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Probing Near-Field EM Fluctuations in Superparamagnetic CoFeB With NV Quantum Dephasometry (Advanced Optical Materials 27/2026)

Shoaib Mahmud, Wei Zhang, Pronoy Das, Angshuman Deka, Wenbo Sun, Zubin Jacob

e71381 | First Published: 17 July 2026

This article relates to:

Quantum Probing of Superparamagnetism

This cover illustrates NV-center quantum dephasometry probing low-frequency EM fluctuations generated by thermally driven superparamagnetic domain flipping in nanoscale CoFeB layer. The dynamic near-field magnetic noise, characterized by spin-dephasing rates and Rabi oscillations, revealing superparamagnetic phase transition and enabling non-invasive spectroscopy of nanoscale spintronic platform. More details can be found in the Research Article by Zubin Jacob and co-workers (DOI: 10.1002/adom.71301).

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e71382 | First Published: 17 July 2026

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RESEARCH ARTICLE

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Probing Near-Field EM Fluctuations in Superparamagnetic CoFeB With NV Quantum Dephasometry

Shoaib Mahmud, Wei Zhang, Pronoy Das, Angshuman Deka, Wenbo Sun, Zubin Jacob

e71301 | First Published: 21 May 2026

This article relates to:

We non-invasively investigate the superparamagnetic spin dynamics of a 1.1 nm CoFeB layer by probing its near-field EM fluctuations using NV centers-based quantum dephasometry. The observed noise is supported by theoretical modeling and SQUID-based magnetization characterization. These results provide critical insight into the magnetization dynamics of nanoscale magnetic layers, with implications for quantum spintronic devices.

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A Carbon-Introduced Single Layer GaN Artificial Optoelectronic Synapse for Human Action Recognition and Spatio-Temporal Encoding

Lipeng Luo, Lihan Li, Qian Zhang, Guoxin Li, Yao Meng, Zhengdong Wu, Wenrui Wu, Xinman Chen, Chao Liu, Fangfang Gao, Shuai Li

e71353 | First Published: 06 July 2026

This article relates to:

A Carbon-introduced GaN optoelectronic synapse array integrates ultraviolet sensing and analog memory via controlled carbon-related defect states, enabling temporal-to-spatial encoding and on-chip trajectory reconstruction. Using STP-enabled reservoir computing for action recognition and LTP-driven photocurrent mapping for sequence recording, this CMOS-compatible architecture demonstrates a compact neuromorphic vision hardware with robust uniformity and device-level reproducibility.

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

Low Roll-Off Deep-Blue Hyperfluorescence OLEDs With Sterically Engineered Emitter

Leneng Qiu, Xin Zhang, Hanfeng Li, Zhen Wu, Je Lin, Jingsong Huang, Guojie Wang

e71368 | First Published: 13 June 2026

A rational π-axis steric-engineering strategy is implemented to design a multi-resonance emitter, DBA-DTPA-tBu, which effectively suppresses Dexter energy transfer, enabling a peak EQE of 28.0% and a state-of-the-art 16.6% at 1000 cd m^{-2}. This work provides a generalizable approach for developing efficiency-stable, ultrapure deep-blue displays that fulfill stringent BT.2020 standards.

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

Selective Activation of R- and N-Line Lasing in Cr^{3+} Substituted LaGaO$_3$ Toward Tailored Photonic Functionality

Mohit Singh, T R Rajalakshmi, Tejendra Dixit, M S Ramachandra Rao, Kamlkrishnan Sethupathi

e71369 | First Published: 17 June 2026

The graphical abstract represents the energy level formation by substituting Cr^{3+} ions in the LGO host lattice at the Ga site. The right half of the figure represents the lasing peaks from isolated and pair Cr^{3+} ions. The SEM rod-like structure represents a micro-cavity, which helps in amplification of stimulated emission from the Cr-substituted LGO system.

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

A Zero-Thermal Quenching Near-Infrared La$_2$SiO$_5$:Nd^{3+} Phosphor Based on High-Symmetry Coordination Site

Qinghong Cai, Xinyang Zhang, Wei Wang, Fuyan Su, Zhenchuan Hu, Haoyang Wu, Wei Ding, Hang Yang, Hua Zou, Yi Wei, Guiqiang Li

e71370 | First Published: 13 June 2026

We report a new zero-thermal quenching near-infrared La$_2$SiO$_5$:Nd^{3+} phosphor, featuring a highly symmetric structure and the integrated emission intensity can maintain 101% and 96% of the initial intensity even at 473 K and 513 K, respectively.

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Bias-Tunable Dual-Functional Broadband Optoelectronic Synaptic Devices for Neuromorphic Visual and Brain-Like Intelligence Applications

Haixia Liang, Junyan Zhang, Xu Liu, Yuhang Song, Donghai Yang, Wei Zhao, Lize Xiong, Jia Huang

e71371 | First Published: 23 June 2026

A bias-tunable dual-functional optoelectronic device based on a heterojunction consisting of organic semiconductor blend PCE10:ZCDC-IF and CsSnI$_3$ is fabricated. The synergistic heterojunction structure and defect-mediated charge carrier dynamics enable broadband photoresponses from the ultraviolet to near-infrared spectrum, and allow the device to reversibly switch between photodetection and photosynaptic operation modes through the bias modulation.

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High-Temporal Dynamic Diamond-Based Deep-Ultraviolet Photodetector via Femtosecond Laser Induced Graphitization

Yifan Zhang, Si Shen, Yuntao Wu, Lisheng Wang, Jingchuo Wang, Junxing Deng, Huashan Li, Xianghu Wang, Zhenfeng Zhang, Xun Yang, Guang Wang, Chongxin Shan, Hai Zhu

e71372 | First Published: 17 June 2026

An all-carbon deep-UV photodetector is fabricated via femtosecond laser-induced graphitization. The device exhibits fast nanosecond response and high-temperature stability up to 470 K. This work provides a practical approach to design UV sensing and imaging in extreme environments.

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Mechanistic Insight into Fluoride-Induced Bathochromic Shifts in Multiple-Boron-Embedded π-Conjugated Systems through Favorable LUMO Localization

Junki Ochi, Takuji Hatakeyama

e71373 | First Published: 17 June 2026

A strategy of embedding multiple boron atoms into a single π-conjugated system is proposed to realize highly sensitive fluoride anion (F$^-$) detection. Following F$^-$ coordination, the HOMO is preferentially destabilized due to the induced anionic character, while retaining a large HOMO-LUMO overlap. As a result, a fluorescence bathochromic shift and a high PLQY value are simultaneously achieved.

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Deep-Blue Through-Space Charge-Transfer MR-TADF Emitters With Anthracene Linkers for Narrowband Fluorescent OLEDs

Xiaoge Song, Cangqu Wang, Xionghai Tang, Maggie Ng, Saason Si Chen, Man-Chung Tang

e71374 | First Published: 16 June 2026

Deep-blue through-space charge-transfer MR-TADF emitters featuring anthracene linkers and U-shaped molecular confinement are developed. Structural engineering with carbazolyl substitution enhances molecular rigidity and suppresses vibronic coupling, improving efficiency, enabling color-pure OLEDs with an EQE of 20% and CIE (0.14, 0.07) without a phosphorescent sensitizer.

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

The Thickness and Crystal Phase Engineering of Copper Vanadate Nanosheets for Broadband Nonlinear Optical Limiting Glass Devices

Guohui Liu, Jingjing Wang, Huaning Chen, Jibao Jin, Xiaoyan Tang, Zhimin Yan, Xinghao Liu, Haiting Zhang, Zheng Xie

e71375 | First Published: 15 June 2026

The copper vanadate nanosheets (β-$Cu_2V_2O_7$/α-$Cu_3V_2O_8$) and their optical limiting devices are designed based on synergistic regulation of crystal and thickness. Based on Z-scan technique analysis, the optical limiting performance of the resultant copper vanadate nanosheets can be regulated by the synergistic effect of the thickness and crystal phase.

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Lead-Free Europium Halide Perovskite Nanoplatelets

Sebastian Fernández, Diana Miquita, Manchero Hu, Han Cui, William Michaels, Pourmina Narayanan, Tyler K. Colenbrander, Qi Zhou, Da Lin, Ana Segura Lecina, Petr Liška, Guosong Hong, Daniel N. Congreve

e71385 | First Published: 03 July 2026

The development of scalable, lead-free blue and violet emissive materials is crucial to next-generation optoelectronic applications. Here, we report lead-free nanoplatelets are synthesized and characterized, exhibiting tunable emission, solution processability, and reasonable emissive efficiency, opening the door to lead-free materials in this crucial spectral range.

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

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Color Center Formation in Silicon-On-Insulator for On-Chip Photonic Integration

Arnulf J. Sneliker-Nielsen, David R. Gangora, Magnus L. Madsen, Christian H. Christiansen, Elke L. Pathrach, Mathias B. Augustesen, Elvedin Memisevic, Sangeeth Kallatt, Rodrigo A. Thomas, Mark K. Svendsen, James L. Webb, Peter K. Jeppesen, Marianne E. Bathen, Lasse Vines, Peter Granum, Stefano Pansani

e71387 | First Published: 03 July 2026

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Unravelling and Mitigating Resolution Loss in UV-Assisted Vapor Phase Polymerization of Monolithic PEDOT-Tosylate Electrochromic Patterns

Raufar Shameem, Bruno Mendes, Suraya Kaal, Robert Brooke, Jesper Edberg, Peter Andersson Ersman, Magnus P. Jonsson

e71389 | First Published: 03 July 2026

This work aims to understand the origin of pattern deviation in PEDOT-Tos films formed via vapor phase polymerization on UV-exposed oxidant. UV-exposure induces formation of loosely bound water which diffuses and produces macroscopic structuring at increased block copolymer contents. Short Pluronic L31 block copolymer at low concentration enables sharp and stable electrochromic patterns in a critical raw-material-free, resist-free platform.

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Self-Powered Broadband Photodetection With Open-Circuit Voltage Exceeding 1 Volt via Template-Guided Perovskite/MoS$_2$ Heterojunctions

Jinjin He, Yong-Jun Li, Xiaohuan Li, Han Mao, Boyang Chen, Mei Xue, Hang Wei, Yongzhe Zhang

e71400 | First Published: 27 June 2026

We employed a novel strategy to fabricate a high-quality heterojunction interface between MoS_2 and $MAPbI_3$, enabling the photodetector to simultaneously achieve robust self-powered operation and exceptionally low noise levels. Experimental results show that the open-circuit voltage response of this heterojunction displays distinct wavelength-dependent characteristics, indicating that this device can function as a wavelength-selective photodetector. These results suggest that precise control of perovskite thickness could enable targeted self-powered photodetection.

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Single-Pixel Color-Tunable QLEDs Based on Solution-Processed Stacked P-i-n-i-p Heterostructures and Their Potential Applications for High-Resolution Displays

Xiangle Gong, Zhen Wang, Zirun Zhao, Zirliang Zhao, Yu Zhang, Heng Liu, Bo Qiao, Suwen Guo, Yan Zheng, Dandan Song, Suling Zhao

e71401 | First Published: 23 June 2026

A novel solution-processed p-i-n-i-p stacked color-tunable QLED is demonstrated. A single shared ZnMgO layer enables bidirectional charge generation and red to green emission-tuning via AC polarity modulation. It has achieved monolithic integration of red and green emissive units, offering a low-cost paradigm for ultrahigh-resolution displays.

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Precisely Control the Component Ratio to Achieve Highly-Efficient Electroluminescence From Er-Doped Perovskite MgGeO$_3$ Nanofilms

Zejun Ye, Haobo Yuan, Tong Zhao, Xinxin Luan, Yang Yang, Jianning Sun

e71402 | First Published: 27 June 2026

Silicon-based devices using Er-doped perovskite MgGeO$_3$ nanofilms are fabricated by atomic layer deposition, whose electroluminescent performances are superior to the comparative olivine Mg$_2$GeO$_4$ ones. Er^{3+} ions are proven to preferentially occupy the octahedral sites in the latter. The optimal MgGeO$_3$:Er device exhibits an external quantum efficiency of 20.9% and a power density of 7.88 mW cm^{-2}.

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Unlocking Advanced Information Encryption Through Dual-Responsive Donor–Acceptor Derived Salicylaldimines

Hexiang Guo, Nannan Ding, Zhiyuan Hen, Meixia He, Yu Fang, Quan Li

e71403 | First Published: 30 June 2026

A versatile strategy has been developed for salicylaldimines that incorporates donor–acceptor units, enabling dual responses of solvatochromic and mechano-chromism. It leverages the twisted conformation of the donor–acceptor unit and the tunable intermolecular stacking by varying the salicylaldimine unit. Our findings pave the way for developing smart materials for advanced information encryption.

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Chiral CsPbBr$_3$ Nanorods With Effective Circularly Polarized Luminescence via Vacancy-Mediated Regrowth Directed by Chiral Ligands

Cheng Liu, Yiwei Zhang, Rui Cao, Yin Xiao

e71404 | First Published: 24 June 2026

A vacancy-mediated chiral-ligand-assisted strategy synthesizes CsPbBr$_3$ nanorods with high photoluminescence quantum yield and chiroptical activity. The process involves depositing a Br-vacancy layer on the CsPbBr$_3$ nanorod surface, followed by chiral ligand adsorption. This also secondary growth via a Br$^-$-mediated electrostatic mechanism which simultaneously capping the surface to suppress overgrowth and impart chirality.

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