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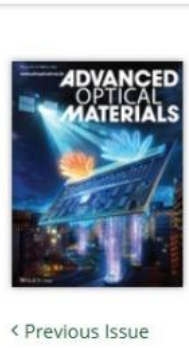

Advanced Optical Materials: Volume 13, Issue 10

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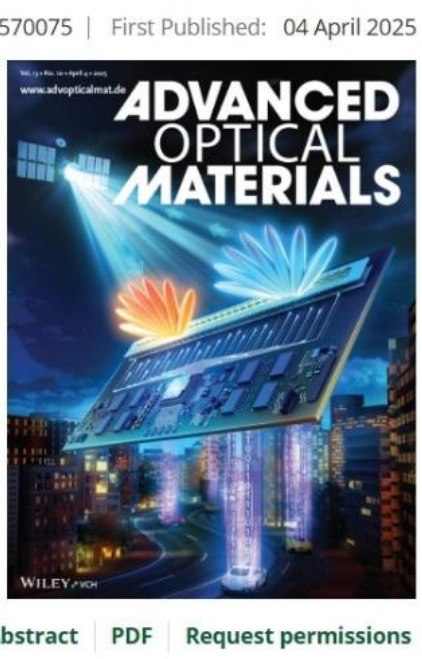
Frequency-Multiplexed Programmable Guided-Wave-Driven Metasurface for Low Earth Orbit Satellite Communication (Advanced Optical Materials 10/2025)

Jian-Qiao Han, Fan-Yi Meng, Chunsheng Guan, Tao Jin, Chang Ding, Tong Cai, Qun Wu, Xumin Ding

2570075 | First Published: 04 April 2025



Frequency-Multiplexed Guided-Wave-Driven Metasurface

In article 2402880, Fan-Yi Meng, Chunsheng Guan, Chang Ding, Xumin Ding, and co-workers propose a frequency-multiplexed, programmable, guided-wave-driven metasurface. This advanced metasurface architecture addresses the limitations in traditional metasurfaces antenna, such as external feeding, complex feeding network, and the challenge of frequency multiplexed functionality. The proposed metasurface holds great potential for applications in 5G/6G and LEO satellite communications.

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Inside Front Cover

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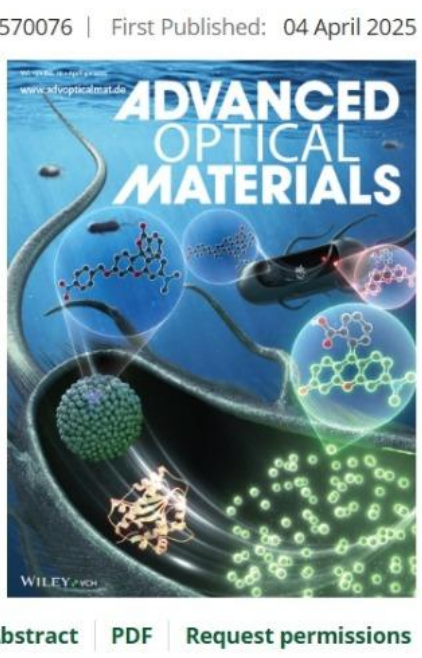
Self-Assembled Fluorophore-Based Probe for Efficient Detection of Endogenous Nitroreductase Activity in *Escherichia Coli* (Advanced Optical Materials 10/2025)

Eiji Nakata, Yoshihiro Yukimachi, Hirokazu Kariyazono, Yoshijiro Nazumi, Futa Komatsubara, Mashal Asif, Yoshihiro Uto, Hitoshi Hori

2570076 | First Published: 04 April 2025



Stimuli-Responsive Supramolecular Cluster Based Fluorescent Probe

A rational design strategy to construct stimuli-responsive supramolecular cluster based fluorescent probes, called "self-assembly induced lactone formation" (SAILac), has been developed. A new nitroreductase-reactive fluorescent probe, Rhodol-OBn(pNO_2), is created based on the structure-activiy relationship studies of the fluorophore scaffold, resulting in a superior S/N ratio and higher reactivity toward nitroreductase than the original probe. This new probe successfully detects the activity of endogenous nitroreductase in *Escherichia coli*. More details can be found in article 2402530 by Eiji Nakata and co-workers.

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Back Cover

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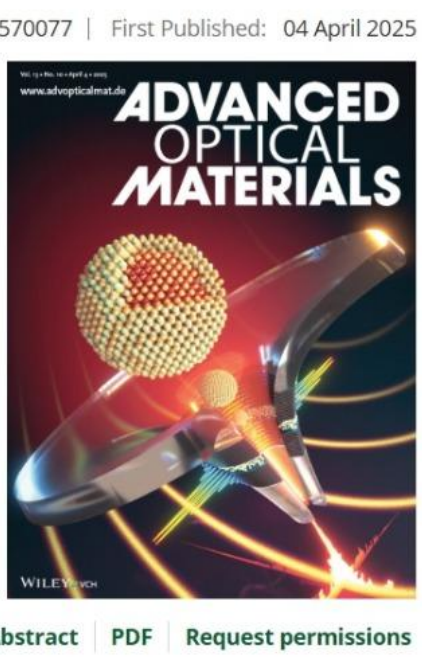
Enhancing the Infrared Emission from Silver Chalcogenide Quantum Dots Through Microcavity Coupling (Advanced Optical Materials 10/2025)

Lina Makke, Erwan Bossavit, Dario Mastrippolito, Andrei Shcherbakov, Mariarosa Cavallo, Huichen Zhang, Tommaso Gemo, Albin Colle, Adrien Khalili, Muchuan Hua, Xavier Lafosse, Xiang Zhen Xu, Mathieu G. Silly, Debora Pierucci, Emmanuel Lhuillier, Benjamin T. Diroll, Aloyse Degiron, Sandrine Ithurria

2570077 | First Published: 04 April 2025



Photoluminescence

In article 2402747, Sandrine Ithurria and co-workers describe how the photoluminescence for colloidal heavy metal-free infrared nanocrystals can be shaped through their introduction into a dielectric cavity. The nanocrystals are made of $Ag_2Se/ZnSe$ structure and emit at around the telecom wavelength. Once a film of nanocrystals is sandwiched by two Bragg mirrors the emission signal is 15 nm wide and highly directive.

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2570078 | First Published: 04 April 2025

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Review

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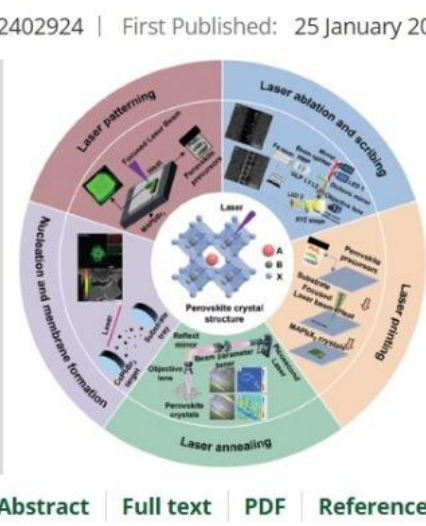
Application of Ultrafast Lasers: A Promising Route toward the Fabrication of Advanced Perovskite-Based Devices

Yuhao Zhang, Youqin Lin, Zongmin Lin, Zijun Yan, Shuli Wang, Yuhan Su, Yue Lin, Hao-Chung Kuo, Zhong Chen, Shouqiang Lai, Tingzhu Wu

2402924 | First Published: 25 January 2025



A review of recent advances in laser technology applied to perovskite materials and perovskite-based devices. It mainly includes laser-induced nucleation and film formation, laser annealing, laser ablation, laser printing, and laser patterning. In the future, the research of laser perovskite materials for high-precision, non-contact, non-damaging processing is expected to promote the development of photonic chips, new photovoltaic, and LED devices.

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Research Article

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Frequency-Multiplexed Programmable Guided-Wave-Driven Metasurface for Low Earth Orbit Satellite Communication

Jian-Qiao Han, Fan-Yi Meng, Chunsheng Guan, Tao Jin, Chang Ding, Tong Cai, Qun Wu, Xumin Ding

2402880 | First Published: 26 December 2024

A frequency-multiplexed, programmable, guided-wave-driven metasurface capable of achieving dynamic and independent beam scanning at two distinct frequencies is designed. This advanced metasurface architecture addresses the limitations in traditional metasurfaces antenna, such as external feeding, complex feeding network, and the challenge of frequency multiplexed functionaliy. The proposed metasurface holds great potential for applications in 5G/6G and LEO satellite communications.

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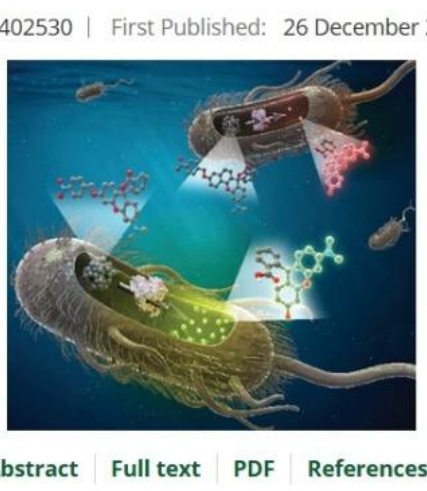
Self-Assembled Fluorophore-Based Probe for Efficient Detection of Endogenous Nitroreductase Activity in *Escherichia Coli*

Eiji Nakata, Yoshihiro Yukimachi, Hirokazu Kariyazono, Yoshijiro Nazumi, Futa Komatsubara, Mashal Asif, Yoshihiro Uto, Hitoshi Hori

2402530 | First Published: 26 December 2024



A self-assembled fluorophore-based probe for nitroreductase is created as the result of structure-activity relationship studies, having a superior signal-to-noise ratio with enough reactivity toward endogenous nitroreductase in *Escherichia coli*.

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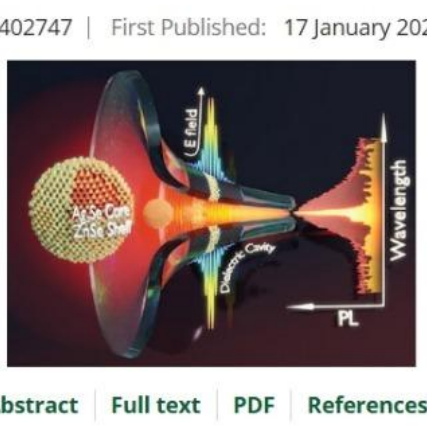
Enhancing the Infrared Emission from Silver Chalcogenide Quantum Dots Through Microcavity Coupling

Lina Makke, Erwan Bossavit, Dario Mastrippolito, Andrei Shcherbakov, Mariarosa Cavallo, Huichen Zhang, Tommaso Gemo, Albin Colle, Adrien Khalili, Muchuan Hua, Xavier Lafosse, Xiang Zhen Xu, Mathieu G. Silly, Debora Pierucci, Emmanuel Lhuillier, Benjamin T. Diroll, Aloyse Degiron, Sandrine Ithurria

2402747 | First Published: 17 January 2025



This paper discusses how infrared luminescence of nanocrystals is shaped by introducing the material into a dielectric cavity. So far most of the efforts are focused on heavy metal containing materials, here the application of such concept to Ag_2Se/ ZnSe core shell nanocrystals are explored. Emission as narrow as 15 nm is obtained for a peak wavelength in the telecom window.

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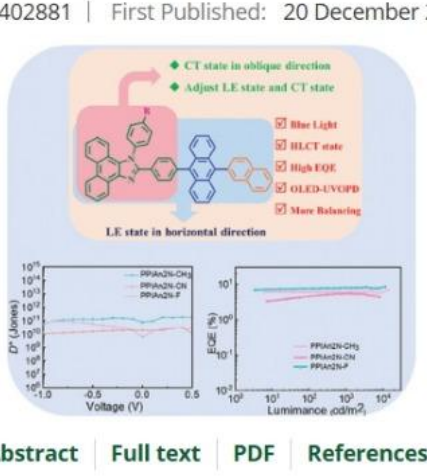
Side Chain Effects on High-Performance PPIAn2N-Derived Dual-Functional Devices for Balanced Blue Light Emission and UV Detection

Qiao Luo, Yannan Gao, Yunshui Bai, Mengge Wu, Huixia Xu, Hua Wang, Ding Zheng, Junsheng Yu

2402881 | First Published: 20 December 2024



The research addresses the principal problem in OLED-OPD bifunctional devices: about balancing luminescence and detection performance and the improving performances. It shows that the balance between luminescence and detection is better when the proportion of CT state in the molecule is close to 50% and CT state features are present.

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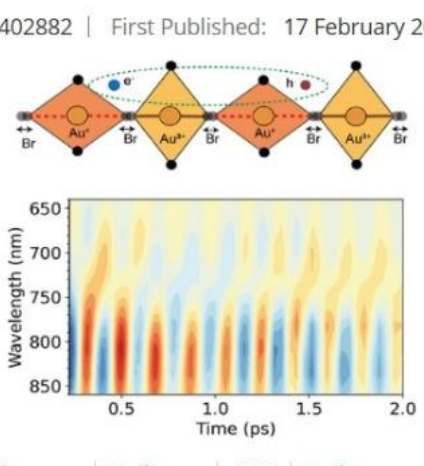
Coherent Phonons, Localization, and Slow Polaron Formation in Lead-Free Gold Perovskite

Sankaran Ramesh, Yonghong Wang, Pavel Chabera, Rafael Araujo, Mustafa Aboulsaad, Tomas Edvinsson, Feng Gao, Tõnu Pullerits

2402882 | First Published: 17 February 2025



Using ultrafast optical and Raman spectroscopy with bandstructure calculations, coupled electronic and vibrational dynamics are explained in Cesium Gold Bromide, a promising lead-free perovskite. Photoexcitation is strongly coupled to Au⋯Br stretching phonon modes. Lattice relaxation along these modes leads to a polaronic state. The decay time of the coherent phonon modes indicates polaron formation in ≈20 ps.

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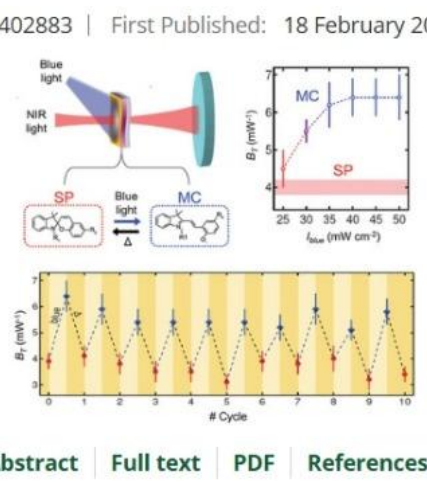
Photochromic Molecules Enable Optical Control of Optomechanical Coupling in a Cavity

Marta Cagetti, Michele Cardelli, Ennio Arimondo, Lorenzo Lavista, Francesca D'Elia, Andrea Camposeo, Dario Pisignano, Donatella Ciampini

2402883 | First Published: 18 February 2025



An optomechanical system with optically-tunable coupling is introduced, featuring a multilayered membrane with a photochromic molecule and NIR-absorbing dye. Laser cooling of a membrane vibrational mode is evidenced, with a 60% improvement in efficiency achieved upon photoisomerization, as well as reversible control of photothermal forces.

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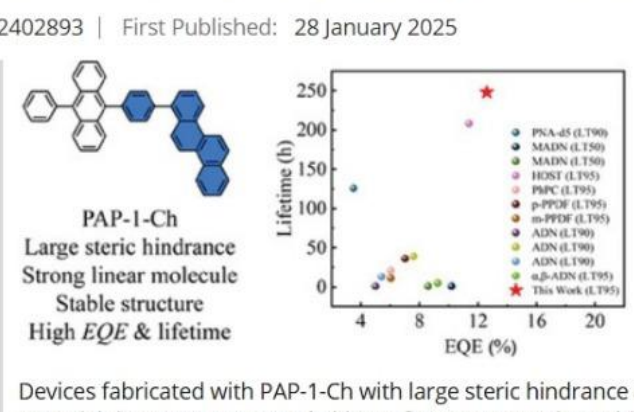
A Novel Chrysene-Anthracene Host Material for Enhanced Efficiency and Lifetime in Blue Fluorescent OLEDs

Yifan Shang, Siqi Li, Xiaopeng Zhang, Changchun Kuang, Yaowu He, Xinkang Zhang, Chengcheng Wu, Zhimin Meng, Xin Jiang, Lingqiang Meng, Guodan Wei, Hong Meng

2402893 | First Published: 28 January 2025



Devices fabricated with PAP-1-Ch with large steric hindrance and strong linear molecule as the host material demonstrate remarkable performance metrics, achieving blue color purity with CIE coordinates of (0.136, 0.130), a maximum external quantum efficiency (*EQE*) of 12.6%, and an LT_{95} over 12 000 h at 100 cd m^{-2}.

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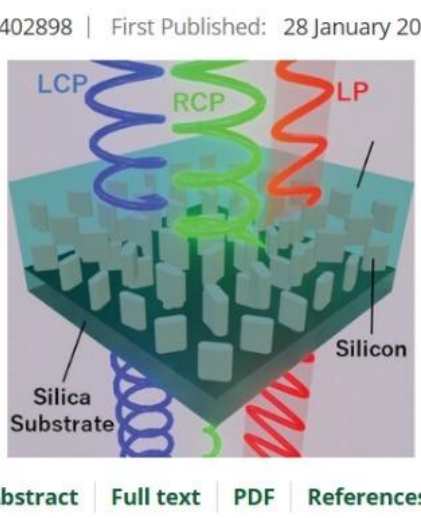
Angle-Tolerant Circular Eigenpolarizations Enabled by Orientational Disorder in Dielectric Metasurfaces

Katsuya Tanaka, Aso Rahimzadegan, Dennis Arslan, Anna Fitriana, Stefan Fasold, Dmitry Pidgayko, Michael Steinert, Thomas Pertsch, Manuel Decker, Carsten Rockstuhl, Isabelle Staude

2402898 | First Published: 28 January 2025



This study demonstrates that orientational disorder in all-dielectric chiral bilayer metasurfaces suppresses linear birefringence and enables robust circular eigenpolarizations across wide angular and spectral ranges. Experimental and numerical results reveal significant circular dichroism and optical activity, highlighting the potential of disordered metasurfaces for broadband, angle-independent optical applications, such as circular polarizers and beam splitters.

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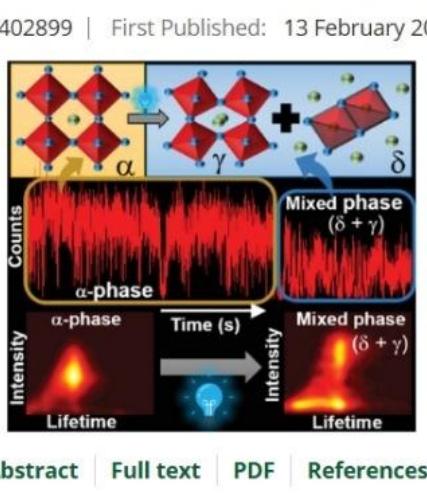
Hot Carrier Trapping in Light-Soaked Mixed Phase $CsPbI_3$ Perovskite Nanocrystals

Mrinal Kanti Panda, Debopam Acharjee, Asit Baran Mahato, Subhadip Ghosh

2402899 | First Published: 13 February 2025



Red-emitting $CsPbI_3$ perovskite nanocrystals are coveted materials for device applications but their real applications are limited by PL intermittency and light-induced phase change. This study reveals rapid phase deformation during blinking, with **α**-phase nanocrystals exhibiting short-lived trap states, while light-soaked mixed phase (γ+δ) nanocrystals develop long-lived deep trap states, causing dispersive blinking.

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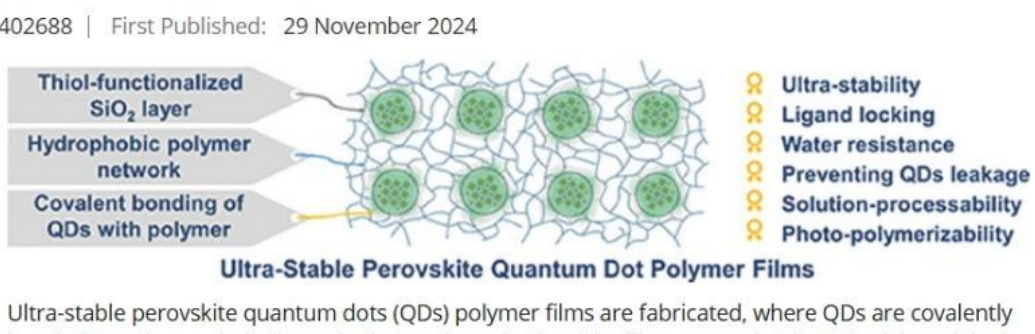
Ultra-Stable Perovskite Quantum Dot Polymer Films

Yiyuan Tang, Xin Zhang, Kaifeng Liao, Lvming Qiu, Ning Du, Leping Xiao, Jiewen Ma, Bo Wu, Zhen Wu, Guojie Wang

2402688 | First Published: 29 November 2024


Thiol-functionalized SiO_2 layer
Hydrophobic polymer network
Covalent bonding of QDs with polymer
Ultra-stability
Ligand locking
Water resistance
Preventing QDs leakage
Solution-processability
Photo-polymerizability
Ultra-Stable Perovskite Quantum Dot Polymer Films

Ultra-stable perovskite quantum dots (QDs) polymer films are fabricated, where QDs are covalently bonded to polymer chain through photopolymerization. The films can maintain 85% of the original fluorescence even in a strong acid solution (pH 1) over 135 days, a longest endurance time reported so far in harsh conditions. Patterned QDs arrays, luminescent textiles and light-converting layers for white light-emitting device prepared from the films are demonstrated.

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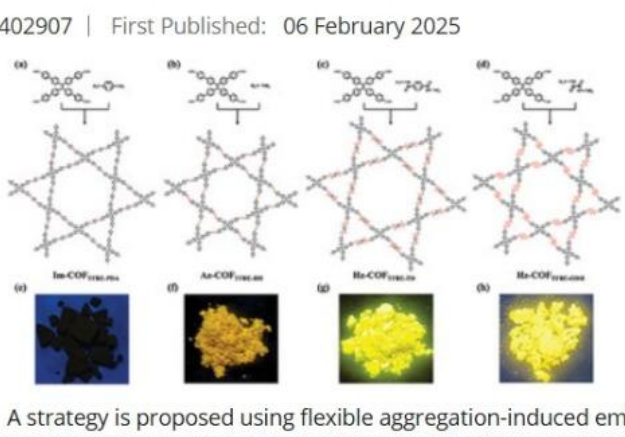
Modulating Linker Conjugation and Flexibility of Aggregation-Induced Emission Covalent Organic Framework for Enhanced Luminescence

Haifei Wan, Xingxiang Wang, Qinqin Nie, Xinyi Wang, Li Wang, Yonghai Song

2402907 | First Published: 06 February 2025



A strategy is proposed using flexible aggregation-induced emission (AIE) building blocks (TFBE) and weakly conjugated linkers to inhibit non-radiative decay in covalent-organic frameworks (COFs). By changing the conjugation and flexibility of linker, the photoluminescence quantum yield of hydrazone (Hz)-$COF_{TFBE-ODH}$ (oxalyl dihydrazide (ODH)) in solid state reaches 26.28%, which exhibits excellent sensing performance for tetracycline and is manufactured in white light-emitting diodes.

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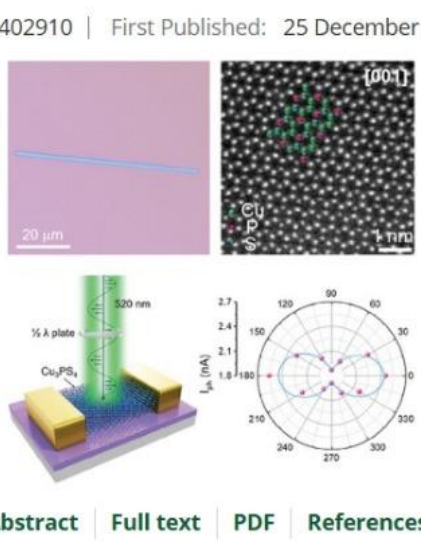
Chemical Vapor Deposition Growth of Ternary Cu_3PS_4 Nanowires for Polarization-Sensitive Photodetection

Denan Kong, Weikang Dong, Hongbin Yu, Chunyu Zhao, Yang Zhao, Yang Yang, Longyi Fu, Lin Jia, Ping Wang, Jijian Liu, Shoujun Zheng, Yan Xiong, Ruibin Liu, Yao Zhou, Jiadong Zhou

2402910 | First Published: 25 December 2024



In this study, high-quality ternary Cu_3PS_4 nanowires are synthesized via the chemical vapor deposition method. The Cu_3PS_4-based photodetector exhibits the responsivity of 8.8 mAW^{-1}, detectivity of 5.01 × 10^9 Jones, photoresponse speeds with the rise (decay) time of 1.5 (3.5) ms, and polarization-sensitivity photoresponse with an anisotropic ratio of 1.3 at 520 nm, paving the way for multifunctional optoelectronic devices.

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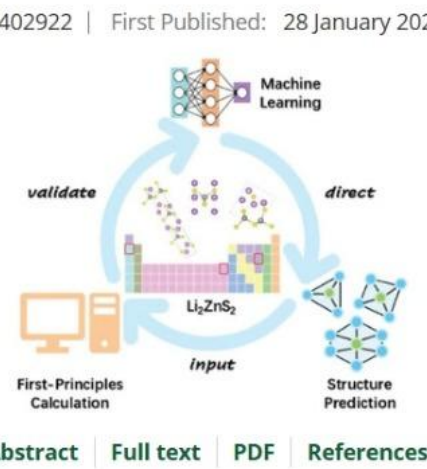
Prediction and Evaluation of Li_2ZnS_2 Crystals as Mid-Infrared Nonlinear Optical Material with High Thermal Conductivity

Qingchen Wu, Linfeng Dong, Lei Kang, Zheshuai Lin

2402922 | First Published: 28 January 2025



By using structure prediction algorithm, first-principles calculations, and machine learning model, three Li_2ZnS_2 phases are predicted and evaluated as mid-infrared nonlinear optical materials with high thermal conductivity, among which one structure exhibits balanced optical and thermal properties. This work highlights the collaborative application of these state-of-art research methods in searching for novel materials.

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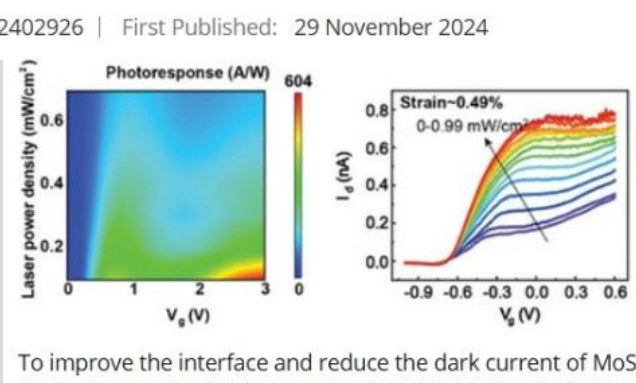
Suppress Dark-Current for High-Photoresponse MoS_2 Transistor

Chunchi Zhang, Jinxiu Liu, Haijuan Wu, Chao Tan, Xin Hao, Zegao Wang

2402926 | First Published: 29 November 2024



To improve the interface and reduce the dark current of MoS_2-based flexible photodetector, in this study, the passivation layer is employed to hinder the leakage current, which can suppress the gate leakage current decrease from 10^{-5} to 10^{-9} A, and thus, the photoresponsivity can increase by 29 times.

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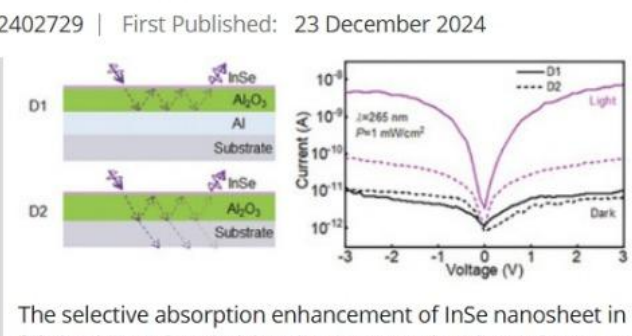
Highly Sensitive InSe Nanosheet Ultraviolet Photodetector Realized Via an Asymmetric Fabry–Pérot Structure

Shi-Rong Chen, Long-Qiang Shan, Wei Shu, Li-Yan Liang, Jiang Wang, Ji-Gang Hu, Wen-Huan Zhu, Lin-Bao Luo, Chun-Yan Wu

2402729 | First Published: 23 December 2024



The selective absorption enhancement of InSe nanosheet in UV region has been realized by fabricating and optimizing the asymmetric Fabry–Pérot (F–P) structure $InSe/Al_2O_3/Al$, leading to a peak response at 265 nm illumination with the photo-to-dark current ratio (I_{light}/I_{dark}) of 719. Responsivity (*R*) and photoconductive gain (*G*) of the device are also increased by two orders of magnitude.

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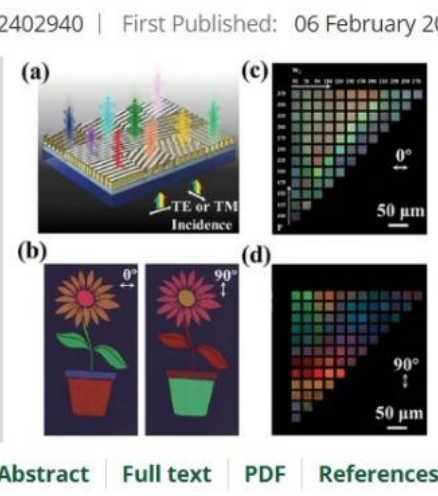
Polarization Manipulated Transmissive Structural Color Based on Dual Complementary Nanograting Cavities

Chenqian Wang, Xiguo Cheng, Zeyang Tang, Zhenwei Ren, Yu Chen, Xin Hu, Chinhua Wang

2402940 | First Published: 06 February 2025



A polarization-manipulated transmissive structural color based on dual complementary nanograting cavities is proposed and experimentally validated. The device not only achieves strong polarization-dependent and wavelength-selective transmission but also introduces selective absorption for higher-order transmission modes associated with inherent nanocavity resonances. These features enable both high design flexibility and a rich color palette with narrow line widths.

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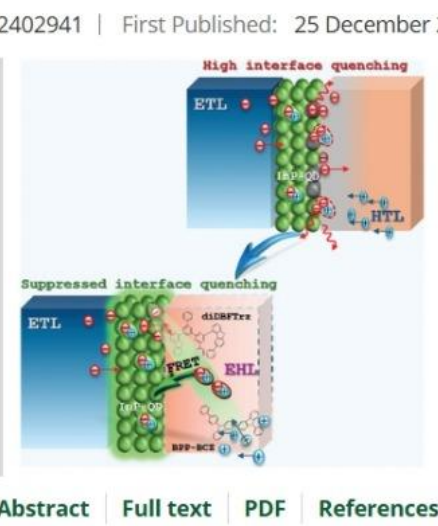
Advanced Exciplex Sensitized Green InP-Based Quantum Dot Light Emitting Diodes for Extended Lifespan

Thi Thuy Truong, Nisha Vergineya S, Jaemin Lim, Nagarjuna Naik Mude, Wan Ki Bae, Jang Hyuk Kwon

2402941 | First Published: 25 December 2024



The exciplex EHL is successfully inserted between QD and HTL of green InP-based QLEDs to recycle overflowing electrons, form excitons, and transfer exciton energies to QD layer. The maximum EQE is enhanced from 10.9% to 19.2%. The optimized BPP-BCZ: diDBFTrz exciplex ratio of 6:4 (max EQE: 17.3%) achieves the LT50 at 1000 cd m^{-2} of 1881 h.

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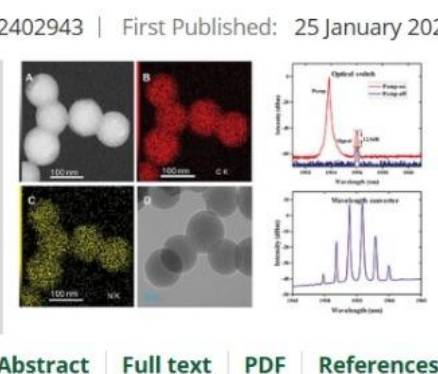
Nonlinear Nitrogen-Doped Carbon-Based All-Optical Switch and Wavelength Converter in Mid-Infrared Region

Ke Wang, Zhoufa Xie, Jianhua Ji, Haiming Huang, Yufeng Song, Zhenhong Wang, Bin Zhang

2402943 | First Published: 25 January 2025



The nonlinear optical characteristics of nitrogen-doped carbon nanospheres (NCN) are explored, leading to the successful development of an all-optical device for the 2 μm wavelength range. This device is created by incorporating the NCN material with microfibers. The NCN-based prototype enables optical Kerr switching and second-order cascaded four-wave mixing for efficient wavelength conversion, optimized for the 2 μm wavelength range.

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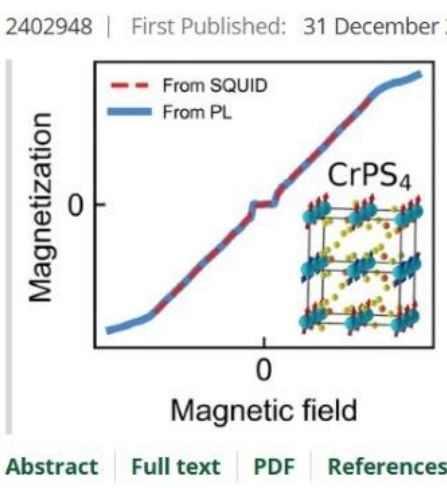
Direct Optical Probing of the Magnetic Properties of the Layered Antiferromagnet $CrPS_4$

Tomasz Fąs, Mateusz Wlazło, Magdalena Birowska, Miłosz Rybak, Małgorzata Zinkiewicz, Leon Oleschko, Mateusz Goryca, Łukasz Gondek, Bruno Camargo, Jacek Szczytko, Adam K. Budniak, Yaron Amouyal, Efrat Lifshitz, Jan Suffczyński

2402948 | First Published: 31 December 2024



A method for all-optical determination of the magnetic properties of 2D antiferromagnet $CrPS_4$ is shown. It makes possible studies of spin ordering and magnetic phase transitions in single- or a few-layer samples of magnetic layered materials, for which a poor signal-to-noise ratio precludes any reliable neutron scattering or standard magnetometry measurements.

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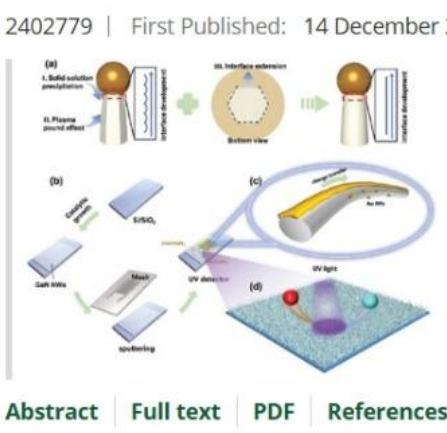
Ultrastable and Quick Response UV Photodetector by High Crystalline Orientation Wurtzite/Zinc-Blende GaN Superlattice

Jingyang Zhang, Jiaxing Wang, Jinglin Fan, Chao Wang, Zening Guo, Kun Zheng, Ru-Zhi Wang

2402779 | First Published: 14 December 2024



Gallium nitride (GaN) UV photodetectors have wide application prospects. In this paper, low-cost MPCVD is being used to prepare wurtzite/zinc-blende (WZ/ZB) mixed GaN superlattice (SL) nanowires (NWs), and the band reconstruction is being realized to improve the UV detection performance. The electrode is being prepared by magnetron sputtering method, and the detector exhibits ultrafast response speed and ultrahigh stability.

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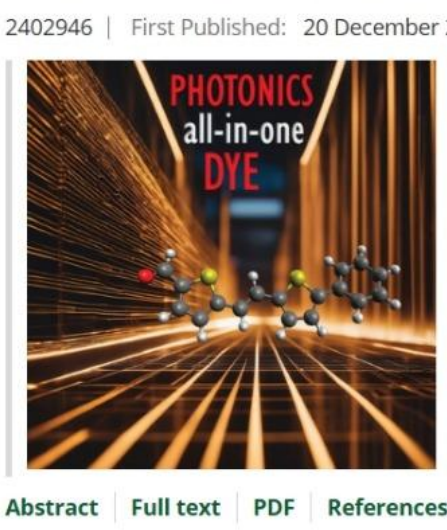
Spectroscopic Wonders: A Multifunctional All-In-One Molecule for Nanophotonics

Adam Szukalski, Yohan Cheret, Anna M. Grabarz, Abdelkrim El-Ghayoury, Bouchta Sahraoui

2402946 | First Published: 20 December 2024



The ToC highlights an unprecedented All-in-One molecule with a simple chemical structure offering versatile photonic applications. It enables efficient light amplification, modulation, and higher harmonic generation. Additionally, a random laser is demonstrated in two distinct environments: liquid and solid, showcasing its remarkable versatility. Finally, a theoretical approach provided deep insights into the experiments at the molecular level.

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From the Bulk to the Nanoscale: Strong Evolution in the Structure and Chiroptical Properties of Chiral Halide Double Perovskites

Maria Maniadi, Kostiantyn Tieriekhov, Olivier Ségut, Nicolas Mercier, Alexandre Abhervé

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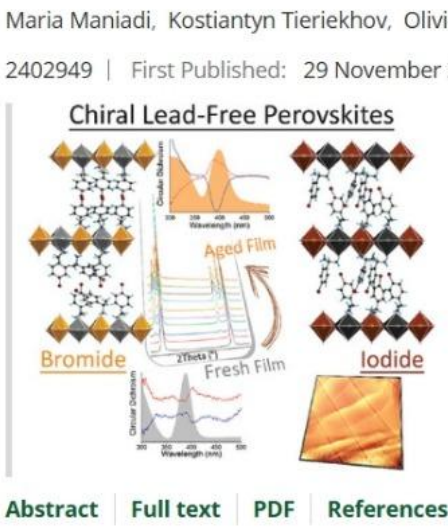

A complete series of bromide-based and iodide-based 2D chiral double perovskites has been structurally characterized and their chiroptical properties investigated to reveal the effect of both polymorphism and nature of the halide anions in the circular dichroism of the thin films.

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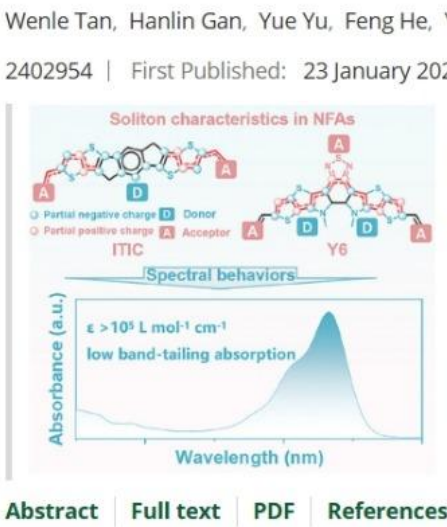
Strong Soliton-Like Characteristics in Non-Fullerene Acceptors – A New Photochemical Insight for Future Molecular Design

Wenle Tan, Hanlin Gan, Yue Yu, Feng He, Yuguang Ma

2402954 | First Published: 23 January 2025



High-performance non-fullerene acceptor molecules, such as ITIC and Y6, exhibit soliton-like electronic structure characteristics, proved by the uniform carbon-carbon bond lengths and alternating atomic charge distributions. These soliton-like characteristics can be modulated by the electron donor and acceptor groups. The corresponding soliton transitions effectively explain the high molar extinction coefficients and low band-tailing absorption observed in absorption spectra.

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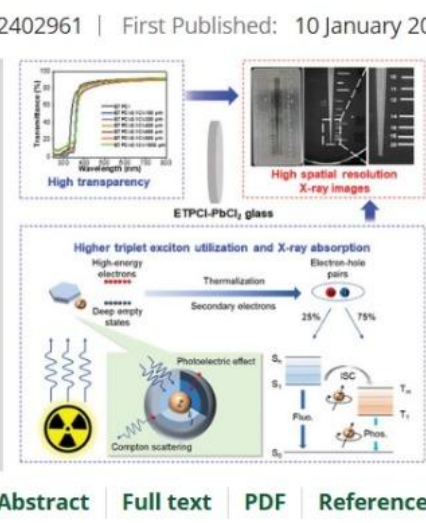
Transparent Organic Glass With Bright Triplet Excitons for High-Spatial-Resolution Indirect X-Ray Imaging via Heavy Metal Halide Incorporation

Ziwei Xu, Nan Li, Xiaolong Feng, Xiangyang Yan, Tong He, Lu Zhang, Shengzhong (Frank) Liu, Zhou Yang

2402961 | First Published: 10 January 2025


High transparency
High spatial resolution X-ray images
Higher triplet exciton utilization and X-ray absorption

Transparent and bright organic scintillator glass has been achieved through incorporating lead halides to enhance the triplet exciton utilization and X-ray absorption of the organic luminescent. These two merits result in X-ray images with spatial resolution as high as 19.9 lp mm^{-1}.

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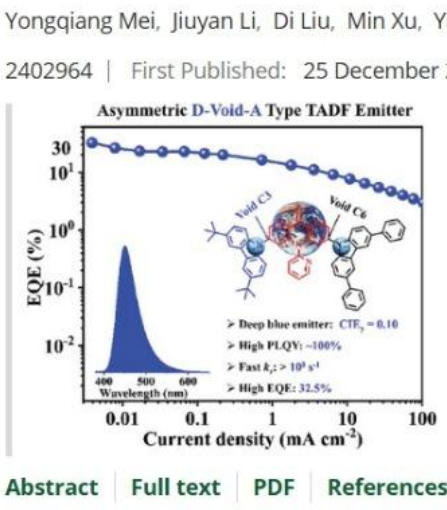
Donor-Void-Acceptor Type TADF Emitters with Asymmetric Donors for Highly Efficient Deep Blue OLEDs

Yongqiang Mei, Jiuyan Li, Di Liu, Min Xu, Yixue Li, Huihui Wan

2402964 | First Published: 25 December 2024



Two asymmetric D-void-A-void-D′ type deep blue TADF emitters containing asymmetric carbazole donors and highly rigid 10-(pyridin-2-yl)acridin-9(10*H*)-one acceptor are developed, which exhibited fast k_rs ($>10^6$ s^{-1}), high EQEs of 32.5% and 30.5% with CIE (0.15, 0.10) and (0.15, 0.11) in deep blue OLEDs.

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Unraveling Plasmonic Field Contributions in Catalysis with $Au@Al_2O_3$-Pd-$Au@Al_2O_3$ Trimer Arrays

Lei Yao, Yunjia Wei, Xing Zhao, Xiangnan Zhu, Dexiang Chen, Xiao Tang, Xingce Fan, Teng Qiu, Qi Hao

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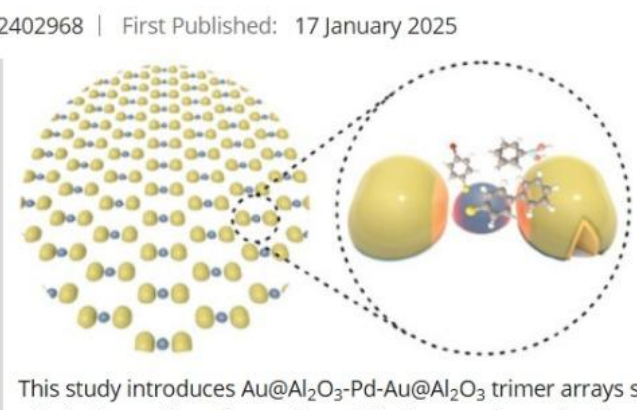

This study introduces $Au@Al_2O_3$-Pd-$Au@Al_2O_3$ trimer arrays specifically designed to isolate field effects from other plasmonic contributions and examine the role of field effects in Pd-catalyzed C—C coupling reactions. Through in situ surface-enhanced Raman scattering, the work reveals how plasmonic nanostructures enhance the catalytic activity and selectivity, providing a foundation for the rational design of high-performance catalytic systems.

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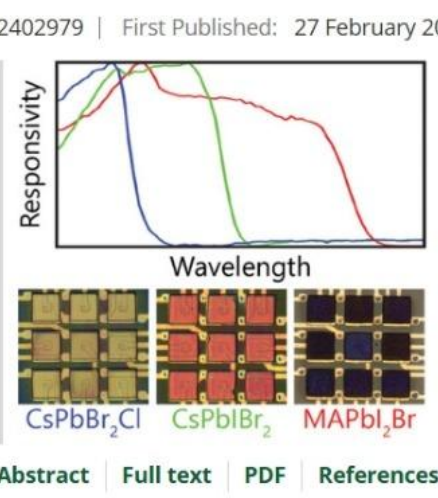
A CMOS-Compatible Fabrication Approach for High-Performance Perovskite Photodetector Arrays

Erfu Wu, Sergey Tsarev, Daria Proniakova, Xuqi Liu, Dominik Bachmann, Sergii Yakunin, Maksym V. Kovalenko, Ivan Shorubalko

2402979 | First Published: 27 February 2025



Lead halide perovskites photodetectors are pixelated using a lithography and pulsed argon milling process. The resulting devices exhibit responsivity of 0.3 A W^{-1}, low dark current density ($<10^{-6}$ mA cm^{-2}), high detectivity (10^{13} Jones), and short fall time (sub-20 ns). This approach not only enhances device performance but also paves the way for CMOS-compatible scalable production of perovskite-based optoelectronic devices.

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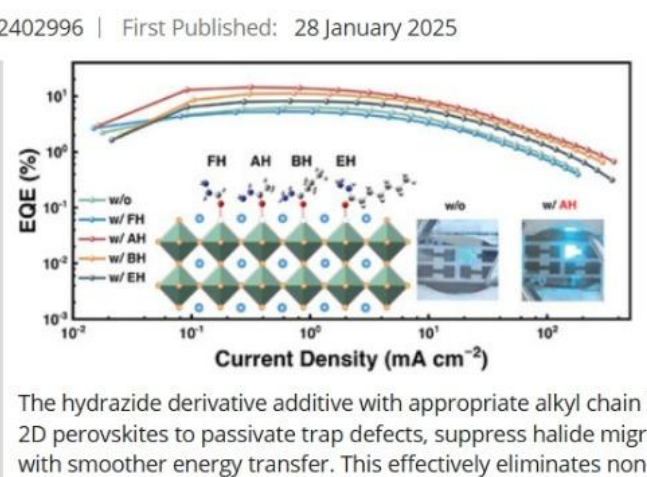
Hydrazide Molecular Configuration Induced Phase Regulation and Defect Passivation Enable Efficient Quasi-2D Blue Perovskite Light-Emitting Diodes

Shuyan Fang, Chao Shen, Zhi Tan, Chenhui Su, Junquan Luo, Siqi Wu, Jian Qing, Yunhan Luo, Renqiang Yang, Jibin Zhang, Ziyang Hu, Jihai Liao, Lintao Hou

2402996 | First Published: 28 January 2025



The hydrazide derivative additive with appropriate alkyl chain length is incorporated into blue quasi-2D perovskites to passivate trap defects, suppress halide migration, and regulate phase distribution with smoother energy transfer. This effectively eliminates non-radiative recombination losses in the blue quasi-2D perovskites. Benefiting from the above advantages, efficient blue perovskite light-emitting diodes with an emission peak at 486 nm, a high external quantum effciency (EQE) of 14.5% and a high luminance of 2659 cd m^{-2} are achieved.

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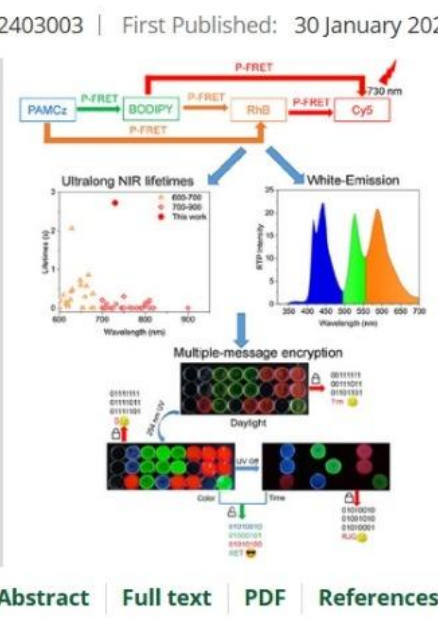
Near-Infrared Organic Ultralong Room-Temperature Phosphorescence Materials Constructed via Multiple Phosphorescence Resonance Energy Transfer

Longyue Yu, Ning Feng, Wenwen Fu, Xionghui Huang, Xin Li, Xia Xin, Jingcheng Hao, Hongguang Li

2403003 | First Published: 30 January 2025



A series of organic ultralong room-temperature phosphorescence (OURTP) films with multicolor emission including a perfect white-emission with CIE coordinate (0.336, 0.330) and persistent NIR-emission with 2.7 s phosphorescence have been constructed by multiple P-FRET. These materials showed excellent temperature and water responsiveness and can be used for multiple-message encryption.

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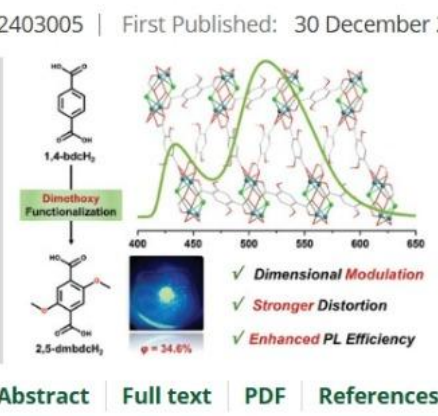
Introducing Methoxy Functionality to Modulate the Lead Halide Dimensionality in Robust Metal–Organic Frameworks for Enhanced Broadband Emission

Ziyi Wang, Yukong Li, Chen Sun, Dongyang Li, Chengdong Peng, Honghan Fei

2403005 | First Published: 30 December 2024



This study presents two new lead halide-based MOFs consisting of $[Pb_4X_2]^{6+}$ (X = Cl, Br) cluster-type inorganic units and 2,5-dimethoxy benzenedicarboxylate linkers, exhibiting efficient broadband green-yellowish emission and exceptional stability. Compared to previously reported MOFs with 1D lead halide chains, the high structural deformation of the 0D lead halide clusters substantially enhances PLQY from 1.5–8.0% to 33.4–34.6%.

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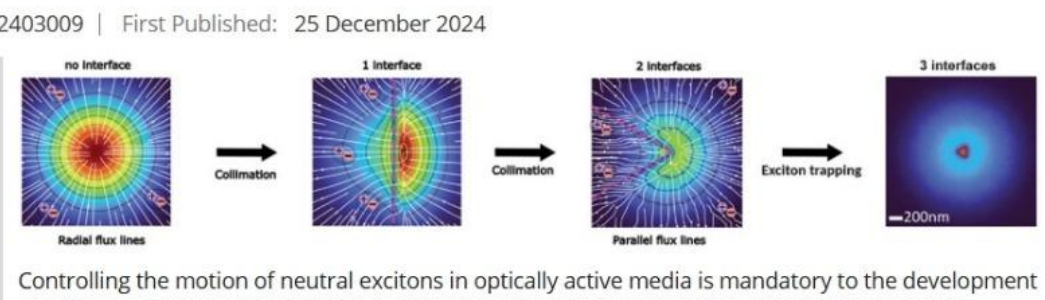
Exciton Collimation, Focusing and Trapping Using Complex Transition Metal Dichalcogenide Lateral Heterojunctions

Hassan Lamsaadi, Aurelien Cuche, Gonzague Agez, Ioannis Paradisanos, Dorian Beret, Laurent Lombez, Pierre Renucci, Delphine Lagarde, Xavier Marie, Ziyang Gan, Antony George, Kenji Watanabe, Takashi Taniguchi, Andrey Turchanin, Nicolas Combe, Bernhard Urbaszek, Vincent Paillard, Jean-Marie Poumirol

2403009 | First Published: 25 December 2024



Controlling the motion of neutral excitons in optically active media is mandatory to the development of advanced circuits and devices for applications in excitonic. Transition Metal Dichalcogenide Lateral Heterojunctions allow advanced in-plane control of the excitonic distribution and flux over large distances, and in particular exciton focalization, flux collimation and trapping.

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