

## PRESS RELEASE

PRESS RELEASE

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### **Successful cooperation of scientists of Fraunhofer ENAS and Center for Microtechnologies with the Tohoku University Sendai, Japan, in the field of micro-electromechanical systems**

Since 2006 the Fraunhofer Institute for Electronic Nano Systems ENAS and the Center for Microtechnologies at the Technische Universität Chemnitz work together with the Tohoku University Sendai. Sendai is the capital city of Miyagi Prefecture, Japan, and the largest city in the Tōhoku region, and the second largest city north of Tokyo. It has more than 1 million inhabitants. At the Tohoku University is one of the nine Japanese „World Premier International Research Centers“ (WPI). The WPI is similar to Germany's Excellence Initiative. It is funded by the Japanese Ministry of Education, Culture, Sports, Science and Technology, MEXT.

In October 2007, the World Premier International Research Center - Advanced Institute of Materials Research (WPI-AIMR) at the Tohoku University started to work across faculties developing new materials and functional principles. Prof. Thomas Gessner, director of the Fraunhofer Institute for Electronic Nano Systems and director of the Center for Microtechnologies at Technische Universität Chemnitz, is a principal investigator at the WPI-AIMR at Tohoku University. The Gessner-group works in the field of NEMS/MEMS devices and micro/nano manufacturing technologies at the Tohoku University within the Shuji Tanaka-lab (the former Esashi-lab).

„Prof. Esashi's style of collaboration is referred to as "Open Innovation", which is now widely recognized as a successful scheme for innovation. He already started it more than 20 years ago. As a result, he successfully commercialized many innovative prototypes and technologies with collaborating companies. This is the basis for his deep understanding of the industrial requirements. His students and his staff take this philosophy to address new research topics and bring technologies as well as devices into application and production.“, Professor Gessner explains. „Together we developed microsystems based on metallic glass.“

#### **Latest example: a micro loudspeaker with a membrane made of metallic glass**

The scientists in Sendai and Chemnitz work together in the field of metallic glass. The scientists at Tohoku University have a deep knowledge of metallic glass which is the result of more than 20 years basic research in this field. The Gessner group at WPI-AIMR started to develop first MEMS based on this knowledge.

IN COOPERATION WITH

**FRAUNHOFER PROJECT  
CENTER  
"NEMS/MEMS DEVICES  
AND MANUFACTURING  
TECHNOLOGIES"  
AT TOHOKU  
UNIVERSITY**



TOHOKU  
UNIVERSITY

IN COOPERATION WITH

 **Fraunhofer**

IN COOPERATION WITH

**ZfM**  
Zentrum für  
Mikrotechnologien

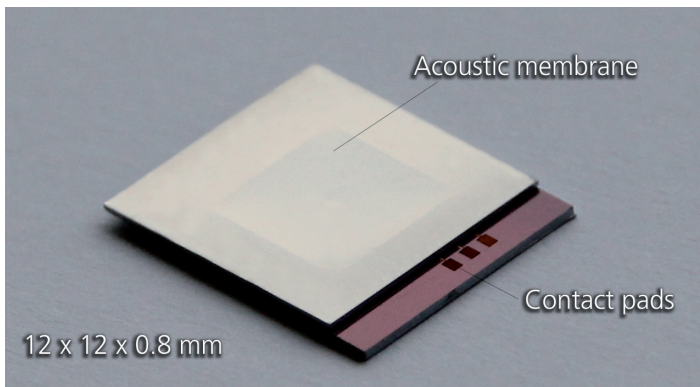


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#### **Editorial notes**

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FRAUNHOFER INSTITUTE FOR ELECTRONIC NANO SYSTEMS ENAS



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

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For the first time, the Fraunhofer Institute for Electronic Nano Systems ENAS presented a MEMS loudspeaker with a membrane of metallic glass 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. Analysts like Supply and Yole Développement predict in their market studies, that there are micro loudspeaker under development which will be on the market within the next years.

The loudspeaker can be manufactured in silicon-based 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. The coil is manufactured in copper technology, which has been developed by the Center for Microtechnologies of the TU Chemnitz.

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.

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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.

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