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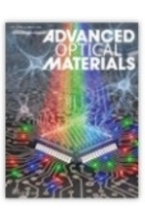

Advanced Optical Materials: Volume 14, Issue 19

22 May 2026

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Cover Picture

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Multilevel Optical Programming of Intrinsic Vacancies in Solution-Processed MoS_2 Films for Retinomorphic Color Differentiation (Advanced Optical Materials 19/2026)

Jihyun Kim, Jiyong Yoon, Gwang Ya Kim, Kijeong Nam, Jaewon Heo, In Soo Kim, Dongjoon Rhee, Donghee Son, Joohoon Kang

e71244 | First Published: 22 May 2026

This article relates to:

Retinomorphic Color Differentiation
Solution-processed MoS_2 harness intrinsic sulfur vacancies as trap sites for retinomorphic color sensing and memory. Incoming RGB light pulses drive wavelength-selective persistent photoconductivity, encoding color-specific conductance states at each pixel. The cover image depicts RGB light converging onto a chip-scale device array, illustrating the vision of translating this vacancy-driven platform into scalable, retinomorphic imaging systems. More details can be found in the Research Article by Dongjoon Rhee, Donghee Son, Joohoon Kang, and co-workers (DOI: 10.1002/adom.202503862).

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Substituent Effects on Cyanine Dyes Vary with Position and Chain Length (Advanced Optical Materials 19/2026)

David Dunlop, Rebecca Strada, Peter Šebej

e71242 | First Published: 22 May 2026

This article relates to:

Effects of Substituents on Cyanines
The substituents and substitution patterns of cyanine polymethines are directly influencing the properties of the cyanine dyes. In addition to well-known structure-properties relationships of cyanine chain length and auxochrome end-groups, in the Perspective (DOI: 10.1002/adom.202503219), David Dunlop, Rebecca Strada, and Peter Šebej we are introducing a comprehensive framework covering these relationships for single- and multiple substituted cyanine chains of various lengths and the effect of the substituents on spectral properties and reactivity. In addition to outlining the properties of known cyanines it also allows rational design of yet unknown cyanines and predictions of their properties.

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Issue Information

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e71250 | First Published: 22 May 2026

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Perspective

Open Access

Substituent Effects on Cyanine Dyes Vary with Position and Chain Length

David Dunlop, Rebecca Strada, Peter Šebej

e03219 | First Published: 11 February 2026

This article relates to:

In cyanines, substituent effects vary as a function of substituent position and cyanine length. Electron-donating- and -withdrawing groups at *meso*- and α-positions of $4n+1/4n-1$ long cyanines ($n = 1, 2, 3…$) cause opposing, hypsochromic and bathochromic shifts of the 1st UV–vis absorption bands.

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REVIEW

Rare-Earth-Mediated Tuning of Organic Afterglow Under Confinement

Changheng Chen, Wenbo Zhang, Xiaowang Liu

e71109 | First Published: 05 March 2026

This review highlights how rare-earth–mediated confinement and energy transfer enable precise tuning of organic afterglow. It summarizes emerging hybrid architectures, activation mechanisms, and design principles that enhance stability, color control, and excitation pathways, offering guidance for developing robust afterglow materials for sensing, imaging, and information-security applications.

Abstract | Full text | PDF | References | Request permissions

Spin Meets the Light: Emergence of Paramagnetic Metal-organic Frameworks (PMOFs) for Optical and Electrochemical Sensing Over the Last Five Years

Sourav Bej, Sandip Dey, Ranajoy Paul, Priyabrata Banerjee, Biplab Biswas

e03747 | First Published: 08 May 2026

Abstract | Full text | PDF | References | Request permissions

RESEARCH ARTICLE

Open Access

Multilevel Optical Programming of Intrinsic Vacancies in Solution-Processed MoS_2 Films for Retinomorphic Color Differentiation

Jihyun Kim, Jiyong Yoon, Gwang Ya Kim, Kijeong Nam, Jaewon Heo, In Soo Kim, Dongjoon Rhee, Donghee Son, Joohoon Kang

e03862 | First Published: 25 February 2026

This article relates to:

Solution-processed MoS_2 films with intrinsic sulfur-vacancy traps are used to integrate light sensing and memory in a simple two-terminal pixel. Successive optical pulses program persistent, multilevel conductance states, while oxygen exposure enables rapid erasure. Wavelength-dependent programming yields RGB differentiation in device arrays, and CNN-interfaced simulations achieve up to 94% multicolor classification accuracy.

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Improved Stretchability of Sequential-Deposited Elastomer-Based Ternary Active Layers via Photo Crosslinking

Minghui Wang, Zhaomin Gao, Jiayi Hua, Jiayu Li, Yulin Han, Feiyan Zhang, Biying Wang, Xin Wang, Fangbin Liu, Kui Zhao, Yu Chen, Yanchun Han, Zicheng Ding

e03715 | First Published: 05 February 2026

Photo crosslinking polymer donor D18 with an azide compound 2BX reduces film crystallinity and suppresses large-scale chain slippage. It significantly enhances the stretchability of D18 film and corresponding sequentially-deposited elastomer-based ternary active layer D18/Y6:SEBS without obvious compromising photovoltaic performance, enabling a large crack-onset strain of 35.91% and a high efficiency-stretchability factor of 5.52%.

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Radiative Cooling by Green(er) Solvents-Upcycled Polyvinyl Chloride From Drug Blisters Waste

Andrea Lanfranchi, Paola Lova, Davide Comoretto

e03720 | First Published: 05 March 2026

This study explores upcycling poly(vinyl chloride) (PVC) from used pharmaceutical blisters into sustainable radiative cooling materials. Using solvent separation and membrane fabrication, PVC was converted into white membranes paired with aluminum foil. Tests showed effective passive cooling, reaching up to 3°C below ambient in dark conditions, highlighting recycled polymers' potential for energy-saving cooling applications.

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Intramolecular FRET Cascades Enable Small Efficiency Roll-Off in Solution-Processed OLEDs

Mahni Fatahi, Debasish Barman, Youichi Tsuchiya, Chihaya Adachi, Eli Zysman-Colman

e71254 | First Published: 27 April 2026

This work highlights how an intramolecular FRET design strategy in solution-processable MR-TADF emitters enables narrowband emission, high PLQY, and efficient exciton harvesting. The resulting hyperfluorescent solution-processed OLEDs reach up to 20.7% EQE_{max} with minimal efficiency roll-off even at 10 000 cd m^{-2}, demonstrating strong potential for next-generation SP-OLED materials.

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Flexible and High-Performance Perovskite-Polymer Composites for Dual X-Ray and Proton Direct Detection

Camilla Bordoni, Bas A. H. Huisman, Joost W. C. Reinders, Ilaria Fratelli, Massimo Chiari, Laura Basiricò, Henk J. Bolink, Andrea Ciavatti, Michele Sessolo, Beatrice Fraboni

e00004 | First Published: 27 April 2026

A polymer–perovskite composite obtained by mechanochemical synthesis enables thick, tunable active layers for efficient absorption of highly penetrating ionizing radiation. Vertical-electrode detectors achieve low X-ray detection limits and high sensitivity direct 5 MeV proton sensing. Flexibility, long-term stability, and radiation hardness are demonstrated, highlighting strong potential for conformable next-generation dosimeters.

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Chameleonic Color-Variable Microbead Emitters for Multilevel Spectroscopic Encryption from Visible to Infrared Wavelengths

Barun Kumar Barman, Keisuke Watanabe, Kenzo Deguchi, Shinobu Ohki, Kenjiro Hashi, Atsushi Goto, Tadaaki Nagao

e03855 | First Published: 30 April 2026

Whispering-gallery-mode microresonators with sharp resonant peaks enable photonic barcoding. Similar to a chameleon, a rare-earth-free microcavity with π-conjugated PAHs enables visibleto-near infrared color generation from a single microbead. The unique resonat emission (spectral barcode) can be dynamically transformed via excitation wavelength change, and thus adds a powerful encryption scheme in the next-generation optical tagging and anti-counterfeiting.

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Surface-Defect Mediated Recombination Dynamics of $Ti_3C_2T_x$ MXene Flakes

Ravindra Kumar Nitharwal, Shravani Kale, Karthika Devi, Dhanashri Sabale, Tejendra Dixit, Sangeeta Kale, Sivarama Krishnan

e71260 | First Published: 14 May 2026

Tunable photoluminescence of $Ti_3C_2T_x$ MXene flakes due to TiO_x surface defects is presented. Raman spectroscopy revealed these surface defects, creating defect energy levels below the conduction band. The band-edge emission showed single-exponential decay, whereas the visible emission bands displayed bi-exponential surface-defect-mediated recombination dynamics.

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Metal-Metal-π Interaction: A Pathway to Construct Organic–Inorganic Excited-State and Supramolecular Assembly

Ying Luo, Yangbo Zhang, Ning Zhou, Xiong Wang, Ying-Fan Tan, Wenjie Zou, Wei Lu, Qingyun Wan

e00009 | First Published: 28 April 2026

An organic–inorganic mixed excited state is designed and demonstrated by combining the metal–metal and π–π interactions within a supramolecular Pt_2–pyrene assembly. Directional orbital overlap between the Pt and carbon atoms gives rise to a long-lived triplet emission, strong emission polarization, exciton–exciton annihilation, and efficient exciton diffusion.

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Non-Aqueous Lyotropic Chiral Chromonic Liquid Crystals With Solvent-Invertible Circularly Polarized Phosphorescence

Jiabo An, Rongji Zhu, Ning Zhou, Yan Wang, Chao Zou, Wei Lu

e71262 | First Published: 28 April 2026

Two birds with one stone: A single enantiomer of the organometallic chromonic mesogens formed chiral lyotropic liquid crystals in two polar aprotic solvents from which opposite signs of prominent circularly polarized phosphorescence were obtained.

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Nanocrystal Quality–Controlled Scintillation in Porous YAG:Ce Aerogels

Pavlo Mai, Yannis Cheref, Raphael Marie-Luce, Frédéric Lerouge, Julien Houel, Gilles Ledoux, Alice Perret, Francesca Cova, Mauro Fasoli, Benoit Sabot, Frédéric Chaput, Christophe Dujardin

e71263 | First Published: 30 April 2026

High-temperature thermal treatment of YAG:Ce nanoscintillator aerogels increases light yield under ionizing radiation by up to eightfold without affecting timing performance. Additionally, low-temperature atmospheric treatments reversibly modify the cerium oxidation state, revealing strong defect sensitivity and offering new strategies to optimize efficient, transparent porous scintillators for radiation detection and energy devices.

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Phototunable Polarization Volume Gratings Driven by Chiral Hydrazone Switches

Artem Boichuk, Lauri Uosukainen, Indu Bala, Ivan Aprahamian, Arri Priimagi

e71264 | First Published: 30 April 2026

Chiral hydrazone photoswitches incorporated into polarization volume gratings enable light-driven, reversible modulation of optical properties. UV and blue light irradiation reversibly alter the hydrazone isomer ratio, leading to tunable diffraction efficiency and spectral response across the visible spectrum.

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An Optical–Electrical Decoupling Strategy for Fabricating Wood-Waste-Derived Laser-Driven Diffusers for Specialized Lighting Inspired by Atmospheric Sunlight Scattering

Lei Zhang, Jie Zhang, Fenghao Zhang, Yuan Meng, Huilin Xu, Xiuying Li, Lu Fang, Qiheng Tang, Wenjing Guo

e03841 | First Published: 28 April 2026

Inspired by atmospheric light scattering, a sustainable laser-driven wood fiber diffuser (LWFD) is developed from wood waste. Delignified fibers combined with polymer and phosphor create isotropic scattering through refractive index mismatch. The device converts collimated laser beams into uniform white illumination and enables long-distance, wireless lighting for safe and energy-efficient applications.

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Optoelectronically Active GaAs/GeSn-MQW/Ge Heterojunctions Created via Semiconductor Grafting

Jie Zhou, Haibo Wang, Yang Liu, Yifu Guo, Alireza Abrand, Yiran Li, Jiarui Gong, Hieu D. Trinh, Po Rei Huang, Jianping Shen, Shengqiang Xu, Daniel Vincent, Samuel Haessly, Yi Lu, Munho Kim, Shui-Qing Yu, Parsian K. Mohseni, Guo-En Chang, Zetian Mi, Kai Sun, Xiao Gong, Mikhail A. Kats, Zhenqiang Ma

e02543 | First Published: 25 April 2026

Semiconductor Grafting enables a lattice-mismatched GaAs/GeSn-MQW/Ge heterojunction with engineered band offsets and optical field distribution. The enlarged conduction and valence band discontinuities govern asymmetric carrier transport, producing bias-dependent dual-mode photodetection from visible to near-infrared wavelengths. The resulting device exhibits ultralow dark current and enhanced responsivity compared to conventional epitaxial GeSn photodiodes.

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$NaNO_3[(NH_2)_2SO_2]_2$: A Halogen-Free KBBF-Type Nitrate Crystal with Record Birefringence for Ultraviolet Applications

Juhui Cui, Feng Yu, Minqiang Gai

e71267 | First Published: 25 April 2026

This work reports the first synthesis of a halogen-free nitrate birefringent material with a KBBF-type structure, which exhibits high-performance birefringence and a broad UV transmission range, together with the characteristic of easy growth of large-sized single crystals.

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