

PRESS RELEASE

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Fraunhofer IPMS brings research and industry together

Integrated photonics as a key technology for compact and high-performance systems

Whether it's sensor technology, data processing, or quantum technologies, integrated photonics lays the foundation for compact and high-performance systems. Optical components and functions can be integrated onto a single chip and combined with electronics and other technologies. The Fraunhofer Institute for Photonic Microsystems IPMS develops photonic devices and systems for this purpose. At the Industry Partner Day on August 20, 2026, Fraunhofer IPMS brought together representatives from research and industry to discuss current developments and future prospects in integrated photonics.

Integrated photonic systems combine electronics, active and passive optical components, and other technologies. For example, light emitters (such as lasers, organic light-emitting diodes/OLEDs, and microLEDs), waveguides, modulators (such as spatial light modulators or microscanner mirrors), and detectors can be combined to form powerful, complex systems. The integration of various functions into a small space enables compact and potentially energy-efficient solutions for a wide range of applications.

"Integrated photonics opens up new possibilities for combining optical and electronic functions in compact systems," explains Prof. Dr. Wenke Weinreich, Director of Fraunhofer IPMS. "With our expertise in development and manufacturing, we aim to help make these technologies usable for new applications. It is crucial to consider the entire development chain, from the technology itself to the integrated system."

Wide Range of Applications and Research Topics

One of Fraunhofer IPMS's key areas of focus in the field of integrated photonics is the development of electro-optical devices and associated CMOS-compatible fabrication technologies on 200 and 300 millimeter wafers. A central technological foundation for this is the silicon nitride (SiN) waveguide platform, which is available for both wafer sizes. It is characterized by very low optical losses across a broad wavelength spectrum ranging from the visible to the mid-infrared range, thereby enabling the realization of complex photonic circuits. This platform not only serves as the foundation for highly sensitive photonic biosensors but also forms the backbone for many other applications. These include, among others, photonic computing, quantum technologies, and hybrid integration with active components. Electronic and optical functionalities are integrated at the wafer level, allowing the resulting devices to be manufactured cost-effectively in large quantities.

Editor

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Fraunhofer IPMS's research portfolio encompasses a wide range of innovative technologies. These include spatial light modulators based on MEMS (microelectromechanical systems) technology, featuring millions of analog-controlled micromirrors that are individually driven by integrated CMOS electronics. They enable highly precise spatial and temporal light modulation for a wide range of applications and are used, for example, in mask-less microlithography, optical quantum computing, and holography. In addition, Fraunhofer IPMS is developing high-resolution OLED microdisplays with resolutions currently up to 2,048 x 2,048 pixels. These combine a CMOS backplane for individual pixel control with OLED materials for light generation and are particularly well-suited for smart glasses and other compact display systems.

Developing New Solutions Together with Industry Partners

To further advance the development of integrated photonic systems, Fraunhofer IPMS is systematically expanding its technological expertise and manufacturing capabilities. The focus is on specific new integration approaches, such as the monolithic and hybrid combination of the SiN waveguide platform with active components like microscanner mirrors or lasers, as well as the scaling of 300 mm manufacturing. Through close collaboration with industry partners, the institute carries out customer-specific pilot production runs and directly tailors technological developments to specific product requirements, such as for use in medical technology, the automotive sector, or quantum systems.

To bring together stakeholders from research and industry and to promote the exchange of ideas on new technological developments and applications, Fraunhofer IPMS organized the Industry Partner Day on August 20, 2026. Under the title "Photonics for Next-Generation Information Systems," participants discussed current developments and future prospects in integrated photonics.

"The exchange with our industry partners is a key component in aligning technological developments with the requirements of future markets at an early stage and jointly developing new solutions," concludes Weinreich.

About Fraunhofer IPMS

Fraunhofer IPMS is a world-renowned research and development service provider specializing in electronic and photonic microsystems. Our technologies are used in industries such as mobility, biotechnology, and medical technology. We are also addressing key future fields, such as quantum technologies and neuromorphic computing. Through our research in green microelectronics, we contribute to a sustainable and resource-efficient world.

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An overview of the research on integrated photonics can also be found on the Fraunhofer IPMS website at <https://www.ipms.fraunhofer.de/en/Components-and-Systems/Integrated-Photonics.html>.

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Images

OLED microdisplay with 2K resolution (2,048 × 2,048 pixels, 1.07 inch).

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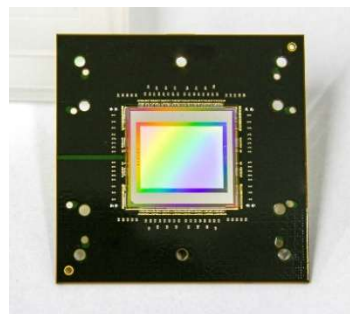
Industry Partner Day 2026 on "Integrated Photonics" at Fraunhofer IPMS

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A miniaturized photonic biosensor chip developed by Fraunhofer IPMS using integrated photonics.

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REALHOLO Spatial Light Modulator from Fraunhofer IPMS

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