ADVANCED OPTICAL MATERIALS

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COVER PICTURE

Front Matters

Helicity-Dependent All-Optical Switching in Bi:Ba-Substituted Rare-Earth Iron Garnet Films Driven by Orbital Magnetic Moment (Advanced Optical Materials 43/2026)

Ramiro Vidal, Ryuichiro Iwakami, Yadi Suzuki, Md Mofakkir Al Mosaid, Hiroko Sekiguchi, Jun Okabayashi, Shinji Isogami, Takayuki Ishibashi

HTML | First Published: 22 November 2026

This article relates to: ...

3D Optical Magnetization Switching

The magnetization direction of a magnetic garnet film can be switched by a single laser pulse. The switching is controlled by the helicity of circularly polarized excitation light and pulse. This high-speed switching of magnetic states is essential for developing next-generation magnetic recording technologies. More information about this research is available from Ramiro Vidal, Takayuki Ishibashi, and co-workers (DOI: 10.1002/adom.202517796).

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Photoswitchable Fluorescence

Dynamic fluorescence modulation via Cyton Competitive Protonation, which are captured by fluorescence dye. Illuminated clusters reveal their emission from open to orange in just a few seconds. The research, led by Shinsuke Takagi and Tsuyoshi Tahara, is published in Advanced Optical Materials (DOI: 10.1002/adom.202517603). More information can be found in the Research article by Akinobu Matsuhari, and co-workers (DOI: 10.1002/adom.170816).

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BACK COVER

Front Matters

Dynamic Fluorescence Modulation via Cyton Driven Competitive Protonation (Advanced Optical Materials 43/2026)

Somesh S. Lo, Mohit S. Mujtahid, Colin-ian Syed, Sergey I. Vagin, Fresh Esther, Antonio Sunjuan, Bastel Privalikal, Dogay A. Gabru, Ulrich S. Schubert, Johanes Gilles, Alexandrea Mattioni

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Photoswitchable Fluorescence

Dynamic fluorescence modulation via Cyton Competitive Protonation

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This article relates to: ...

Light-activate fluorescence

A two-component cruise-cyton system demonstrates dynamic fluorescence modulation through photochemically and thermal coupling. Illumination of a merocyanine photoacid generates protons that drive a transient fluorescent pyridinium cyton, switching its emission color and intensity in seconds. Reported by Somesh S. Lo and Dr. Johanes Gilles and colleagues reveal the proton-shuttling mechanism underpinning this reconfigurable fluorescent switch.

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ISSUE INFORMATION

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RESEARCH ARTICLE

Open Access

Helicity-Dependent All-Optical Switching in Bi:Ba-Substituted Rare-Earth Iron Garnet Films Driven by Orbital Magnetic Moment

Ramiro Vidal, Ryuichiro Iwakami, Yadi Suzuki, Md Mofakkir Al Mosaid, Hiroko Sekiguchi, Jun Okabayashi, Shinji Isogami, Takayuki Ishibashi

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Helicity-dependent all-optical magnetization switching was demonstrated for Bi:Ba-substituted rare-earth iron garnet films. Switching occurred for both left- and right-handed circularly polarized light pulses, with a switching ratio between 0.8 and 0.9. The switching efficiency was found to be dominated by the orbital magnetic moment of Fe, with a linear relationship between orbital moment (L_z) and switching ratio. These findings establish orbital-driven switching as a promising mechanism for high-speed magnetic recording.

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Dynamic Fluorescence Modulation via Cyton Driven Competitive Protonation

Somesh S. Lo, Mohit S. Mujtahid, Colin-ian Syed, Sergey I. Vagin, Fresh Esther, Antonio Sunjuan, Bastel Privalikal, Dogay A. Gabru, Ulrich S. Schubert, Johanes Gilles, Alexandrea Mattioni

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Regulating the Energy Levels of Hg1-xCdxSeyTe1-y Quantum Dots for High-performance Extended Shortwave Infrared Photodiodes

Xinyu Gu, Wenghei Wan, Jiefeng Lin, Yanqiang Yao, Zegiyu Hong, Zhenghui Wu, Huadan Shan

eTOC | First Published: 22 November 2026

Including Hg, it's the liquid phase ligand exchange for HgCdSeTe QDs is developed. The resulting QDs films and also improved the current passivation of HgCdTe QDs, resulting in better rectification and current collection in Hg-Te QDs-based SWIR photodiodes.

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Regulating Haze Formation in Black Electrochromic Polymer Films

Tina Marie Y. Hyungil, Juan Sun, Joseph B. Rohr, Luana E. Fleig, Jack E. Fischer, Jiangyu Mei

HTML | First Published: 12 November 2026

This study investigates haze in electrochromic polymer films at different stages, including pre-treatment, post-treatment, and after cycling. Haze is measured using a spectrophotometer. Film morphology and thickness are characterized by SEM and AFM. Morphological features such as surface roughness, pinholes, and phase separation are analyzed to explain haze formation. These findings help guide strategies for controlling haze in electrochromic polymer films and improving their optical performance. Illustration in the graphic was generated using ChatGPT (AI) via image generation. Operator and is not to scale.

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Magnetic Nanocomposite to Mediate Optical Switching of VO_2 Thin Film Via Hyperthermia Effect

Hai-Hoang Thi Thanh, Florent Bourquard, Damien Jamon, Sophie Neveu, Patrick Garrelie, Mathieu Stoffel, Florence Garrelie, Thierry Donnet, Jean-Francois Bardeau, Nicolas Moncoffre, Francoise Rossi

eTOC | First Published: 12 November 2026

This study offers a novel approach to mediate the optical switching of VO_2 thin films by alternating magnetic field via hyperthermia effect. A Fe$_3$O$_4$/SiO$_2$ composite monolith acts as a heat source and converts an alternating magnetic field into heat, which activates the phase transition of VO_2 and thus modulates the optical transmittance. The process is reversible and stable.

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Coordination-Directed Structural Evolution Between Luminescent $[Ru_2]^{4+}$ and Electrochromic $[Ru_3O]^{6+}$ Metallacages Through Ligand Design

Ruonan Yao, Yafei Guo, Jinchen Chen, Ming Chen, Hao Liu, Hongli Yu, Juwei Jin, Zhenjian Guo, Jing Zhao, Quanlin Liu

eTOC | First Published: 16 November 2026

Symplanes in precursor ratio and crystallization-driven self-assembly. Luminescent dinuclear [Ru$_2$]$^{4+}$ and electrochromic trinuclear [Ru$_3$O]$^{6+}$ metallacages are selectively obtained. Structural evolution between luminescent and electrochromic states is demonstrated, and coordination-directed self-assembly establishes a direct structure–property relationship. The luminescent phase enables prototype anti-counterfeiting devices, while the electrochromic (λ_{max} = 512 & 1140 nm, ΔT = 27.8% at 512 nm, ΔT = 47.6% at 1140 nm).

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Terahertz Phase Inversion via Field-Free Spin-Orbit Torque Switching in an Antennna Integrated Symmetric Heterostructure

Amin Khan, Tiago de Oliveira Schenkel, Sunayana, Mohammad Imteyaz Abdullah, Rostislav Rojas-Lafita, Sascha Preu, Markus Münzenberg

eTOC | First Published: 12 November 2026

This work demonstrates full electrical control of the phase of broadband terahertz pulses using a field-free spin-orbit torque switching in a symmetric Co/Pt/Co heterostructure. Antenna integration enables efficient coupling through sub-mW torque with 1 ps electrical pulses, producing a terahertz phase inversion with high reproducibility and enhanced emission upon a mode-to-light-speed phase-matched terahertz frequency.

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Photocontrol Photomultiplication Dual-Mode Organic Photodetectors with Tunable Visible/NIR Responses

Yang Li, Yanbing Chen, Jiaxi Chen, Zhuohang Li, Xin Hu, Hongbiao Chen, Zhen Li, Dongdong Qu, Yang Li, Yanbo Pei

eTOC | First Published: 12 November 2026

A strategy to develop photocontrol and photomultiplication dual-mode operation in a single organic photodetector is demonstrated. Photocontrol operation improves linearity and dark current, while photomultiplication operation enhances the ratio of injected current, while spectral switching is enabled via bias-dependent charge collection, thereby increasing weakest-structural design.

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Harnessing the Pyro-Photonionic Effect in Benzimidazolium Bismuth Bromide Perovskites for Enhanced Photodetection

Subhrat Rout, Sangeeta Karunkar, Sushmita Maity, Dipak Samanta, Souvik Kabir, K. D. M. Rao, Rajdeb K. Pati

eTOC | First Published: 12 November 2026

This work presents the synthesis of a new and noble benzimidazolium based bismuth bromide ($(BenzH_2)_3Bi_2Br_9$) perovskite system which shows pyro-photonionic effect. The material exhibits a strong correlation between organic and inorganic components. The use of benzimidazolium cation not only enhances the pyro-photonionic effect in an overall centrosymmetric structure but also boosts the photodetection.

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Ultra-Narrowband Bright-Yellow Emission from an Organoboron Nanographene

Sudhir K. Kesiri, Takuma Hosoki

eTOC | First Published: 16 November 2026

A ligand-conjugation with **LB-TXB2**, featuring a BODIPY acceptor, successfully sensitizes Tb^{3+} ions, producing the regularly incorporation of dual-function ligands. The resulting **LB-TXB2**@Tb complex exhibits bright yellow emission with an exceptionally high quantum yield (QY = 0.93). Time-resolved spectroscopy of **LB-TXB2**@Tb achieves an ultra-fast energy transfer rate (kET) of 1.0 × 10^{12} s^{-1} and a luminescence lifetime of 1.0 ms.

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Enhanced Thermal Stability of InAs Colloidal Quantum Dot Films With ASN$_3$ Ligands

Xin Wen, Han Wang, Jiaqing Hou, Carolina de Garcia Bastiani, Wenhu Zhou, Erik Garcia Bastiani, Ghada Koleilat

eTOC | First Published: 13 November 2026

This article develops a novel solid-state ligand exchange strategy to enhance the surface passivation and thermal stability of InAs colloidal quantum dots (CQDs) using ASN$_3$ salt-based passivation solution ligands. The quantum dot films exhibit a field-effect mobility of 0.1 cm^2 V^{-1} s^{-1} and maintain their photovoltaic performance up to 200°C, showcasing their potential for consumer electronics.

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Nanoporous Stacked Polytriazine With Sulfur Enrichment for Detection of Near Infrared Radiation

Tanya Gupta, Akshayakumar Diyorkand Salunke, Sameru Pradhan, Debalaina Pradhan, Parikshit Mohanty

eTOC | First Published: 13 November 2026

This work develops a novel nanoporous polytriazine, designated as CNSNP, created by incorporation of sulfur in the organic framework through a catalyst-free solid-state reaction in HNMP. The combined effect of sulfur, along with doping, significantly reduces the bandgap from 2.8 eV to 1.8 eV, enabling the material to absorb and detect near-infrared photoresponse.

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Molecular N-Type Doping Enables Schottky Interface Engineering in MTe_2 Field-Effect Transistors for Ultrasensitive Photodetection and Low-Power Logic Applications

Yihe Li, Yang Liu, Kai-Hsin Chang, Yi-Cheng Lin, Jin-Hua Hsieh, Wen-Hao Chang, Yuan Yao, Xuan-Yun Lin, Wei-Jia Qiu, Shang-Yen Hsieh, Yu-Chuang Tung, Shun-Wei Liu, Chih-Ting Lin

eTOC | First Published: 12 November 2026

N-DMBI doping enhances interfacial band bending to suppress charge injection, while its incorporation extends the spectral response toward the near-infrared, enabling broadband photodetection and low-power logic.

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Photoelectrochromism of Semiconductor Heterojunction All-Solid-State Electrochromic Device

Yuanyuan Cai, Yuanyuan Zhu, Zhe Pei, Yanheng Li, Hongmei Yang, Shengnan Duan, Chuan Jing, Yuting Jing, Xiaoyu Zhao

eTOC | First Published: 13 November 2026

This is the strong dependence of the transmittance on light intensity, the semiconductor heterojunction all-solid-state electrochromic device can be regarded as a typical photoelectrochromic device according to the definition. Based on the photoelectrochromic effect, it has broad application prospects in flat screen displays, flexible display and sensing.

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Aggregation-Activated Delayed Fluorescence in Phenothiazine-Decorated Fluorenone Diimpyles Between TADF and TTA

Antonio Magliano, Daniele Cavalli, Lucia Cicconi, Mumtaza Iqbalpuri, Giuseppe Lamberti, Andrea Mazzanti, Andrea Mandoli, Andrea Pucci, Giacomo Ciamaichelis, Stefano Stagni, Tiziana Orlali, Giulio Cerullo, Paul Hanlon, Stefania Abbruzzetti, Cornelia Sava Fimiana, Roberto Giannuzzi, Giuseppe Ugo, Gian Paolo Suranna, Vincenzo Balzani

eTOC | First Published: 16 November 2026

Aggregation-activated delayed fluorescence (AADF) is observed in phenothiazine-decorated fluorenone diimpyles. Amorphous aggregates exhibit TADF, while crystalline aggregates show TTA-dominated emission. The material is successfully applied in oxygen-sensing films and demonstrates dual-quenching responses to the excited-state energy transfer to oxygen and to the charge-transfer state, enabling ratiometric RGC and TTA.

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REVIEW

Review

Programmable Internal Fields in Zero-Bias Photodetectors: Physics, Materials, and Applications

Mohit Kumar, Hyungjin Seo

eTOC | First Published: 16 November 2026

Zero-bias photodetectors employ programmable internal fields, typically created by compositional and/or dopant-level gradients, to transform photocarrier generation and collection into a directional process. This review surveys the physics, materials, and device strategies that engineer these internal fields, enabling self-powered operation, ultrafast response, and advanced functionalities such as polarization sensing, memory, and information processing.

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RESEARCH ARTICLE

Open Access

Coupling Axial Chirality with Through-Space Charge-Transfer-Induced Excited-State Regulation in Bicarbazole-Based Blue CP-OLED Emitters

Si-Wei Chen, Zijian Chen, Weihua Liu, Wenglen Li, Qiang Wu, Yinjie Gao, Tao Yu, Xuekai Ma, Junlong Liu, Yi Zhang, Yuguang Ma, Wei Huang, Wenjun Wang, Wenbo Hu

eTOC | First Published: 13 November 2026

Three new chiral emitters (*R*-/*S*-CzBCz and *R*-/*S*-CzBCzCz) are developed and exhibit efficient blue emission, high photoluminescence quantum yield, and circularly polarized luminescence. The *S*-enantiomer of CzBCz, when doped into a host matrix, achieves a maximum external quantum efficiency of 5.2% and a CIE coordinate of (0.15, 0.07).

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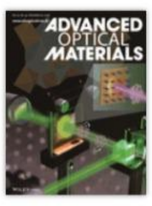

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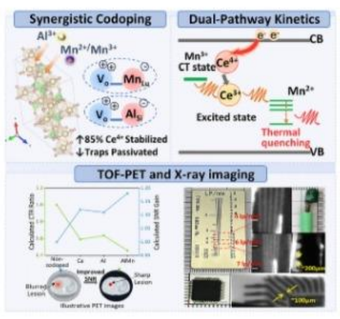
RESEARCH ARTICLE

Synergistic Valence and Defect Engineering in Al, Mn-Codoped LYSO:Ce for Ultrafast TOF-PET Scintillators

Chengyi Li, Shuwen Zhao, Jiaqi Yu, Aochen Zhang, Peng Qiu, Zhongjun Xue, He Feng, Dongzhou Ding

e72042 | First Published: 14 November 2026



Al/Mn codoping modulates Ce valence, oxygen-vacancy states, and Ce–Mn energy transfer in $(Lu,Y)_2SiO_5$:Ce (LYSO:Ce) scintillators. This strategy enriches Ce^{4+} electron-capture centers, favors Al/Mn–oxygen-vacancy association that weakens deep trapping, and introduces Mn-mediated quenching of slow emission tails, enabling ultrafast scintillation, strongly suppressed afterglow, and high light yield for timing-oriented radiation detection and high-resolution X-ray imaging.

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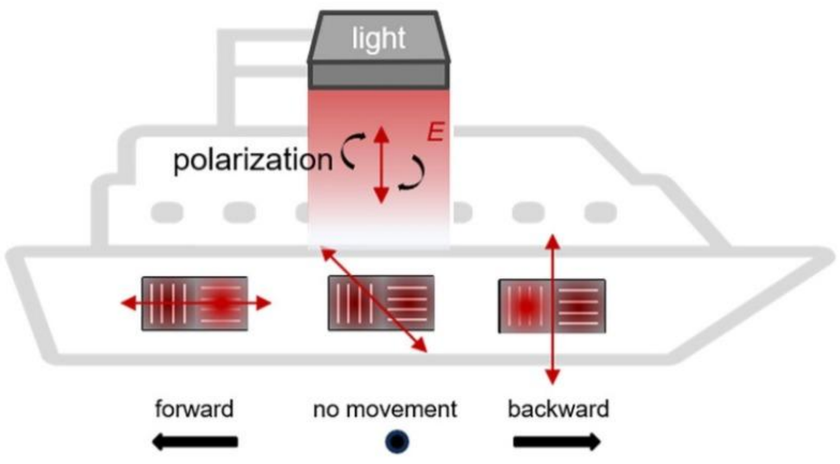
Polarization-Modulated Programmable Multidirectional Swimming Actuators

Yucong Su, Zuyang Ye, Licheng Cao, Yadong Yin

e72043 | First Published: 13 November 2026



A single laser beam enables programmable control of photothermal swimming actuators without localized light tracking. Polarization-selective heating creates distinct thermal distributions that drive motion through the Marangoni effect. Simply changing the polarization direction switches the actuator between different motion modes, including forward-backward translation and targeted turning, providing a simple strategy for versatile light-driven locomotion.

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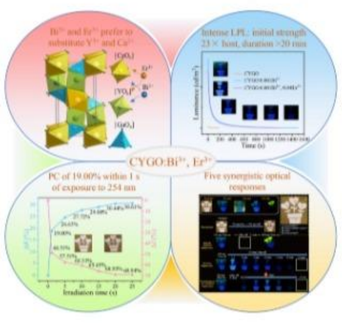
Synergistic Integration of Rapid Photochromic and Long Afterglow in $CaYGaO_4:Bi^{3+}/Er^{3+}$ for Dynamic Multimodal Anti-Counterfeiting

Shuixian Yao, Yingying Yuan, Xiaoying Liang, Jun Cheng, Rongfei Wei, Hai Guo, Fangfang Hu

e72044 | First Published: 14 November 2026



Guided by heterovalent substitution and DFT calculations, Bi^{3+}/Er^{3+} co-doping in $CaYGaO_4$ creates oxygen vacancies for rapid photochromism (19% within 1 s) while retaining bright persistent afterglow over 20 min. This synergy, arising from decoupled defect populations, enables five distinct optical responses, establishing a versatile platform for dynamic, high-security multimodal anti-counterfeiting.

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