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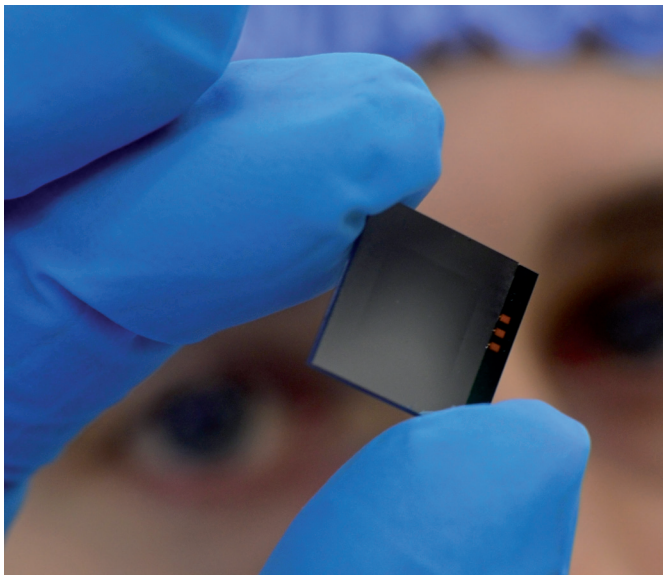
PRESS RELEASE

Fraunhofer ENAS exhibits application samples of nano-materials in Japan

The Fraunhofer Institute for Electronic Nano Systems ENAS shows samples of nano-materials applied in sensors and actuators at the nano tech 2016 – the International Nanotechnology Exhibition and Conference in Tokyo, Japan.

MEMS loudspeaker made of metalic glass
Micro loudspeakers are part of mobile electronic devices such as smart phones, tablets and laptops. By using micro technologies, the speakers can be fabricated on silicon wafers. This is a great advantage compared to conventional manufacturing of loudspeakers. The researchers at Fraunhofer ENAS use a thin layer of metallic glass as membrane for the MEMS speaker. Due to their amorphous micro structure, metallic glasses exhibit superior mechanical properties in comparison to crystalline materials. It can be deposited by standard micro technology processes. In combination with dispensed magnetic paste and a micro coil, an electrodynamic actuator – the micro loudspeaker – has been fabricated.



The prototype of the MEMS loudspeaker with a metalic glass membrane has a size of 12 x 12 x 0,8 mm. Photo © Fraunhofer ENAS | Download: www.enas.fraunhofer.de/presse.

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Editorial notes
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Nanoporous metals for micro energy storage systems
Furthermore, Fraunhofer ENAS investigates fabrication technologies for nanoporous metals to use these materials in micro energy storage systems. For achieving high values of electrical capacitance in supercapacitor architectures, electrodes with large surface-to-volume ratio are needed. Fraunhofer ENAS applies nanoporous gold structures as electrodes for micro double-layer capacitors. These structures are fabricated within a simple and MEMS compatible process. Therefore, a gold layer is deposited by sputtering and subsequently patterned by photolithography. Gold acts as seed layer for the following Au/Sn electroplating. The final nanoporous structure is achieved by removal of Sn.

Multi wafer bonding technology for optical systems
Also in medical engineering, micro and nano technology enables enhanced and smaller diagnostic and monitoring systems. Fraunhofer ENAS develops together with partners a miniaturized, low-cost, portable OCT microsystem for painless and earlier detection of skin cancers by physicians or dermatologists. The work is done within the European project VIAMOS. By using of micro-opto-electromechanical systems (MOEMS) technologies, the system can be 10 times cheaper and 150 times smaller than the conventional commercially available systems. The OCT microsystem consists of a tunable light source, objective lens, an array of Mirau interferometers, a beam-splitter cube and a Fabry-Pérot interferometer. The Mirau interferometer is a key component of the OCT microsystem. Batch fabrication of the array-type Mirau interferometers can be achieved through optimized MOEMS process and is much more miniaturized compared to other conventional tools. A doublet of array of micro lenses, an array of actuated micro mirror, a focus-adjustment spacer and a beam splitter plate are bonded on wafer-level to a complex stack. The researchers at Fraunhofer ENAS developed a multi wafer bonding technology taking into account the required high precision of optical systems. The stack consists of five different wafers bonded by anodic bonding technology and with a bonding temperature lower than 360 °C.

Fraunhofer ENAS presents exhibits together with the Fraunhofer Project Center "NEMS/MEMS Devices and Manufacturing Technologies at Tohoku University" and the Gessner Group of WPI-AIMR of the Tohoku University in Sendai, Japan, at the German pavilion in hall 5 at booth 5J-14 from January 27 until 29, 2016.