

PRESS RELEASE

PRESS RELEASEJanuary 16, 2025 || Page 1 | 3

Optical systems from Fraunhofer IPMS for medicine

High-precision images and lasers for faster, more precise therapies

Particularly in medicine and bioanalytics, results must be determined precisely and reliably. The optical systems of Fraunhofer IPMS enable position control and gentle analysis options, which realize precise results in the shortest amount of time. The versatile applications of micro scanners in medicine include image acquisition for medical endoscopes, confocal microscopy, fluorescence microscopy and spectroscopy.

Fraunhofer IPMS has many years of experience in the development and manufacture of customized, highly miniaturized MEMS scanners. The micro scanners are characterized by large scanning angles and high scanning frequencies and demonstrate excellent long-term stability. This enables them to generate comprehensive, high-resolution medical images that still show good results even after a long period of use. A new development from the institute, the first hybrid 2D vector scanner modules with electromagnetic drive, allow two-dimensional, quasi-static deflection with larger mirror apertures as well as a high vector positioning speed.

Micro scanner mirrors enable the precise and fast projection or scanning of a wide variety of materials and objects thanks to spatial beam deflection by means of rotation and translation. The manufacturing technology, specific to Fraunhofer IPMS, equips the MEMS-scanners with high miniaturization, fatigue-free SCS (single crystalline silicon) mechanics, integrated position sensors and high scanning frequencies. The 1- or 2-dimensional design can be realized in any combination of quasi-static and resonant drives. Therefore, a very broad design space can be addressed for numerous possible applications of MEMS scanners.

The micro scanners from Fraunhofer IPMS are used in a therapy laser for the treatment of eye diseases as well as in endoscopy, spectroscopy or medical microscopy. The use of fluorescence markers in modern laser scanning microscopes makes it possible to determine how much tissue is affected by tumor cells in the operating room - within the nanometer range. Any surrounding, healthy tissue is thus spared.

Editor

Julia Schulze | Fraunhofer Institute for Photonic Microsystems IPMS | Phone +49 351 8823-1314 |
Maria-Reiche-Straße 2 | 01109 Dresden | www.ipms.fraunhofer.de | julia.schulze@ipms.fraunhofer.de

Comprehensive offer for developers and manufacturers

The control algorithms developed at IPMS for various scan modules ensure high-precision positioning of the reflective mirror plate. These can be transferred to the digital control of the customer's system electronics (FPGA or microcontroller). In addition, customer evaluation kits are offered which enable testing of the modules in their specific application scenarios. At Fraunhofer IPMS, micro scanners can be realized in all combinations of vectorial (quasi-static) and resonant beam positioning as 1D or 2D tilting mirrors or translation mirrors and can be implemented using the same manufacturing technology (AME75).

The comprehensive range will be presented at SPIE Photonics West

From January 25 to January 30, 2025, Fraunhofer IPMS will be represented at the conference and trade fair for photonic technologies - SPIE Photonics West - in San Francisco and will present its research work with numerous exhibits and macromodels at its booth (Hall F, Booth #4623) as well as in lectures. Appointments with experts from the fields of area light modulators, micro scanners and micro displays can now be booked on the [Fraunhofer IPMS website](#).

About Fraunhofer IPMS

Fraunhofer IPMS is a leading international research and development service provider for electronic and photonic microsystems in the application fields of Smart Industrial Solutions, Bio and Health, Mobility as well as Green and Sustainable Microelectronics. Research focuses on customer-specific miniaturized sensors and actuators, MEMS systems, microdisplays and integrated circuits as well as wireless and wired data communication. The institute develops systems and components on 200 and 300 mm wafers in their state-of-the-art clean rooms. Services range from consulting and design to process development and pilot series production.

Images



2-dimensional magnetic vector scanner.

© Fraunhofer IPMS