li, Chunhuan Zhang, Jiannian Yao, Haiyun Dong, Yong Sheng Zhao

e71296 | First Published: 18 May 2026



An organic polymorph strategy is developed for multi-color circularly polarized lasing. Three kinds of microcrystals are synthesized from one compound by controlling molecular self-assembly. The polymorphic microcrystals combine cavity effects, optical gain, and chiroptical activity induced by the coupling of fluorescence linear anisotropy with linear birefringence, enabling violet-blue, blue, and cyan circularly polarized laser emission.

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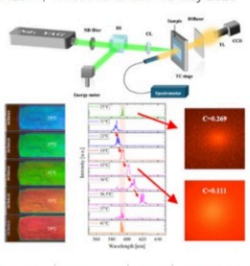
Thermally Tunable Random Lasing With Switchable Modes from Disordered Cholesteric Phase of Hydroxypropyl Cellulose

Yining Shi, Ziwei Mu, Tian Xia, Yue Shi

e71297 | First Published: 18 May 2026



A plant-derived hydroxypropyl cellulose cholesteric phase forms a disordered chiral photonic host for laser emission. Temperature shifts its photonic bandgap across the dye gain, switching emission between scattering-driven and band-edge-enhanced random lasing output. The coupling between the high-density band-edge state with the multiple scattering network lowers lasing threshold, lengthens feedback loops, introduces circular polarization, and suppresses speckle for improved imaging illumination.

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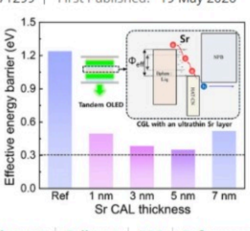
Strontium Charge-Generation Assistant Layer for High-Performance Tandem Organic Light Emitting Diodes

Hyo-Bin Kim, Sung-Cheon Kang, So-Jeong Lim, Minsu Kim, Jang-Kun Song

e71299 | First Published: 19 May 2026



An ultrathin Sr interlayer is introduced as a charge-generation assist layer to overcome the electron-injection barrier in deep-LUMO charge-generation layers (CGLs) of tandem OLEDs. The Sr layer facilitates trap-assisted tunneling and lowers the effective injection barrier, enabling improved charge balance and yielding tandem OLEDs with doubled efficiency, enhanced color purity, and improved operational stability.

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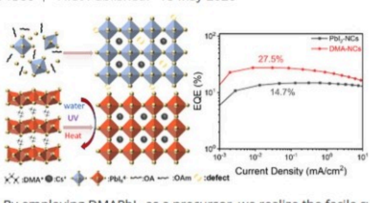
$DMAPbI_3$-Enabled Synthesis of Stable $CsPbI_3$ Nanocrystals for Light-Emitting Diodes With 27.5% External Quantum Efficiency

Guohao Bu, Shujian Wang, Chen Yang, Wenyuan Zhou, Chao Tian, Naiwei Liu, Jun Pan, Chaoyu Xiang

e71300 | First Published: 18 May 2026



By employing $DMAPbI_3$ as a precursor, we realize the facile synthesis of high-quality $CsPbI_3$ nanocrystals through an intermediate-product pathway. This approach mitigates non-radiative recombination defects, achieving a PLQY of 93% and outstanding stability. The resulting red PeLEDs exhibit a peak EQE of 27.5%, far surpassing PbI_2-based counterparts, thus offering substantial promise for optoelectronic applications.

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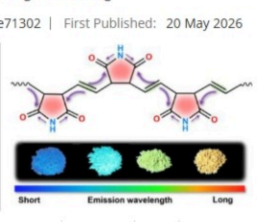
Maleic Anhydride-Based Polymers With Tunable Cluster Luminescence

Ruitao Pan, Ruihan Lei, Xiang Chen, Ting Li, Xuhui Zhang, Renjie Li, Jing Huang, Shibo Wang, Yang Wang, Weifu Dong

e71302 | First Published: 20 May 2026



PMV microspheres were fabricated via 2SP and further aminated into PMVA-G with stable morphology and improved QY. Thermal cyclization achieved an emission redshift. Tunable cluster states regulated luminescence. Amination and acylation reconstructed carbonyl cluster centers. The obtained polymers show great potential for agricultural light-conversion films.

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Chiral Diazafluorene-Based Re(I) Emitters Showing Circularly Polarized Photo-/Electroluminescence and Enantiomer-Dependent Cytotoxicity

Maria P. Davydova, Yao Tan, Yuhan Ai, Mariusz Wolff, Lyubov S. Klyushova, Eugene S. Vasilyev, Irina Yu Bagryanskaya, Mariana I. Rakhmanova, Shaolong Gong, Alexander V. Artem'ev

e71303 | First Published: 20 May 2026

Bright green circularly polarized phosphorescence and efficient OLED performance are achieved with chiral Re(I) complexes, which additionally show enantiomer-selective cytotoxicity, opening a pathway toward multifunctional optoelectronic-biomedical platforms.

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