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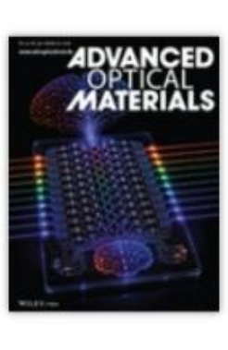

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COVER PICTURE

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On-Chip Photonic Neural Network Architectures (Advanced Optical Materials 39/2026)

Seokjin Hong, Berkay Neseli, Seungyeon Cho, Seungsoo Lee, Yeonjun Kim, Seungyoon Choi, Hyo-Hoon Park, Hamza Kurt

e71791 | First Published: 24 October 2026

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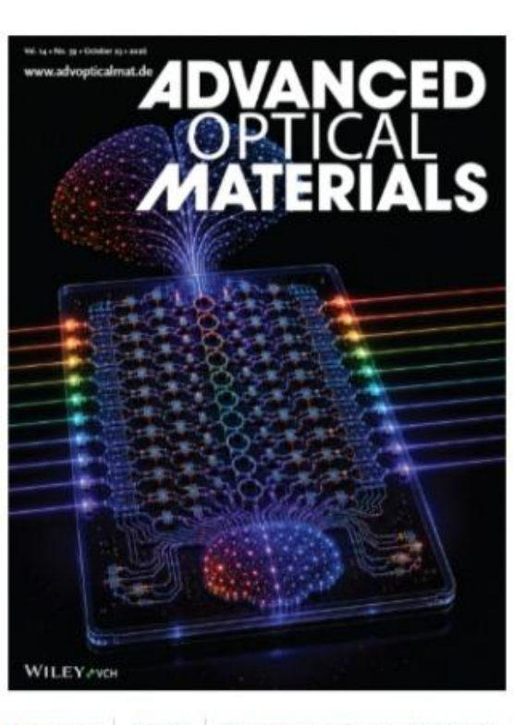

Photonic Neural Network
The cover illustrates an on-chip photonic neural network, where multicolored optical channels propagate through an integrated network of photonic computing elements. The emerging brain-shaped optical network symbolizes the transformation of light-based device operations into neural computation, highlighting parallelism, high bandwidth, and low latency for next-generation artificial intelligence acceleration. More details can be found in the Review Article by Hamza Kurt and co-workers (DOI: 10.1002/adom.71567).

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REVIEW

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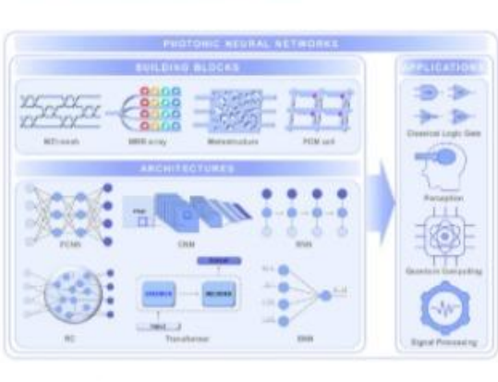
On-Chip Photonic Neural Network Architectures

Seokjin Hong, Berkay Neseli, Seungyeon Cho, Seungsoo Lee, Yeonjun Kim, Seungyoon Choi, Hyo-Hoon Park, Hamza Kurt

e71567 | First Published: 14 August 2026

This article relates to:



This review presents a comprehensive overview of on-chip photonic neural network architectures, covering key photonic building blocks, representative network types, and emerging applications. Recent advances, implementation challenges, and future directions are examined, highlighting the potential of integrated photonics to enable ultrafast, energy-efficient, and scalable artificial intelligence hardware.

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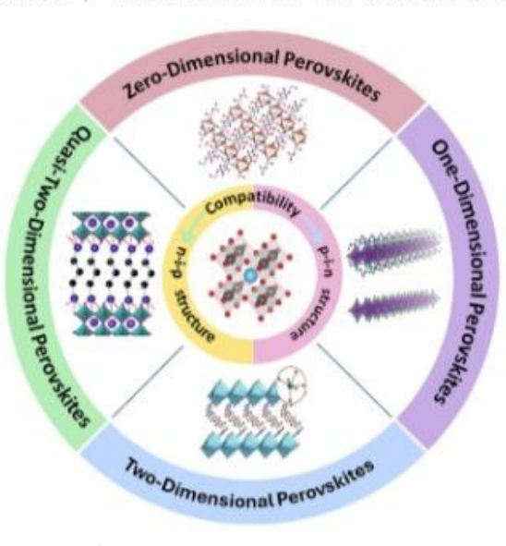
Compatibility of Low-Dimensional Perovskites in n–i–p and p–i–n Perovskite Solar Cells

Wenjie Zhang, Zhengyan He, Qixiang Zhang, Zhiqiang Zhang, Qi Zhang, Shufang Zhang

e71889 | First Published: 07 October 2026


Zero-Dimensional Perovskites
One-Dimensional Perovskites
Two-Dimensional Perovskites
Quasi-Two-Dimensional Perovskites
Compatibility
n-i-p structure
p-i-n structure

Low-dimensional perovskites effectively suppress non-radiative recombination and bolster environmental stability, yet their transport anisotropy constrains device integration. This review establishes a mechanistic framework governing the architectural compatibility of 0D, 1D, quasi-2D, and 2D perovskites in n–i–p and p–i–n configurations, providing tailored design principles that align spatial phase distributions with directional charge extraction pathways.

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A Mini-Review on Perylene-Based Carbon Dots: Synthetic Strategies, Property Regulation, and Functional Applications

Yingqi Liang, Yiming Hao, Tzu-Ming Liu, Yupeng Liu, Songnan Qu

e71907 | First Published: 13 October 2026

Perylene-based carbon dots possess high efficiency in red/near-infrared emission, near-100% photoluminescence quantum yield, and enhanced charge transport capabilities due to their inheritance of the large conjugated precursor structure. This article reviews the recent research progress on perylene-based carbon dots, focusing on their synthesis, luminescence mechanism, structure-property relationships, and emerging applications in optoelectronics, biophotonics, and energy conversion.

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RESEARCH ARTICLE

Full Access

Chiral Ag/$Bi_6S_2O_{15}$ Hybrid NWs Film Tailored Intense SERS Activity for Sensitive Detection Application

Qiaodan Du, Niuniu Zhou, Bin Yang, Dan Liang, Yinzhi Zhang, Wei Ma, Yuan Zhao

e71888 | First Published: 07 October 2026

Chiral Ag NWs films exhibited chiral enhanced plasmon resonance effects under linearly polarized excitation. $Bi_6S_2O_{15}$ NWs were assembled onto chiral Ag NWs films, with the SERS intensity reaching 2.0 times higher than that of the achiral Ag NWs film. Chiral Ag/$Bi_6S_2O_{15}$ hybrid NWs films were applied for the detection of ergothioneine (EGT), which was a potent mitochondria-targeted antioxidant.

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Chiroptical Imaging of Enantiomeric DNA Crystals

Akash Tiwari, Vidya R. Singh, Andrew Horvath, Jordan Janowski, Daniela Sanchez-Giannakis, Simon Vecchioni, Yoel P. Ohayon, Ruojie Sha, James W. Canary, Bart Kahr

e71863 | First Published: 29 September 2026

Spatially mapped circular retardance of enantiomeric DNA single crystals when measured by imaging polarimetry. *L*-deoxyribose DNA and *D*-deoxyribose DNA were characterized by X-ray diffraction in the respective space groups $P4_1$ and $P4_3$. The sense of the order changes in the circular retardance was correlated with the crystal enantiomorphism.

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Photoluminescent Color Centers on a Mainstream Silicon Photonic Foundry Platform

Prosper Dellah Allo, A. Aadhi, Amirhossein Mosaddegh Yengejeh, Hazel Bakajsza, Mirabel N. M. Mensah, Marcus Tamura, Bhavin J. Shastri, Alexander N. Tait

e71866 | First Published: 09 October 2026

Silicon photonic chips route and process light efficiently but are inherently inefficient at generating it. Here, bright light-emitting defects, W-centers, are written into the silicon layer of finished chips from a mainstream commercial foundry: high-energy ions are implanted straight through the protective oxide and activated by a 250 thermal anneal, and the chips then emit efficiently at 1218 nm.

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Vectorial Complex-Amplitude Holography and Dual-Gray Nano-Printing via Synthesis Metasurfaces

Hongqiang Zhou, Chongli Zhao, Meiqi Wang, Ruizhe Zhao, Cong He, Tianlong Man, Guangzhou Geng, Yuhong Wan, Lingling Huang

e71867 | First Published: 28 September 2026

We propose and experimentally demonstrate a metasurface strategy enabling dual-independent grayscale nano-printing and holographic display via coherent synthesis light-field engineering. We suppress the original orthogonal polarization reconstruction components and generate a novel holographic field, as a third holographic reconstruction. This produces dual-grayscale nano-printing patterns with Malvs' pattern to form encrypted information in the near field.

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Sub-Diffraction and Irreversibly Tunable Imaging With Potato Starch Lenses

Petr Bouchal, Jiří Liška, Petr Viewegh, Radim Chmelík, Tomáš Šikola, Zdeněk Bouchal

e71868 | First Published: 29 September 2026

Native potato starch granules function as sustainable birefringent microlenses that enable polarization-controlled conventional and vortex lensing via spin-to-orbital angular momentum conversion. They provide sub-diffraction and spiral-contrast imaging, support vortex-array generation with controllable topological-charge sign, exhibit irreversible focal-length tuning and stimuli-triggered disintegration, offering a new platform for adaptive and transient photonic applications.

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Revealing Anti-Thermal Quenching Broadband Cyan-Green Emission in Oxonitridoaluminosilicate Phosphors Induced by Anion Ordering Substitution

Hongwei Zheng, Long Zhang, Ting Wen, Ke Liu, Tingting Zhao, Chuanlong Lin, Lunhua He, Xiaoming Wang, Huan Jiao, Yonggang Wang

e71869 | First Published: 28 September 2026

In this work, we employed NPD refinement and DFT calculations to reveal the anti-thermal-quenching broad-band cyan-green emission behavior in oxonitridoaluminosilicate phosphors induced by anion-ordering substitution.

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Wide Angular Range Direction-of-Arrival Estimation Based on Diffractive Neural Network Integrated Stacked Intelligent Metasurfaces

Yi Yu, Weiqing Zhao, Junming Zhao, Tian Jiang, Ke Chen, Yijun Feng

e71870 | First Published: 27 September 2026

This work introduces a novel label encoding and training algorithm that reformulates the diffractive neural network perception framework, enabling reliable continuous DOA inference across a wide angular range from −50° to +50°. Full-wave simulations and microwave experiments validate this approach's exceptional generalization and robustness, highlighting its significant potential for future advanced electromagnetic sensing.

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High-Stress Si_3N_4 Reflective Membranes Monolithically Integrated With Cavity Bragg Mirrors

Megha Khokhar, Lucas Norder, Paolo M. Sberna, Richard A. Norte

e71871 | First Published: 14 October 2026

Silicon nitride membranes are record-breaking mechanical sensors, yet their delicate fabrication and alignment into precision optical cavities have confined them to the laboratory. A monolithic process directly integrates suspended high-stress membranes onto Bragg mirrors, forming self-aligned optomechanical cavities in seconds. This dry, wafer-scale approach unlocks scalable, robust silicon-nitride sensors for precision measurement beyond the lab.

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Red-Green-Blue Circularly Polarized Luminescence: Ultra-large Dissymmetry Factors and Handedness Inversion for Information Encryption

Huajun Lei, Xingchen Liu, Wei Liu, Yi Li, Yonggang Yang

e71872 | First Published: 30 September 2026

A composite system is fabricated by integrating narrowband emissive perovskites with highly reflective cholesteric liquid crystal polymer networks. RGB CPL with ultra-large $|g_{lum}|$ values is achieved. By utilizing a photoisomerizable chiral dopant, a patterned half-waveplate is prepared to realize CPL handedness inversion. It enables dual-mode information encryption and decryption via a specific circular polarizer under daylight and UV light.

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Fully Dry Assembly of Graphene/MoS_2 van der Waals Heterojunctions for Self-Powered Photodetection

Xiangjun Liu, Zhuan Cheng, Daojie Hu, Lixin Zhou, Jisheng Sun, Renzong Wang, Jingda Ni, Ruibiao Yang, Xinhou Wang, Guodong Zhou, Yucheng Xiong

e71873 | First Published: 29 September 2026

A probe-assisted, fully dry assembly strategy enables deterministic manipulation and precise stacking of graphene and MoS_2 flakes without polymer-assisted transfer or wet processing. The resulting atomically clean van der Waals heterointerface promotes efficient interfacial charge separation, yielding a high-performance self-powered photodetector with a responsivity of 0.577 A/W and a specific detectivity of 7.2×10^{10} Jones.

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Zero-Light Thermal Scanning of Multi-Level Security Information via Localized Emissivity Modulation

Jeong-Min Lee, Geon-Tae Park, Seok-Beom Seo, Dahyun Song, Kyoung-Ho Kim, Sun-Kyung Kim

e71874 | First Published: 30 September 2026

Maskless laser writing transforms a single 20 nm Ag film into programmable multi-level thermal security tags by locally controlling photothermal dewetting and infrared emissivity. Roughness-driven plasmonic field confinement produces distinct emissivity states, enabling 3- and 4-level information to be decoded by long-wave infrared imaging in complete darkness and at temperatures up to 100°C.

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High-Entropy Engineering Enables Highly Enhanced Upconversion Luminescence in β-$NaGdF_4$-Structured Fluorides

Yingjun Li, Dawei Sun, Haixin Liu, Hongxian Wei, Shasha Wang, Gejihu De

e71877 | First Published: 28 September 2026

In this work, Er^{3+}-activated high-entropy fluoride upconversion luminescent materials with an β-$NaGdF_4$-structure were successfully synthesized using a solvothermal method, demonstrating significantly enhanced luminescent performance. Experimental results indicate that the six-element high-entropy fluoride exhibits the optimum upconversion luminescence, with both emission intensity and quantum yield reaching 2.5 times those of the β-$NaGdF_4$:Yb/Er.

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Optically Gated Rotary Motion via a Dynamic Ag(I)-Bridged Molecular Motor–Switch Hybrid

Shangzhe Yang, Shaorui Li, Hang Xu, Yuanmeng Zhao, Hai-Bing Xu

e71878 | First Published: 29 September 2026

A dynamic Ag(I) bridge optically gates rotary motion in a molecular motor–switch hybrid. Closing the dithienylethene photoswitch prolongs the motor's thermal helix inversion half-life, while a rigid polymer matrix decouples the two functions.

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Upconversion Charging-Induced Near-Infrared Persistent Luminescence for Simultaneous Imaging and Temperature Sensing

Chuan Liao, Tong Qi, Guojun Zheng, Liangliang Zhang, Jiahua Zhang, Jianrong Qiu

e71879 | First Published: 28 September 2026

An upconversion charging (UCC) technique has been introduced to achieve long-wavelength high-efficiency charging in Cr^{3+}-activated persistent phosphors. UCC-induced persistent luminescence is used for simultaneous imaging and temperature sensing. Multiple linear regression was adopted to synergize three linearized thermal response parameters, which greatly improved the relative sensitivity and reduced the temperature uncertainty of the thermometer.

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Dual-Bidirectional Optoelectronic Bi_2O_2Se Single Crystal Enabled by Site-Selective O-Se Substitution for Self-Contained Scene Perception-Recognition-Interaction System

Yanan Liu, Zewen Li, Zongbo Feng, Chenhao Xu, Xinyu Luo, Baozeng Zhou, Yongxu Hu, Lei Zheng

e71881 | First Published: 30 September 2026

Herein, we report well-engineered dual-bidirectional optoelectronic Bi_2O_2Se crystals fabricated via a site-selective O-Se substitution strategy, showing balanced ambipolar transport with an I_{ON}/I_{OFF} ~ 6000 and multispectral PPC/NPC effects from ultraviolet to infrared. Moreover, integrated applications in high-dimensional secure optical communication, visual bionic capabilities for round-the-clock motion detection and recognition, and context-aware interaction to dynamic events are demonstrated.

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