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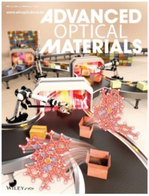
Discovery of Novel Iridium(III) Complex-Based Photofunctional Materials Using Excited-State Descriptors (Advanced Optical Materials 7/2025)

Chu Wang, Lin Liu, Wei Sun, Juanjuan Wang, Qing-Kai Li, Kai Feng, Bin Liao, Wei-Hai Fang, Xuebo Chen

2570063 | First Published: 04 March 2025



Novel Iridium(III) Complex-Based Photofunctional Materials Discovery

Designing Ir(III) complex-based photofunctional materials for OLEDs and photocatalysis presents significant challenges. In article 2402317, Bin Liao, Xuebo Chen, and co-workers propose a three-step, data-driven workflow that leverages machine learning, time-dependent density functional theory (TDDFT), and complete active space perturbation theory (CASPT2) coupled with complete active space self-consistent field (CASSCF) methods. By incorporating critical excited-state descriptors, a promising uracil-based Ir(III) complex is identified from the self-constructed database.

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Iontronically Tunable Broadband Graded Index Films (Advanced Optical Materials 7/2025)

Paolo Franceschini, Andrea Tognazzi, Virginia Maria Demartis, Luca Carletti, Evgenii Menshikov, Ivano Alessandri, Alfonso Carmelo Cino, Fabrizio Torricelli, Costantino De Angelis, Maria Antonietta

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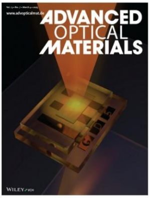

Tunable Optical Devices
Laser light is deflected thanks to the spatial modulation of the bulk electronic conductance of a PEDOT:PSS layer arranged in an organic electrochemical transistor configuration. More details can be found in article 2402410 by Maria Antonietta Vincenti and co-workers.

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Back Cover

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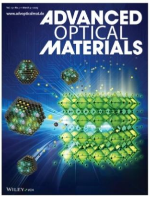
Converting Perovskite Nanocrystals to PbS Quantum Dots Toward Short-Wave Infrared Photodetectors (Advanced Optical Materials 7/2025)

Wenjie Zhang, Fan Fang, Huaying Zhong, Lili Huang, Haodong Tang, Xi Chen, Junjie Hao, Lei Zhang, Leifeng Cao, Jun Tang, Keyu Zheng, Peter Müller-Buschbaum, Wei Chen

2570065 | First Published: 04 March 2025



PbS QDs via Perovskite Nanocrystal Conversion
In article 2402740, Haodong Tang, Jun Tang, Keyu Zheng, Wei Chen, and co-workers present a novel perovskite conversion method (PCM) for fabricating high-quality PbS quantum dots (QDs) using perovskite nanocrystals (PeNCs) as lead precursors. The method improves QD performance by reducing trap density and enhancing charge carrier transport, demonstrated in SWIR photodetectors with significantly higher responsivity and detectivity compared to conventional hot injection methods.

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2570066 | First Published: 04 March 2025

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Review

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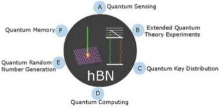
Quantum Optics Applications of Hexagonal Boron Nitride Defects

Aslı Çakan, Chanaprom Cholsuk, Angus Gale, Mehran Kianinia, Serkan Paçal, Serkan Ateş, Igor Aharonovich, Milos Toth, Tobias Vogl

2402508 | First Published: 13 February 2025


A Quantum Sensing
B Extended Quantum Theory Experiments
C Quantum Key Distribution
D Quantum Computing
E Quantum Random Number Generation
F Quantum Memory
hBN

Hexagonal boron nitride has emerged as a compelling platform for classical and quantum technologies. The past decade has witnessed a surge of novel ideas and developments, which may be overwhelming for newcomers to the field. This review provides an overview of the fundamental concepts and key applications, including quantum sensing, quantum key distribution, quantum computing, and quantum memory.

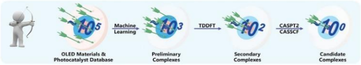
Abstract | Full text | PDF | References | Request permissions

Research Article

Discovery of Novel Iridium(III) Complex-Based Photofunctional Materials Using Excited-State Descriptors

Chu Wang, Lin Liu, Wei Sun, Juanjuan Wang, Qing-Kai Li, Kai Feng, Bin Liao, Wei-Hai Fang, Xuebo Chen

2402317 | First Published: 09 December 2024



The design of iridium(III) complex-based photofunctional materials faces challenges in organic light-emitting diodes (OLEDs) and photocatalysis. A three-step data-driven design approach is presented using machine learning, time-dependent density functional theory (TDDFT), and multiconfigurational perturbation theory (CASPT2//CASSCF). By further incorporating key excited-state descriptors, a promising multifunctional uracil-based Ir(III) complex from the "OLED Materials and Photocatalyst Database is identified."

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

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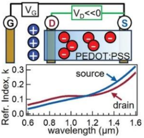
Iontronically Tunable Broadband Graded Index Films

Paolo Franceschini, Andrea Tognazzi, Virginia Maria Demartis, Luca Carletti, Evgenii Menshikov, Ivano Alessandri, Alfonso Carmelo Cino, Fabrizio Torricelli, Costantino De Angelis, Maria Antonietta Vincenti

2402410 | First Published: 25 December 2024



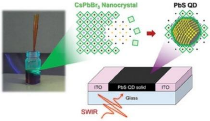
A three-terminal organic electrochemical transistor (OECT) based on PEDOT:PSS film allows to obtain a tunable device with spatially modulated optical properties. Within the polymer film, the tuning of the bias level among electrodes induces a non-uniform charge distribution, which gives rise to a spatially-dependent refractive index profile across the device.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Converting Perovskite Nanocrystals to PbS Quantum Dots Toward Short-Wave Infrared Photodetectors

Wenjie Zhang, Fan Fang, Huaying Zhong, Lili Huang, Haodong Tang, Xi Chen, Junjie Hao, Lei Zhang, Leifeng Cao, Jun Tang, Keyu Zheng, Peter Müller-Buschbaum, Wei Chen

2402740 | First Published: 29 November 2024



PbS quantum dots (QDs) fabricated via the perovskite nanocrystals conversion method (PCM) show reduced trap densities and enhanced charge transport, outperforming conventional hot injection method QDs in SWIR photodetectors. PCM-QD devices exhibit higher responsivity, detectivity, and faster response, offering promise for advanced optoelectronic applications.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

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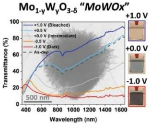
Mixed Molybdenum–Tungsten Oxide as Dual-Band, VIS–NIR Selective Electrochromic Material

Florian Gillissen, Michaël Lobet, Jennifer Dewalque, Pierre Colson, Gilles Spronck, Rachel Gouttebaron, Mathieu Duttine, Brandon Faceira, Aline Rougier, Luc Henrard, Rudi Cloots, Anthony Maho

2401995 | First Published: 13 February 2025



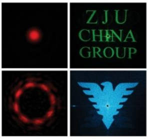
Visible (VIS)–near-infrared (NIR) dual-band electrochromic modulation is originally demonstrated in mixed molybdenum–tungsten oxide nanostructures. Owing to the controlled formation of oxygen vacancies and reduced W/Mo species during the solvothermal synthetic process, these optically active formulations are shown to transit through a VIS-darkened and NIR-transparent "warm" optical state, allowing to better adapt smart windows to cold climates and seasons.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Chalcogenide Visible Transmissive Metasurface Optics

Hao Dai, Yilin Shi, Zezhao Ju, Kunhao Lei, Ye Luo, Jieren Song, Ruizhe Liu, Qikai Chen, Mengxue Qi, Yaoguang Ma, Lan Li, Hongtao Lin

2402359 | First Published: 17 February 2025



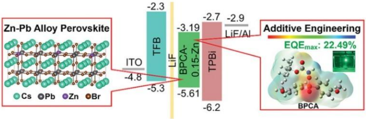
This work presents the first visible transmissive metasurfaces based on chalcogenide $Ge_{23}Sb_7S_{70}$ (GSS), exploiting its high refractive index and low optical loss. Devices such as metalenses, meta-holograms, and spectrometers are designed and fabricated, paving the way for advanced metasurfaces in visible optics.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

High-Performance Zinc-Lead Alloy Green Quasi-2D Perovskite Light-Emitting Diodes

Guangchuan Zhong, Guoqiang Yuan, Boyang Li, Langwen Qiu, Yan Zhang, Guanwei Sun, Zhao Chen, Fanyuan Meng, Shi-Jian Su

2402360 | First Published: 18 February 2025



High-performance zinc-lead alloy green PeLEDs with a record EQE of 22.49% are achieved through Zn^{2+} substitution combined with additive engineering. This strategy not only mitigates lead toxicity but also enhances device efficiency and stability, marking a significant advancement toward more environmentally friendly PeLEDs.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

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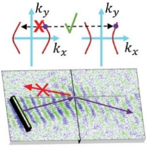
Deep-Subwavelength Focusing and Reflectionless Negative Refraction in Visible-Light Hyperbolic Metasurface

Kobi-Yaakov Cohen, Shimon Dolev, Guy Bartal

2402591 | First Published: 25 January 2025



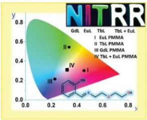
Visible-frequency hyperbolic metasurfaces (HMSs) are explored for their super-resolution capabilities. Near-field measurements reveal anomalous focusing, sub-wavelength imaging, and angle-independent, reflectionless negative refraction across HMS interfaces. This study highlights HMSs as a powerful platform for on-chip super-resolution imaging and wave compression, with intrinsic impedance matching that may enable precise, sub-wavelength control of light-matter interactions.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Lanthanide-Tetradentate Schiff Base-PMMA Composite Films for Tunable White Light Emission

Uttam Sarkar, Manjeet Singh, Mrinal K. Adak, Sagarika Bhattacharya

2402592 | First Published: 25 December 2024



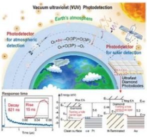
Targeted white light emission is acquired on the incorporation of a tetradentate open cyclic Schiff base-lanthanide metal complexes ($Eu^{III}L$ and $Tb^{III}L$) into the Poly(methyl methylacrylate) [PMMA] matrix on illumination with 375 nm radiation. Three different lanthanide metal ions (Gd^{III}, Tb^{III}, and Eu^{III}) possess identical coordination environments in the presence of 2-(((2-(2-hydroxyethoxy)ethyl)imino)methyl)phenol ligand. However, alteration of central metal ion modulates the luminescence of the complexes from blue to green to red.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Ultrafast Diamond Photodiodes for Vacuum Ultraviolet Imaging in Space-Based Applications

Lemin Jia, Siqi Zhu, Naiji Zhang, Zhuogeng Lin, Wei Cai, Lu Cheng, Xiaoqiang Lu, Wei Zheng

2402601 | First Published: 12 January 2025



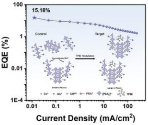
This paper presents a diamond Schottky photodiode designed for rapid solar imaging in the vacuum ultraviolet (VUV) range. With a rise response time of 15 ns and selective sensitivity from 170–220 nm, this device significantly advances diamond photodetector technology. Future integration into an optomechanical system aims to enable multidimensional detection of solar VUV radiation.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Phase Modulation on Low-Dimensional Perovskite for High Performance Blue Light Emitting Diodes

Kangyang Wang, Shibing Zou, Kezhou Fan, Zheng Zhang, Jiong Li, Honggang Chen, Feilin Zou, Kam Sing Wong, Jianbin Xu, Keyou Yan

2402597 | First Published: 13 December 2024



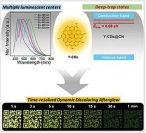
TPBi is employed to control the film growth and modulate the phase purification. The coordination of imidazole with Pb^{2+} helps to merge the small-n slices into the large-n phase with reduced defects. Consequently, sky-blue PeLEDs emitting at 488 nm demonstrate an impressive external quantum efficiency (EQE) of 15.18%.

Abstract | Full text | PDF | References | Request permissions

Enabling Visualized Time-Resolved Dynamic Discoloring Afterglow from Carbon Dots by Engineering Luminescent Centers and Trap-States for Security Applications

Yixuan Xu, Zihan Cheng, Henggang Wang, Jun Jiang, Zuxu Zhou, Linger Feng, Xiaomeng Wang, Hengwei Lin, Kai Jiang

2402607 | First Published: 18 November 2024



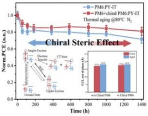
Minute-level time-resolved dynamic discoloring afterglow (TDDA) is achieved through the engineering of luminescent centers in carbon dots (CDs) and the introduction of trap-states via embedded CDs into carbon nitrides, thereby extending the TDDA duration from less than 10 s to ≈1 min. This advancement enables easy recognition of the entire dynamic discoloring afterglow process by naked eyes, highlighting significant potential for security applications.

Abstract | Full text | PDF | References | Request permissions

Chiral Steric Effect for Improved Phase Transition and Exciton Dynamics in Efficient and Stable All-Polymer Solar Cells

Wen-Qing Zhang, Ren-Jie Hu, Zhen Fu, Jia-Wei Qiao, Peng Lu, Hang Yin, Xiao-Yan Du, Wei Qin, Xiao-Tao Hao

2402613 | First Published: 06 December 2024



This study discussed a chiral strategy to enhance the performance and stability of all-polymer solar cells. The chiral steric effect can enhance the interactions and entanglement between molecules to regulate the phase transitions during film formation. Chirality-generated orbital angular momentum can enhance the intersystem crossing to increase the ratio of triplet states, thereby extending the exciton lifetime and diffusion length.

Abstract | Full text | PDF | References | Request permissions

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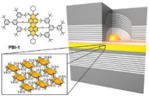
Enwrapped Perylene Bisimide Enables Room Temperature Polariton Lasing and Photonic Lattices

Dominik Horneber, Johannes Düreth, Tim Schembri, Simon Betzold, Matthias Stolte, Sven Höfling, Frank Würthner, Sebastian Klembt

2402617 | First Published: 08 January 2025



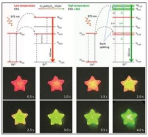
Perylene bisimides (PBIs) are a promising material platform for exciton-polariton lasing due to their high photoluminescence quantum yield, stability, and tunable solid-state packing. This study demonstrates microcavity polariton lasing at room temperature using an enwrapped PBI derivative. Distinct polaritonic band structures are observed via photonic confinement in optical lattices that pave the way for chiral light-matter coupling and topological effects.

Abstract | Full text | PDF | References | Request permissions

Single-Mode Excited Thermally-Responsive Multicolor Emissions of High Entropy Upconversion Perovskite Halides for Anticounterfeiting

Yanqing Hu, Shijie Yu, Rui Zhang, Jiaqiang Zhou, Xi Zhang, Li Cai, Jiasheng Wan, Yijun Xue, Shuang Sun, Yiling Cui, Ming Zhao, Zuo-Xi Li, Qiyue Shao

2402546 | First Published: 18 November 2024



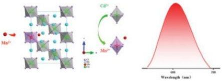
The color-shifting emissions of high entropy upconversion perovskite halides stem from luminescent kinetics transformation from energy transfer upconversion at low temperature to excited state absorption at high temperature. The multicolor emissions can also be trigged by the 975 nm laser heating effect.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Efficient and Stable Red-Orange Emission from Polaronic Magnetic Excitons in Mn (II)-Doped 0D All-Inorganic Rb$_4$CdCl$_6$

Bin He, Bao Ke, Chengzhi Yang, Yijun Chen, Xianci Zhong, Weijian Li, Bingsuo Zou

2402624 | First Published: 15 December 2024



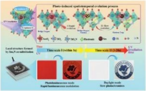
Mn (II)-doped 0D Rb$_4$CdCl$_6$ exhibits both a high photoluminescence quantum yield and stable orange-red emission from polarized magnetic excitons. This luminescence originates from Mn^{2+} d–d transitions, weak ferromagnetic coupling, and self-trapped excitons. Additionally, the strong electron–phonon coupling and excellent structural stability further underscore its potential for magnetic optoelectronic applications.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Unlocking Time-Dependent Visual Response Mode Through Regulating the Photo-Induced Local Structure Evolution Process of C@TiO$_2$:Sm,N

Fangke Wang, Ruiling He, Yuanyuan Zhao, Lin Zhu, Zhixin Xu, Zengming Qin, Ji Zhang, Haijiao Xie, Kangjun Wang

2402625 | First Published: 30 January 2025



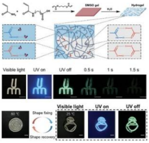
The phenomenon of luminescence modulation and photochromism occurring on different time scales is achieved through a straightforward strategy involving Sm, N co-substitution in TiO$_2$. In situ irradiated technologies (ISI-EPR, ISI-XPS) and DFT calculations reveal that such visual response mode is attributed to the dynamic evolution of a distinct local structure formed through Sm, N co-substitution upon UV.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Intrinsic Room-Temperature Phosphorescent Hydrogel Driven by Phase Separation and Glass Transition

Xinzhen Fan, Lu Gao, Yijie Jin, Tian Qiu, Xavier Banquy, Xiao-Xia Zhu, Chuanzhuang Zhao

2402627 | First Published: 29 November 2024



Hydrogels with intrinsic room-temperature phosphorescence (RTP) is designed through the copolymerization of acrylamide (Am) and *N*-acryloyl-aminoundecanoic acid (NAUA). The phase separation of the polymer network and the glass transition of the hydrophobic domain restrain the mobility of water molecules and enhance the stability of phosphorescent clusters, leading to a long afterglow (>1.5 s).

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

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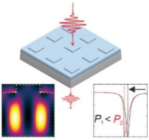
Ultrafast Modulation of Guided-Mode Resonance in a Nonlinear Silicon Nitride Grating

Subhajit Bej, Nikolai Tkachenko, Robert Fickler, Tapio Niemi

2402632 | First Published: 17 January 2025



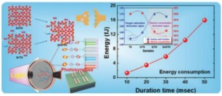
The article reports an experimental demonstration of ultrafast nonlinear optical modulation in a silicon nitride diffraction grating using guided-mode resonance. The grating exhibits over 50% resonance modulation driven by the optical Kerr effect, enabling dynamic switching and all-optical pulse shaping. These results, supported by simulations, suggest promising applications in all-optical devices and nonlinear material characterization.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Ultra-Low Power Photosynaptic Devices Based on Persistent Photoconductivity-Modulated SnO$_2$

Woo-Jin Lee, Sang-Hyun Sohn, Il-Kyu Park

2402636 | First Published: 09 November 2024



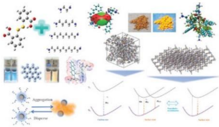
Ultra-low power photosynaptic device is demonstrated based on persistent photoconductivity-modulated SnO_2, which incorporates two foreign elements, Zn and Sr, which act as an acceptor to reduce the electron concentration and a reducing agent to create additional oxygen vacancies, respectively. The SnO_2 thin film with Zn dopant and Sr reduction significantly reduces the energy consumption of the photosynaptic device to about 4 fJ, which is comparable to the biological level of 1-10 fJ per synaptic event. The synergistic effect enables the demonstration of a UV recognizer exhibiting analog characteristic for smart window system controlling the blocking of UV radiation.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Engineering Solid-State Fluorescent Carbon Dots with Aggregation-Induced Emission by Fatty Amine Chains-Regulated Charge Transfer and π-π Stacking

Canpu Yang, Jiusheng Hu, Wenjiang Tan, Jinhai Si, Xun Hou

2402638 | First Published: 16 January 2025



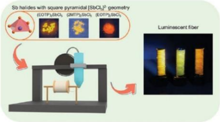
Four solid-state emissive CDs with AIE properties are synthesized by adjusting fatty amine chains. The spatial configuration and the interaction of disulfide bonds and fatty amine chains favor solid-state emission and AIE. The charge transfer and π-π stacking can be regulated by fatty amine chains, which impact emission wavelength, AIE strength, and PLQY.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Flexible Luminescent Fibers Based on Novel Antimony Halides Toward Advanced Anti-Counterfeiting and Information Encryption

Tianrui Zhou, Yunluo Wang, Lin Zhou, Jianghua Wu, Zesheng Pan, Futing Sun, Hao Gu, Ruifeng Liu, Tingting Ye, Jingshan Hou, Yongzheng Fang, Jixuan Liu, Bin Liu, Minghui Wang, Haijie Chen, Lianjun Wang, Wan Jiang

2402641 | First Published: 21 November 2024



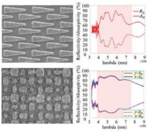
Based on using large rigid organic cations to optimize the lattice distortion, a series of novel Sb halides feature efficient light emission are obtained. Stable luminescent fibers based on them are firstly assembled and used for advanced anti-counterfeiting and information encryption. It shows a predictable design strategy for unknown Sb halides and extends their applications in flexible optoelectronics fields.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Phase-Modulation Metasurface-Based Visible Broadband Absorbers with Polarization Sensitivity or Independence

Liye Li, Wengang Wu

2402643 | First Published: 10 January 2025



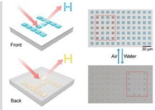
The authors propose two novel phase-modulation metasurface-based visible broadband absorbers based on the trapezoid Al-SiO_2-Al structures, which have an essential difference from traditional amplitude-modulation absorbers. The first design is polarization-sensitive and the second is polarization-independent. Both have the properties of angle robustness and environmental refractive index robustness. In theory, the influence of diffraction loss on the absorption performance is emphasized.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Hydrogel-Based Dynamic Structural Color with Optical Janus Effect for Imaging Encryption/Concealment

Lanlan Liu, Chenyu Feng, Guohao Bo, Jing Wang, Hanying Zhang, Huguang Shao, Jian Zhang, Xuefeng Zhang

2402644 | First Published: 29 November 2024



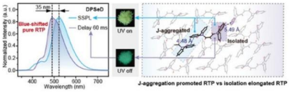
A simple bilayer structure containing hydrogel micropixels and semi-transparent ultrathin aluminum film is proposed for the dynamically tunable structural color with optical Janus effect. Through grayscale electron-beam lithography, the thickness and swellability of the hydrogel micropixels can be individually regulated, enabling reversible dual-sided displays for imaging encryption/concealment with humidity change.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Time-Resolved and Blue-Shifted Pure Room-Temperature Phosphorescence by Dynamic Isolation of Triplet Exciton in Crystal

Yike Wang, Longyan Zhang, Jingyu Zhang, Chengxi Sun, Qixin Lv, Dongyue Cui, Ping Li, Chao Zheng, Runfeng Chen

2402647 | First Published: 14 January 2025



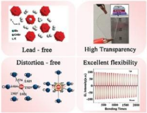
Blue-shifted pure room-temperature phosphorescence (RTP) is first realized in **DPSeD** crystal, showing time-resolved color change from yellow-green to cyan. Both isolated and J-aggregated phosphors contribute to the pure RTP emission dynamically, where the phosphors in J-aggregation lead to red-shifted but stronger RTP while the isolated phosphors exhibit long-lived pure RTP.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Suppressing the Jahn-Teller Effect in 0D Manganese-Based Perovskite Derivatives for Transparent and Flexible Light-Emitting Diodes

Yangyang Cai, Siyu Yan, Xinran Du, Tingting Lin, Yue-jian Lin, Longzhen Qiu, Weizhi Wang

2402650 | First Published: 26 December 2024



A lead-free perovskite derivative without distortion is achieved by suppressing the Jahn-Teller effect. The distortion-free structure is beneficial to high luminescent performance and stability by reducing defects. In addition, the fabricated light-emitting diodes have a high transparency of 76% and excellent flexibility with a luminescence intensity maintenance of 90% after 2000 bending cycles.

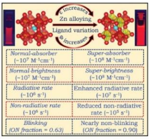
Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Editor's Choice

Super-Absorber, Super-Bright, Nearly-Non-Blinking $CsPbI_3$ Perovskite Nanocrystal

Soumen Mukherjee, Swarnali Ghosh, Mainak Ghosal, Sourav Dey, Saptarshi Mandal, Chayan K. De, Rahul Debnath, Manobina Karmakar, Ayon Jyoti Karmakar, Prasanta K. Datta, Prasun K. Mandal

2402608 | First Published: 24 October 2024


ε increases
Zn alloying
Ligand variation
ϕ increases
Normal-absorber (~10⁷ M⁻¹cm⁻¹)
Super-absorber (~10⁸ M⁻¹cm⁻¹)
Normal-brightness (~10⁷ M⁻¹cm⁻¹)
Super-brightness (~10⁸ M⁻¹cm⁻¹)
Radiative rate (~10⁶ s⁻¹)
Enhanced radiative rate (~10⁷ s⁻¹)
Non-radiative rate (~10⁶ s⁻¹)
Reduced non-radiative rate (~10⁵ s⁻¹)
Blinking (ON fraction = 0.63)
Nearly non-blinking (ON fraction = 0.90)

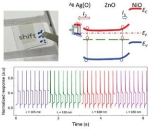
Adopting an uncharted pathway of achieving gigantic magnitude of molar extinction coefficient (ε) ($\approx 2 \times 10^8$ M^{-1} cm^{-1}) and PLQY (0.98) through Zn-alloying and surface-passivating ligand variation, super-absorber and super-bright (brightness $\approx 2 \times 10^8$ M^{-1} cm^{-1}) $CsPbI_3$ based perovskite nanocrystal has been reported. Very high peak of ON fraction (90%) at the ultrasensitive single particle level makes this super-absorber and super-bright PNC a nearly-non-blinking one.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

Indirect In Situ Oxidization of Metallic Nanoparticles for a High-Performance Broadband Transparent Detector by Plasmonic and Pyro-Phototronic Coupling

Thanh Tai Nguyen, Sanh Vo Thi, Naveen Kumar, Malkeshkumar Patel, Junghyun Lee, Chanhyuk Choi, Ha Trang Nguyen, Juhyung Yun, JinJoo Park, Joondong Kim

2402655 | First Published: 25 December 2024



High-performance self-powered transparent broadband photodetector are often restricted in terms of operating spectrum and sensitivity. The present paper proposes a novel method to address the constraints that incorporating Ag-based compounds into traditional ZnO-based photodetectors to expands the operating range to the near-infrared region, resulting in an enhanced sensitivity by 476%. This improvement is achieved by harnessing the combined effect of plasmonics and pyro-phototronics.

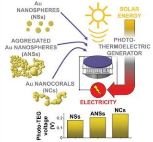
Abstract | **Full text** | **PDF** | **References** | **Request permissions**

🔓 Open Access

Optical Properties of Anisotropic Gold Nanoparticles for Solar Light Harvesting and Photo-Thermoelectric Conversion

Runpeng Miao, Michael Bissoli, Vincenzo Amendola

2402662 | First Published: 30 December 2024



Au NPs are valued for their optical properties but face challenges in broadband light harvesting. Here, the thermoplasmonic properties of nanospheres are compared with anisotropic Au NPs like aggregated nanospheres and nanocorals, all synthesized via a clean laser ablation process. Nanocorals have broadband absorption up to 2500 nm, resulting in effective light harvesting for photothermal applications and photo-thermoelectric electricity generation.

Abstract | **Full text** | **PDF** | **References** | **Request permissions**

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