



FRAUNHOFER INSTITUTE FOR PHOTONIC MICROSYSTEMS IPMS

PRESS RELEASE

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Compact LCOS Microdisplay with Fast CMOS Backplane for High-Speed Light Modulation

Researchers from the Fraunhofer Institute for Photonic Microsystems IPMS, in collaboration with HOLOEYE Photonics AG, have developed a compact LCOS microdisplay with high refresh rates that enables improved optical modulation. This innovative microdisplay will be presented for the first time at the 31st International Display Workshops (IDW) 2024 in Sapporo, Japan.

LCOS microdisplays are characterized by their low power consumption, small size, and lightweight design. They are used in switchable adaptive optics, particularly as phase modulators, and as projection displays in augmented or virtual reality (AR/VR). Phase modulators, also known as spatial light modulators (SLMs), are used in biological imaging and microscopy, among other applications, for wavefront correction and beam shaping. The goal is to improve image resolution, minimize distortions caused by biological tissue, or protect samples. The new LCOS microdisplay from HOLOEYE and Fraunhofer IPMS utilizes an innovative CMOS backplane that enables high-speed light modulation.

Matthias Verworn from HOLOEYE explains: "With the new backplane generation from IPMS, we can realize compact micro-SLMs and specifically address applications with requirements for a small form factor. The very small pixel size enables larger diffraction angles, while the fast interface supports high clock rates and flexible, application-specific display addressing options."

The unique features of the new LCOS microdisplay open new possibilities in wearable holographic AR systems, in optogenetics, e.g. for structured photostimulation of neurons, as well as in quantum optics and quantum computing.

Philipp Wartenberg, Head of IC and System Design at Fraunhofer IPMS, states: "The newly developed backplane architecture of our compact LCOS microdisplay significantly expands the possibilities for light modulation and far exceeds existing refresh rates. This is enabled by the integration of a complete framebuffer and a high-speed interface to the pixel matrix, achieving a data transfer rate of up to 576 Gbit/s to a pixel array with a resolution of 1440 x 1080 pixels and a pixel size of 2.5 μm ."

HOLOEYE plans to launch the first products with this LCOS light modulator in early 2026.

Editor

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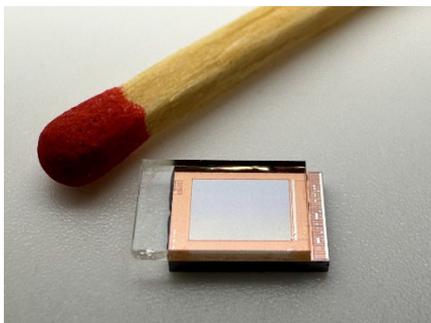
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About HOLOEYE Photonics AG

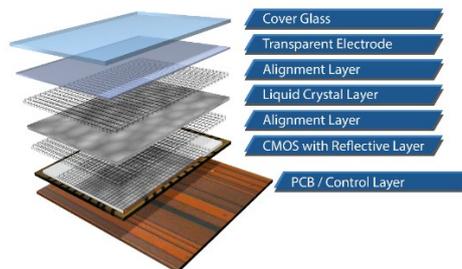
Founded in 1999, with headquarters in Berlin, Germany, HOLOEYE is providing products and services in the fields of Spatial Light Modulators (SLM), LCOS microdisplay components and Diffractive Optical Elements (DOE). HOLOEYE provides highly specialized and diversified standard solutions for academic and industrial R&D and offers component customizations, custom developments, and volume production for industrial integration.

About Fraunhofer IPMS

Fraunhofer IPMS is one of the leading international research and development service providers for electronic and photonic microsystems in the application fields of intelligent industrial solutions and manufacturing, medical technology and health, and mobility. In three state-of-the-art clean rooms and with a total of four development sites in Dresden, Cottbus and Erfurt, the institute develops innovative MEMS components and microelectronic devices on 200 mm and 300 mm wafers. Services range from consulting and process development to pilot production.

Images

Compact LCOS Microdisplay with Fast CMOS Backplane for High-Speed Light Modulation
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Structured Design of an LCOS Cell ©HOLOEYE Photonics AG



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Fraunhofer IPMS at IDW 2024:

Booth:

- Semi-transparent microdisplay
- LCOS-Microdisplay in cooperation with HOLOEYE Photonics AG
- OLED-Microdisplays with new Backplane-architecture for high-speed light modulation
- Ultra-low power OLED-Microdisplays

Lecture:

Uwe Vogel: "Semi-Transparent CMOS Backplane for Advanced Near-to-Eye Microdisplays", Keynote

Further Publications:

Philipp Wartenberg, Bernd Richter, Stephan Brenner, Johannes Zeltner, Christian Schmidt, Judith Baumgarten, Andreas Fritscher, Simone Lenk, Martin Rolle, Michael Törker, Uwe Vogel: "New small-node CMOS microdisplay backplane for high-speed programmable light modulation designed for OLED, microLED and LCOS front-plane technologies", Proc. SPIE 12624, Digital Optical Technologies 2023, 1262416 (7 August 2023); <https://doi.org/10.1117/12.2675479>

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