



X-FAB MEMS FOUNDRY GMBH

New Industry 4.0 MEMS Fab for Smart Sensor Integration „i4MEMS“

X-FAB develops technologies and processes for the production of integrated circuits. These are used to translate signals such as light, temperature or speed into digital signals and process them further. The integrated circuits are mainly used by other companies to develop their own products in the automotive, consumer electronics, industrial and medical sectors. X-FAB MEMS Foundry at the Erfurt site specialises in the development of technologies in the field of micro-electro-mechanical systems (MEMS) - especially intelligent sensors. These are used, for example, for control functions or for condition monitoring. X-FAB MEMS also relies on a combination of MEMS and existing CMOS (Complementary Metal Oxide Semiconductor) technologies.

Challenges

Intelligent sensors are used in a wide variety of products, each of which has its own individual and specific demands on the underlying semi-conductor technologies. In order to create innovative system

solutions that can be used in automotive, industrial and medical technology as well as in the future Industry 4.0 and the Internet of Things, new solutions are required that consist of a combination of MEMS and CMOS technologies. The existing CMOS process lines are subject to very strict limitations in order to ensure high quality and reliability. For the production of intelligent microsystems, for example in medical technology, these must now be expanded to include additional components such as MEMS. But special process steps using materials that are not compatible with CMOS technologies are also the focus of the project work. For this purpose, the process lines must be adapted and expanded accordingly

Objective

In order to be able to respond even more strongly to individual customer wishes in the future, it is necessary to optimise the wafer production processes. For this purpose, all relevant processes are set up for a wafer size of 8". This wafer size is necessary

and well suited for both integrated MEMS sensors and the subsequent combination with CMOS technologies, as both processes can then be carried out on the same equipment. Furthermore, by expanding its technology portfolio, X-FAB aims to create a production facility for integrated smart sensors that will make an essential contribution to the microelectronics value chain in Germany. In the future, X-FAB MEMS Foundry wants to produce both large series and very small series equally profitably. To this end, a new clean room area is being exchanged of the relevant production, process and material data is being set up.

Approaches

In its project, X-FAB will create an innovative and flexible production line for sensors for automotive and medical applications with considerable research and development effort. The development work includes special process and material developments to make the systems more reliable, stable and reproducible. This



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Project duration

01/17 – 12/21

Funding code

16IPCEI629

Location

Erfurt



applies in particular to processes with low capacity utilisation. New concepts for quality assurance and process control are being developed, new device and application designs as well as new methods for handling different substrates (material and shape) within the same production. In addition, the individual process steps are being automated and integrated in terms of data technology in the direction of Industry 4.0.

Perspectives

The developments from the project not only offer a technological platform on which intelligent sensors can be used as components for future and innovative IoT applications, but also secure a technological lead for microelectronics in Europe. Medium-sized and small companies in particular will benefit from this, as the demand for intelligent sensors from this sector is especially high. X-FAB will adjust its manufacturing capacities and capabilities to this and thus facilitate SMEs' access to innovative high technologies. With the development of high-performance, energy-saving and cost-effective semiconductor solutions, the two X-FAB projects contribute to advancing the key technology of micro- and nanoelectronics as a common European goal and to addressing the societal challenge of digitalisation. The solutions developed can be used in all industries where sensors play a role.

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Imprint

Editor
Federal Ministry for Economic Affairs and Climate Action (BMWK), Public Relations
11019 Berlin
www.bmwk.de

Status
December 2020

Editing and design
VDI/VDE Innovation + Technik GmbH

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