

FRAUNHOFER INSTITUTE FOR ELECTRONIC NANO SYSTEMS ENAS

PRESS RELEASE

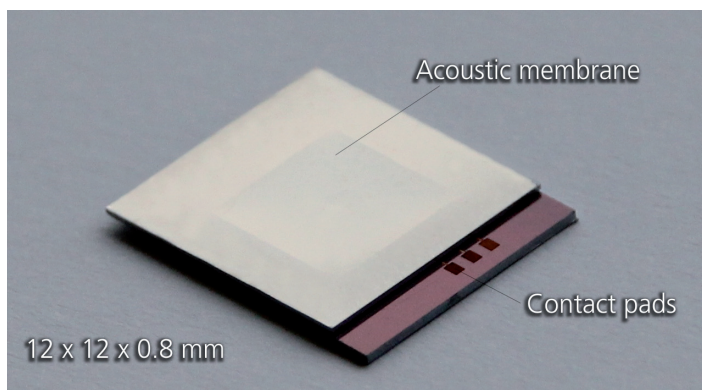
PRESS RELEASE

April 21, 2015 || page 1 | 2

Fraunhofer ENAS introduces a MEMS loudspeaker with a membrane of metallic glass at the nanomicro biz 2015

For the first time, the Fraunhofer Institute for Electronic Nano Systems ENAS presents a MEMS loudspeaker with a membrane of metallic glass for the first time during the nanomicro biz 2015 from April 22 to 24 in Yokohama, Japan. The MEMS loudspeaker has the size of a fingernail and is manufactured in silicon micro technology at wafer-level.

Nowadays, micro loudspeakers are part of all mobile electronic devices such as smart phones, tablets and laptops. This market is estimated to demand more than one billion microspeakers per year and is still growing. A manufacturing of the speakers on silicon wafers can have distinctive advantages over conventional manufacturing like high accuracy and reproducibility as well as low-cost batch processing and new packaging possibilities. For the first time, Fraunhofer ENAS shows research results of a loudspeaker manufactured in MEMS technology. A thin layer of metallic glass is used as membrane of the MEMS speaker. Due to their amorphous micro structure, metallic glasses exhibit superior mechanical properties in comparison to crystalline materials. It can be deposited with standard micro technology processes. In combination with dispensed magnetic paste and a micro coil, an electrodynamic actuator has been fabricated and is exhibited at the Fraunhofer ENAS booth no A-0 at the nanomicro biz 2015. The coil is manufactured in copper technology, which has been developed by the Center for Microtechnologies of the TU Chemnitz.



The MEMS loudspeaker with a membrane of metallic glass is manufactured in silicon micro technology at wafer-level.

Photo © Fraunhofer ENAS | Download: www.enas.fraunhofer.de/presse.

IN COOPERATION WITH

FRAUNHOFER PROJECT
CENTER
"NEMS/MEMS DEVICES
AND MANUFACTURING
TECHNOLOGIES"
AN DER TOHOKU
UNIVERSITÄT



TOHOKU
UNIVERSITY

IN COOPERATION WITH

 **Fraunhofer**

IN COOPERATION WITH

ZfM
Zentrum für
Mikrotechnologien



TECHNISCHE UNIVERSITÄT
CHEMNITZ

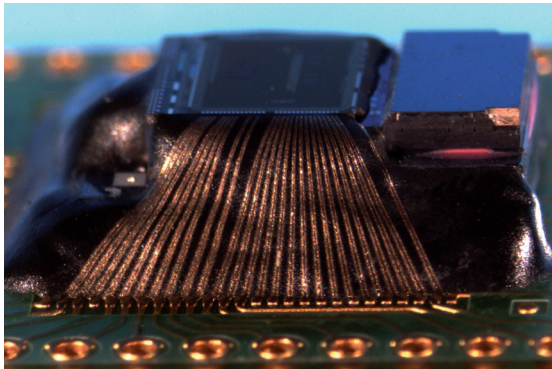
Editorial notes

Dr. Martina Vogel | Fraunhofer Institute for Electronic Nano Systems ENAS | Phone +49 371 45001-203 |
Technologie-Campus 3 | 09126 Chemnitz | Germany | www.enas.fraunhofer.de | martina.vogel@enas.fraunhofer.de |

FRAUNHOFER INSTITUTE FOR ELECTRONIC NANO SYSTEMS ENAS

The researchers also show further actuators like a RF switch, a tunable Fabry-Pérot interferometer and actuators for active flow control as well as MEMS technologies.

Fraunhofer ENAS exhibits samples of contacting and bonding of MEMS devices by aerosol jet printing. This non-contact direct-writing technology is a selective deposition process. This additive process allows not only processing a wide variety of materials but can be performed onto a wide variety of substrates without conventional masks or thin-film equipment. By depositing electrical conductive materials, electrical interconnects can be realized over topographic structures and surfaces. In most instances, the deposited materials consist of metallic nanoparticles. To increase the conductivity of the deposited porous metal particles a selective laser sintering is applied. Thereby, lines width of 25 μm can be performed.



A 3D integrated system in a package (SiP) "CoolPod" is assembled by triple stacking of three devices (ASIC, acceleration sensor, powerdown interrupt generator) onto customized printed circuit board (PCB). Printed non planar silver nanoparticle-based chip-2-board interconnects are fabricated using Aerosol Jet technology and silver nanoparticle ink. Line width of printed interconnects was set to 25 μm . Photo © Fraunhofer ENAS | Download: www.enas.fraunhofer.de/presse.

Joerg Froemel from Fraunhofer ENAS gives the talk „MEMS devices enabled by material innovation“ about these and further current researches during the 21st International Micromachine Nanotech Symposium on April 22, in Yokohama, Japan.

The **Fraunhofer-Gesellschaft** is the leading organization for applied research in Europe. Its research activities are conducted by 66 institutes and research units at locations throughout Germany. The Fraunhofer-Gesellschaft employs a staff of nearly 24,000, who work with an annual research budget totaling more than 2 billion euros. Of this sum, around 1.7 billion euros is generated through contract research. More than 70 percent of the Fraunhofer-Gesellschaft's contract research revenue is derived from contracts with industry and from publicly financed research projects. International collaborations with excellent research partners and innovative companies around the world ensure direct access to regions of the greatest importance to present and future scientific progress and economic development.

Further contact data

Felix Gabler | Phone +49 371 45001-259 | felix.gabler@enas.fraunhofer.de | Fraunhofer Institute for Electronic Nano Systems ENAS, Chemnitz/Germany | www.enas.fraunhofer.de

Frank Roscher | Phone +49 371 45001-239 | frank.roscher@enas.fraunhofer.de | Fraunhofer Institute for Electronic Nano Systems ENAS, Chemnitz/Germany | www.enas.fraunhofer.de

Joerg Froemel | Phone +49 371 45001-260 | joerg.froemel@enas.fraunhofer.de | Fraunhofer Institute for Electronic Nano Systems ENAS, Chemnitz/Germany | www.enas.fraunhofer.de