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Cover Picture

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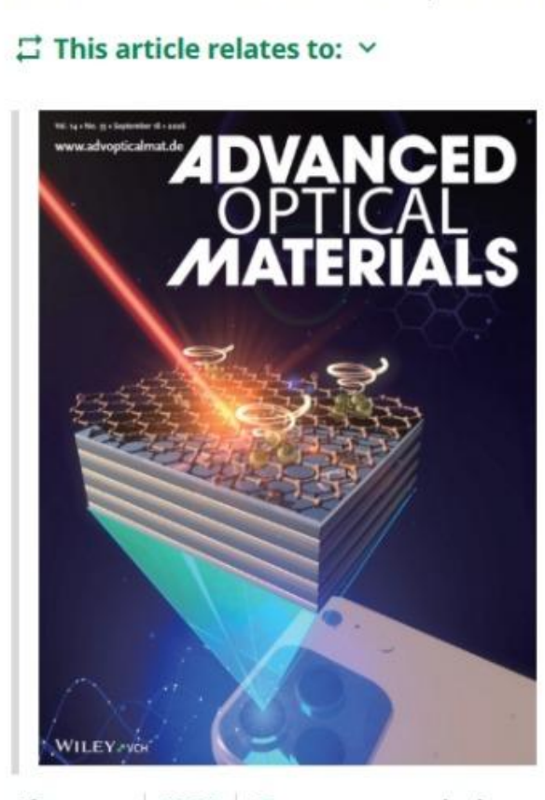
Bloch Surface Wave-Coupled Enhanced Fluorescence on a Nano-Assembly–Photonic Crystal Hybrid Interface for Ultrasensitive Detection (Advanced Optical Materials 35/2026)

Sudha Maria Lis S, Weinan Liu, Seemesh Bhaskar, Somnath Pandit, Brian T. Cunningham, Shivakiran Bhaktha B. N.

e71642 | First Published: 18 September 2026

This article relates to:



Photonic crystal-based smartphone sensor
This cover illustrates attomolar sensing of analytes using a smartphone camera via photonic crystal coupled emission platform. The sensor design relies on the generation of circulating displacement currents induced by the spatially confined electric fields in the presence of gold nanoparticles, TiO_2 nanorod hybrid cryosorets along with graphene oxide interface, leading to the unprecedented fluorescence enhancements. More details can be found in the Research Article by Brian T. Cunningham, Shivakiran Bhaktha B. N., and co-workers (DOI: 10.1002/adom.71496).

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Issue Information

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e71639 | First Published: 18 September 2026

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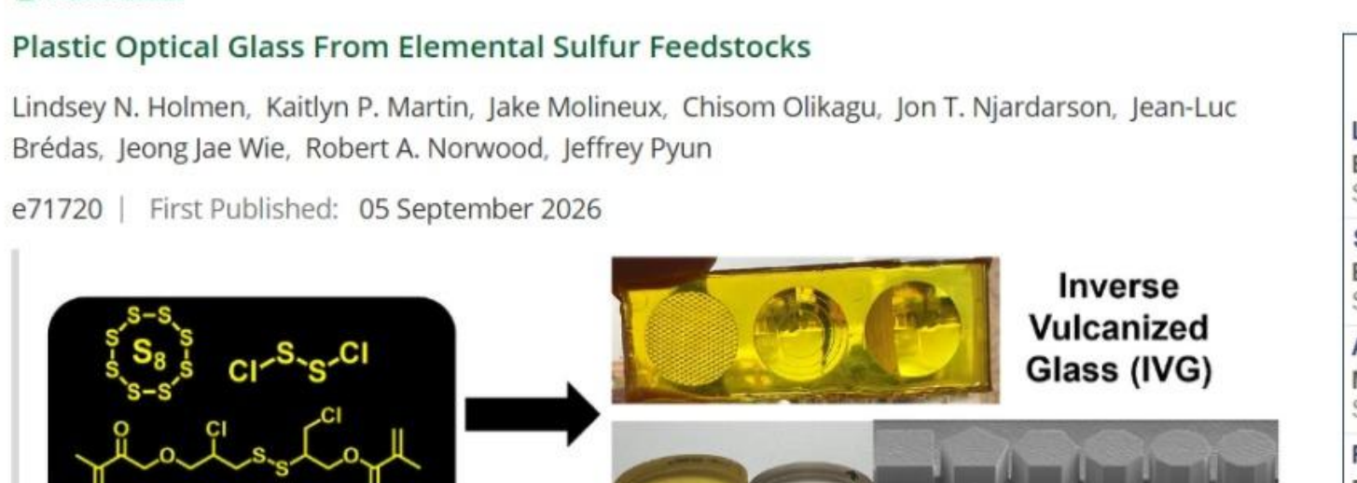
PERSPECTIVE

Full Access

Plastic Optical Glass From Elemental Sulfur Feedstocks

Lindsey N. Holmen, Kaitlyn P. Martin, Jake Molineux, Chisom Olikagu, Jon T. Njardarson, Jean-Luc Brédas, Jeong Jae Wie, Robert A. Norwood, Jeffrey Pyun

e71720 | First Published: 05 September 2026


Sulfur Feedstocks For Plastic Optics
Inverse Vulcanized Glass (IVG)
Disulfide Glass (DSG) and Photo-DSG

Sulfur-derived plastic optical glasses prepared from elemental sulfur (S_8) and sulfur monochloride (S_2Cl_2) petrochemical feedstocks provide high refractive indices and broadband visible-to-infrared transparency. Advances in inverse vulcanization, sulfenyl chloride inverse vulcanization, and photopolymerization enable inverse vulcanized glasses, disulfide glasses, and photopolymers for precision optics, photolithography, additive manufacturing, and photonic fabrication.

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REVIEW

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The Evolution of Electrochromic Materials: Transitioning from Single-Metal Oxides to Multimetal-Based Systems for Multifunctional Smart Devices

Kavya V. Palliyal, Pritha Dutta, Mukhesh K. Ganesha, A. Soundarya Mary, Ashutosh K. Singh

e71706 | First Published: 31 August 2026

Single-Metal Oxides
Multimetal Systems
Enhanced Performance
Electrochromic Switching

The evolution from single-metal to multi-metal electrochromic systems is traced, revealing how synergistic metal interactions tune electronic structure, ion transport, optical modulation, and stability. These advances enable multifunctional devices integrating smart windows, energy storage, self-powering, flexible electronics, and thermal management, while rational materials design and sustainable fabrication emerge as key pathways toward next-generation electrochromic technologies.

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Advances in Luminescent Polyurethanes: Materials Design and Emission Modulation

Run Zhang, Xujie Wang, Kai Pan, Biao Zhao, Jianping Deng

e71707 | First Published: 31 August 2026

Luminescent polyurethanes, distinguished by their extensive customizability and abundant intermolecular hydrogen bonds, can fulfill a wide range of roles in luminescent materials, including loading luminescence source through doping and bonding, as well as generating and modulating luminescence through hydrogen bonds. This review investigates various luminescent sources, including metal-based materials, organic luminescent systems, and quantum dots, and summarizes their combination with polyurethane toward developing luminescent materials.

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RESEARCH ARTICLE

Full Access

Bloch Surface Wave-Coupled Enhanced Fluorescence on a Nano-Assembly–Photonic Crystal Hybrid Interface for Ultrasensitive Detection

Sudha Maria Lis S, Weinan Liu, Seemesh Bhaskar, Somnath Pandit, Brian T. Cunningham, Shivakiran Bhaktha B. N.

e71496 | First Published: 22 July 2026

This article relates to:

Bloch surface wave-enabled photonic crystal interfaces integrated with metallo-dielectric nano-assemblies produce intense electromagnetic hotspots that enhance fluorescence by ~1300-fold. The hybrid platform mitigates quenching and enables attomolar detection using a smartphone camera. This work establishes a compact, highly sensitive strategy for portable, real-time diagnostics based on photonic crystal–coupled emission.

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Vertical p-$Mo_xNb_{1-x}S_2$/ FS-n-GaN Photodetectors for Autonomous Driving, Imaging, and Optical Communication

Kaifeng Wang, Xue Fan, Jiachang Guo, Jun He, Zhixiang Zhong, Kangkai Fan, Yu Xu, Zihao Huang, Huile Zhang, Chunyan Chen, Shengsen Chen, Xiaohua Li, Hezhou Liu, Xinke Liu, Jun He

e71577 | First Published: 09 September 2026

A wafer-scale vertical p-$Mo_xNb_{1-x}S_2$/FS-n-GaN heterojunction, photodetector is developed through precise p-type doping and Type-II band alignment. The device achieves an ultrahigh gain of 65 500 and 1.66×10^{14} Jones detectivity. This architecture enables centimeter-level environmental perception accuracy, establishing an innovative material–architecture paradigm for next-generation GaN-compatible autonomous sensing platforms.

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Tailoring Amine Substitution in Fluorene and Dibenzothiophene: A Molecular Strategy for Ultralong Organic Phosphorescence

Francesco Ruighi, Gianluca Accorsi, Eduardo Fabiano, Lorenzo Franco, Alessandro Agostini, Samuel Zatta, Leonard E. Cleve, Federica Angilè, Francesco Paolo Fanizzi, Gustavo Fernández, Agostina L. Capodilupo

e71667 | First Published: 19 August 2026

Tailored amine substitution in fluorene and dibenzothiophene derivatives enables systematic control of excited-state properties and triplet population. Combined photophysical studies, TD-DFT calculations and time-resolved EPR reveal how charge-transfer character, sulfur-induced spin–orbit coupling and triplet manifold engineering cooperate to promote efficient ultralong organic phosphorescence in rigid PVA matrices.

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Regioselective π-Extension of Helical PAHs: Tuning Energy Gaps and Excited-State Dynamics Directed by Clar's Sextet Migration

Zhibo Liu, Zheng Zhang, Hikaru Sotome, Takashi Hirose

e71675 | First Published: 25 August 2026

Central and terminal ring fusions of per-*peri*-perbenzo[7]helicene (**PB[7]H**) yield novel helical polycyclic aromatic hydrocarbons (HPAHs). The migration of Clar's aromatic sextets governs the inner-rim stiffness. This topology-directed strategy bridges the discrete optical gaps of homologous series. Transition moment density (TMD) analysis visualizes the structural origins of the decoupled oscillator strengths and distinct excited-state dynamics.

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Structural Reconfiguration Unlocks Pressure-Ultrasensitive and Efficient Above-Bandgap Emission in (AMP)PbI_4 Perovskite for Optical Manometry

Shuo Yang, Shuailing Ma, Marcin Runowski, Peng Du, Sebastian Mahlik, Min Lian, Xingbin Zhao, Yifan Tian, Hongwei Wang, Tian Cui

e71676 | First Published: 08 September 2026

A pressure-ultrasensitive Dion–Jacobson perovskite enables precise optical manometry through synchronized organic–inorganic structural reconfiguration. Reaching a structural "sweet spot" at 0.97 GPa triggers a 300% fluorescence boost and vivid color transitions. This work underscores the potential of lattice rigidity engineering in hybrid halides for robust, reversible, and low-threshold optoelectronic sensing.

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An All-Silicon Hybrid Refractive–Metalens Bifocal Imaging System With Dual Image Planes and Broadband Achromatic Performance

Chao-Chien Hsu, Qiu-Chun Zeng, You-Song Huang, Chih-Ming Wang

e71689 | First Published: 27 August 2026

An all-silicon hybrid refractive–metalens system enables dual-field-of-view thermal imaging in the long-wave infrared spectrum without mechanical motion. By implementing wavefront shunting, the static module operates in both a 10 mm wide-angle and a 26.7 mm telephoto mode across two focal planes. Optimized high-transmittance nanostructures maximize optical throughput for efficient target search and high-resolution tracking.

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Multi-Dimensional Near-/Far-Field Holography Enabled by On-Chip Metasurface for Information Encryption

Bo Chu, Shuqiao Xu, Hanxin Zheng, Zicheng Yang, Haoshuang Zhong, Guoyong Zhang, Xiao Chen, Hao Chen, Zhuo Chen

e71690 | First Published: 24 August 2026

The proposed chip-integrated metasurface combines Fresnel and far-field holography for joint encryption. The Fresnel-region plaintext can only be decrypted by retrieving keys distributed across multiple far-field holograms. This near-/far-field collaborative strategy enforces joint authorization for decryption, thereby preventing information leakage. This collaborative strategy simultaneously enhances information capacity and system security.

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Controlled Self-Assembly of Polydiacetylene Photoswitches Toward Multi-Stimuli Responsiveness and Anticounterfeiting Functionality

Yeye Ai, Yinuo Zhuo, Liangquan Zeng, Haojie Mo, Kaiyang Zhu, Yuhan Liu, Zhihao Huang, Yu Zhang, Qing Wang, Kaixuan Song, Yongguang Li

e71691 | First Published: 22 August 2026

A self-assembled pyrene–diacetylene system enables long-wavelength-sensitized polymerization and polymerization-triggered excimer dissociation, producing dual colorimetric and fluorescent responses suitable for information encryption and anticounterfeiting applications.

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Tunable Polariton Canalization in Natural Van Der Waals Oxide

Hossein Shiravi, Wenkai Zheng, Daniel Rhodes, Luis Balicas, Haidong Zhou, Guangxin Ni

e71692 | First Published: 22 August 2026

This work demonstrates the first report of tunable polariton canalization in natural α-V_2O_5 van der Waals crystals. Using infrared nano-imaging combined with electromagnetic simulations, highly directional polariton propagation is directly observed in pristine flakes without nanostructuring or chemical modification. The findings establish α-V_2O_5 as a robust and versatile platform for mid-infrared nanophotonic applications.

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Giant Flexoelectric Effect in MoS_2 for High-Performance Photodetectors and Reconfigurable Logic Computing

Yuqi Ren, Qinwen Xu, Chenxi Hu, Bingqian Xu, Binghui Lin, Haiyang Li, Yao Cai, Chengliang Sun

e71693 | First Published: 31 August 2026

Microwell-induced strain gradients generate strong flexoelectric polarization in MoS_2, selectively modulating a metal–semiconductor Schottky barrier and producing directional transport. The optimized architecture delivers an enhancement of over 5.5-fold in effective piezoelectric response relative to the planar control, and enables reconfigurable NAND/NOR optoelectronic logic simply by reversing the source–drain bias, integrating sensing and computing in one device.

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Two-Dimensional Plasmonic Hot Spots Engineering for Photocatalysis

Ziming Liu, Shengsui Cai, Lei Shao, Qin Yang, Sheng Chen, Bin Yan, Runfang Fu

e71694 | First Published: 24 August 2026

A general self-assembly strategy yields 2D plasmonic nanosheets with precisely tunable interparticle nanogaps. Narrower gaps induce prominent Fano resonance and amplify local electric fields, therefore boosting hot electron generation and photocatalysis. The engineering of plasmonic hot spots over a 2D range offers a prospective way to design a high-efficiency plasmonic photocatalyst.

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Enhancement of Circular Dichroism in Chiral Dielectric Metasurfaces by Ion Beam Irradiation

Anna Fitriana, Katsuya Tanaka, Lukas Raam Jaeger, Martin Hafermann, Thomas Pertsch, Carsten Ronning, Isabelle Staude

e71695 | First Published: 03 September 2026

Ion beam irradiation enables post fabrication tuning of dissipative losses in chiral dielectric metasurfaces composed of C4 symmetric silicon nanostructures. By tailoring the absorption toward critical coupling condition, circular dichroism is enhanced from 0.70 to 0.85, demonstrating a versatile route for maximizing optical chirality and polarization control in low-loss nanophotonic platforms.

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Revealing Mechanofluorochromism and Intricate Long-lived Decay Pathways in Keto-Coumarin-Based Molecular Crystals

Peter W. McDonald, Subhadeep Das, Arnab Mandal, Gilles Clavier, Clémence Allain, Abhijit Patra, Rémi Métivier

e71696 | First Published: 09 September 2026

Donor–acceptor organic emissive materials show great promise in cutting-edge optical applications. Herein, the photophysical properties of two keto-coumarin organic materials are studied in detail. Both show mechanofluorochromism, but a diphenylamine donor derivative exhibits intricate decay pathways in the crystal form, including decays ranging from ps to ms. Information encryption is then demonstrated by organic-matrix doping.

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Flexible Bi_2Te_3 Photothermoelectric Position-Sensitive Detector

Ruxia Du, Hang Ju, Miaomiao Wei, Peiyu Zeng, Xuyan Zhang, Beibei Zhu, Junpeng Lu, Zhenhua Ni, Xing Gu, Wenhui Wang, Li Tao

e71697 | First Published: 24 August 2026

Flexible position-sensitive detectors based on the photothermoelectric effect in Bi_2Te_3 are presented, avoiding heterojunctions or p-n junctions. Broadband sensitivity from visible to 1550 nm is achieved. Excellent mechanical robustness is demonstrated, with performance retained after 1000 bending cycles. This work provides a reliable, cost-effective solution for precise positioning in soft robots and drones.

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Chiral Molecular Scintillators of Zn-Tb Heterometallic Complex With Excellent Circularly Polarized Luminescence and High-Resolution X-Ray Imaging

Yaqing Liao, Junjie Hu, Ling Wang, Sien Yin, Xiang Li, Shuidong Zhu, Yingbing Lu, Yan Peng, Jinsheng Liao, He-Rui Wen

e71699 | First Published: 27 August 2026

Two pairs of new chiral molecular scintillators were successfully synthesized by introducing Zn^{II}/Tb^{III} ions and halogen anions, and they exhibit excellent PLQY, ultra-low X-ray detection limits. Moreover, they have excellent CPL and strong CPRL performance, and chiral flexible scintillation films were fabricated for high-resolution imaging applications. This work provides new insights into the synthetic design of chiral molecular scintillators.

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