

MEMS REPORT

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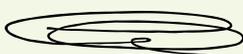
Saxonian Kickoff of the "Research Fab Microelectronics Germany"

Signing of the Foundation Declaration for the New Fraunhofer Project Center in Dresden

Dear Customers, Partners and Friends
of Fraunhofer IPMS,

Our Saxonian kickoff event for the "Research Fab Microelectronics Germany" (FMD) was very well received by both business and political leaders. Joining us at the celebration were Prime Minister Tillich, Saxon State Minister for Science and Art Dr. Stange, Parliamentary Secretary of State at the Federal Ministry of Education and Research (BMBF) Stefan Müller and Deputy Chairman of the CDU/CSU parliamentary group Michael Kretschmer. Like many industrial representatives, they are very interested in the new construct of cooperation between Fraunhofer and Leibniz. Following the kick-off events here and in other federal states, the FMD has received its first nationwide wave of attention. We are excited to see which new projects will result for our institute! On August 18, 2017, Minister Tiefensee and our President Prof. Neugebauer signed a "Memorandum of Understanding" introducing the development of a new project center for interdisciplinary work in the areas of microelectronic and optical systems for biomedicine in Thuringia. Here, too, the strategy is set to expand cooperation with other institutes and open up new areas of application for our technologies.

We are very pleased about the new opportunities both the research fab and the project center will bring. We wish you an informative reading of the current MEMS report!



Prof. Dr. Harald Schenk



Prof. Dr. Hubert Lakner

NEW HORIZON 2020 PROJECT: "PHASMAFOOD"

In January of this year, the EU-funded PhasmaFood project began developing optical intelligent systems for the on-site quality assessment of food.



The PhasmaFood project aims to develop a miniaturized and thus portable system to assess the quality and predict the shelf-life of foodstuffs directly in the supermarket. It should be knowledge-based and able to set at varying parameters in order to be used for a wide range of different applications.

The project will test the system concept by detecting mycotoxins in nuts and grains, spotting early spoilage of fruits, vegetables, meat and fish as well as exposing counterfeit alcoholic beverages, edible oil, milk and meat. Three optical sensor modules are used to detect the necessary signals.

In addition to a commercial micro-camera and a UV-VIS spectrometer for the wavelength range 450-900 nm, the MEMS-based, near-infrared spectrometer for wavelengths from 950 nm to 1900 nm developed at Fraunhofer IPMS plays a decisive role. Captured spectral data is transmitted wirelessly to a smartphone and reverted to a cloud-based reference database in which evaluation is performed. The PhasmaFood system enables private, individual consumers to directly check the quality and freshness of food.

PhasmaFood (project number 732541) is funded by the European Commission and is a "Research & Innovation Action" within Horizon 2020. Managed by INTRASOFT, the project started in January 2017 and has a term of three years. In addition to Fraunhofer IPMS, seven other European partners are involved.

www.phasmafood.eu

SENSOR MEETS RFID: COUPLED WITH SENSORS, RFID SOLUTIONS WILL OPTIMIZE FUTURE WORK PROCESSES

In these times of IoT and Industry 4.0, the concept of “system” is becoming increasingly important. The demand for a global infrastructure, making it possible to connect physical and virtual objects and facilitate the communication between them, is growing. In order to meet these demands, individual machines as well as whole systems will face new requirements. In the future, data will not only be collected, but rather fed automatically into the web through cloud connectivity. There, data will be processed for real-time monitoring. What on the one hand provides a great opportunity of progress toward the “Smart Factory”, presents the need for new, intelligent solutions for the collecting and processing of data on the other. To tackle this problem, Dr. Andreas Weder and his team from the Fraunhofer Institute for Photonic Microsystems IPMS in Dresden work to develop special RFID sensor solutions for a wide range of applications.

Due to Industry 4.0 wanting to capture parameters of physical nature, Weder and his team have extended the “current” RFID technology to include additional dimensions. The research work focuses on RFID circuits which allow for the simple integration of analogue and digital sensors coming from different manufacturing sources. Coupled sensors now make it possible to measure physical parameters such as pressure, humidity, vibration or temperature for proper evaluation. Intelligent software solutions also provide for easy integration into existing environments and the control systems at hand.

Weder explains, “With our RFID expertise encompassing ASIC and antenna design, sensor tag development, and sensor, system, and cloud integration, we can provide customer-specific complete solutions. Our services cover the entire value chain from circuit development to software integration in complete industrial applications, focusing on RFID suppliers, equipment manufacturers and systems integrators.

At this point in its RFID sensor development, Fraunhofer IPMS is putting emphasis on passive UHF RFID solutions. In comparison with HF or LF, UHF provides higher distance ranges. Battery-free systems require no maintenance or power supply, providing for easy integration in various products, machines and objects and broadly diversified application possibilities.

The Fraunhofer IPMS RFID-based solution can identify potential malfunctions and issues threatening plant failure early to prevent future production loss and safety risks. This capability is especially interesting to those in the field of predictive maintenance, servicing and maintaining the condition of machines and buildings alike.



RFID sensors make the measurement of temperature and other physical parameters in hard-to-reach installation locations and challenging environments possible.

Wireless transmission of physical measured values such as pressure and temperature can also be applied in the life sciences. When tracing and monitoring food, for example, the continuity of the cooling chain or the integrity of vacuum packaging can be documented. The Fraunhofer IPMS RFID sensor technology now allows for such transmission parameters to be recorded, transmitted and presented without interruption.

Other areas of application include moisture measurement during construction, diverse medical applications and sensor control in logistics.

Fraunhofer IPMS presented its various RFID evaluation kits already equipped with sensors at the 2017 “RFID & Wireless IoT tomorrow” conference and exhibition from September 27-28, 2017 in Düsseldorf, Germany.

SAXONIAN KICKOFF OF THE “RESEARCH FAB MICROELECTRONICS GERMANY”

With investment of 350 million Euro in research facilities, the eleven Fraunhofer Group for Microelectronics institutes and two Leibnitz Association institutes will strengthen their network within the “Research Fab Microelectronics Germany” (FMD) in order to provide new products from a single cross-location source. Aiming to reinforce the innovative capability of the semiconductor and electronics industry in Germany and Europe throughout competitive global environments, the German Federal Ministry of Education and Research (BMBF) will support the development plan with the largest investment in research equipment since reunification. Set to receive 100.8 million Euro from the program, Fraunhofer institutes in Saxony celebrated the official start of the Research Fab Microelectronics Germany project with 200 guests from business, politics and science on August 8, 2017.

Together with Prof. Georg Rosenfeld, Fraunhofer Board Member, and Prof. Hubert Lakner, Chairman of the Research Fab Microelectronics Germany Steering Committee, Minister President Stanislaw Tillich, Minister of Science Dr. Eva-Maria Stange and Parliamentary Secretary of State at the Federal Ministry of Education and Research Stefan Müller unveiled a symbolic stele in front of the Fraunhofer IPMS in Dresden.

Prof. Rosenfeld remarked, “Microelectronics has system relevance. Both established and new industries need microelectronics to master the digital future. With the Research Fab Microelectronics, we provide the necessary research equipment and make new know-how available to industry to significantly contribute to the technological sovereignty of Germany and Europe.”

Stefan Müller pointed out that with the Research Fab Microelectronics Germany will be able to promote its own developments in microelectronics more than ever before. “Investing in the most powerful systems, equipment and laboratory facilities, our future program allows the institutes to provide outstanding international research services.

In the research fab, we are able to bundle existing research into an excellent pool of know-how. This strategy enables us to generate innovation in the field of microelectronics as well as provide them from a single source throughout the entire innovation chain. We thereby strengthen an important key industry with focus on tech-

nological sovereignty and jobs as well as Germany as an attractive location.”

Emphasizing the importance of Saxony as a leading microelectronics location in both Germany and Europe in his opening remarks, Minister President Tillich stated, “Our microelectronics cluster is gaining a further boost with the research fab. With an excellent research landscape, well-trained specialists and the close interlinking of business and science, the Saxony location provides the best conditions to help shape Industry 4.0, technology-efficient energy generation and intelligent mobility. We therefore support the federal government as well as the Free State of Saxony in their initiative to further strengthen Germany and Europe in international competition.”

Science Minister Dr. Eva-Maria Stange recalled that this large-scale investment is based on structures created by the Free State of Saxony, such as the High Performance Center “Functional Integration for Micro- and Nanoelectronics” in Dresden/Chemnitz. She said, “With long preparation, Saxony has made the Research Fab Microelectronics possible. Around 128 million euros were granted by structural funds for construction projects and initial equipment at the Maria-Reiche-Straße location alone. I am very pleased that our joint investment in basic and applied research is now paying off. The Research Fab Microelectronics is an evidence to a long but very successful path.”

Using the example of the development of FD-SOI (Fully Depleted Silicon On Insulator) processes on 300 mm wafers, Prof. Hubert Lakner explained what the interweaving of expertise presently distributed among the application-oriented microelectronics institutes could look like at Fraunhofer. “With the Research Fab Microelectronics Germany, we can also offer the cutting-edge technology area of 300 mm wafers the latest technologies along the entire value-added chain – from design and technology modules to wafer-level integration. In this way, we provide our industrial partners an interesting offer for the further development of such high-performance processes in order to bring products, especially in the area of the Internet-of-Things, to market with shorter innovation cycles. We thank the German Federal Ministry of Education and Research in particular for these new possibilities.”

Representing the semiconductors and electronics industry at the kick-off event, Managing Director of Globalfoundries Dresden



From left to right: Dr. Eva-Maria Stange, Saxon Minister of Science, Stanislaw Tillich, Minister President of the Free State of Saxony, Stefan Müller, Parliamentary Secretary of State at the BMBF, Prof. Hubert Lakner, Chairman of the Steering Committee at the Research Fab Microelectronics and Executive Director of the Fraunhofer IPMS, Prof. Georg Rosenfeld, Member of the Board Fraunhofer-Gesellschaft and Prof. Harald Schenk, Director of the Fraunhofer IPMS at the unveiling of the symbolic stele at the entrance to the Fraunhofer IPMS in Dresden.

Dr. Rutger Wijburg reiterated the clear advantage of having such excellent high-tech research in the immediate vicinity. "Globalfoundries has been successfully cooperating with the Fraunhofer-Gesellschaft for many years. The FMD investment provides good opportunities for further deepening and expanding this cooperation. Our focus is on our FD-SOI technology, which is available for extremely energy-efficient IoT solutions. With the support of Fraunhofer at the Dresden location, we want to realize the potentials of FD-SOI electric-saving technology on the German and European markets."

Approximately 100 million Euro from the awarded funding will be used for the underlying modernization as well as the expansion of the existing research facilities in the four Saxonian Fraunhofer

Institutes including the Fraunhofer Institute for Photonic Microsystems IPMS, Fraunhofer Institute for Integrated Circuits IIS with the Division Engineering of Adaptive Systems EAS, Fraunhofer Institute for Reliability and Microintegration IZM with the Division All Silicon System Integration Dresden ASSID and Fraunhofer Institute for Electronic Nanosystems ENAS.

The most important areas of investment include equipment for the production of novel microsystems, leading edge CMOS processes on 300 mm wafers, 2.5 / 3D wafer level integration as well as equipment for circuit design, test and reliability assessment. Fraunhofer IPMS will invest approximately 60 million euros of the funding for the manufacturing of new MEMS and microsystems as well as for leading edge CMOS processes on 300 mm wafers.

SIGNING OF THE FOUNDATION DECLARATION FOR THE NEW FRAUNHOFER PROJECT CENTER IN ERFURT



Prof. Reimund Neugebauer, President of the Fraunhofer-Gesellschaft, and Wolfgang Tiefensee, Economics and Science Minister, sign the foundation declaration for the new Fraunhofer Project Center in Erfurt.

Health, demographic change and well-being are key social challenges, which can only be overcome if actors from business, science and society work together closely. Therefore, the respective use and further development of key technologies in areas such as biosciences, microelectronics, optics and photonics are of particular importance. For this reason, three Fraunhofer institutes are working together on interdisciplinary approaches at the Fraunhofer Project Center "Microelectronic and Optical Systems for Biomedicine". These are the Fraunhofer Institute for Photonic Microsystems IPMS, a leading research service provider in the field of microelectronics and microsystem technology, the Fraunhofer Institute for Applied Optics and Precision Mechanics IOF, a recognized competence center for optics and photonics, and the Fraunhofer Institute for Cell Therapy and Immunology IZI, a leader in the field of biosciences. In order to set up the project

center, the state of Thuringia signed a joint founding agreement with the Fraunhofer-Gesellschaft on August 18, 2017.

"The Fraunhofer-Gesellschaft has been producing the urgently needed innovative input for the Thuringian economy for a region which is strongly dominated by medium-sized businesses," said Wolfgang Tiefensee, Economics and Science Minister. Already today, there are five Institutes and Institute sections with over 600 employees and an annual budget of 65 million euros actively involved in the state of Thuringia. "With the new project center, the location will also be strengthened as the common interface between Thuringia's core industries of optics, medical technology and microelectronics." For this reason, Thuringia is grateful that the decision on the location of the new project center fell on Erfurt. The state of Thuringia will contribute half of the total cost of the start-up phase until 2022 in the amount of 35 million euros. For this year alone, the Ministry of Economic Affairs has allocated

a total of 750,000 euros. "My commitment is that, together with the local parties involved, we will do everything we can to make the new center a permanent success for the Fraunhofer-Gesellschaft and the technology location Thuringia."

Prof. Reimund Neugebauer, President of the Fraunhofer-Gesellschaft, adds: "Societal challenges such as the advancement of biomedicine can only be solved through interdisciplinary approaches. With the new project center, we are setting a clear signal here. The interdisciplinary approach of biosciences, microelectronics, optics and photonics will hereby contribute to the successful further development of biomedical applications and to new medical technology solutions for the benefit of all. All in all, the city of Erfurt with its research infrastructure, the established companies and the link to the universities in Erfurt, Ilmenau and Jena, is an important success factor."

Prof. Hubert Lakner, Managing Director of the Fraunhofer IPMS, adds: "The rapid transfer of research and development results into commercial products within the framework of the project center can only be achieved if components and systems can subsequently be manufactured on an industrial scale. For this reason, we need suitable manufacturing partners, who will accompany the entire development phase right from the onset. The work on the transfer of R&D to industrial technologies and pilot production is an integral part of this project center."

Transfer to industrial application

The project center will initially focus on two selected fields of application: improved medical imaging and visualization as well as biomarker analysis. In the future, the expansion of activities to other fields of application is not out of the question. While taking political strategies such as the growth strategy of the European Union, the high-tech strategy of the Federal Government and the investment strategy of the state of Thuringia into account on the one hand, and current trends in biomedicine on the other, systems for medical technology, analytics, diagnostics, biotechnology, biophotonics, pharmaceuticals, health and aging, and the food industry shall be developed and transferred into industrial applications. The first five years up until the end of 2022 are intended for the construction phase. The Fraunhofer-Gesellschaft and the state of Thuringia will provide start-up financing in the amount of 20 million euros spread over five years in equal parts. The Fraunhofer-Gesellschaft and the Free State of Thuringia also take over the investments of around 15 million euros for the construction and equipment of the new project center. The project center will then be included in the federal-state funding of the Fraunhofer-Gesellschaft.

UPCOMING EVENTS

RFID tomorrow

Düsseldorf, Germany September 27 - 28, 2017
Van der Valk Airporthotel

MikroSystemTechnik Kongress

Munich, Germany October 23 - 25, 2017
Hotel INFINITY Unterschleißheim

SEMICON Europa / productronica

Munich, Germany November 14 - 17, 2017
Munich Convention Center, Hall B2, Booth 317

sps ipc drives

Nuremberg, Germany November 28 - 30, 2017
Nuremberg Convention Center, Booth 7A-246

Fraunhofer IPMS Industry Partner Day

Dresden, Germany December 7, 2017
Fraunhofer IPMS

www.ipms.fraunhofer.de/en/events.html

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