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Gateone: Boosting Smart System Innovation for SMEs

“Gateone” is a European project to equip SMEs with smart technologies and solutions to boost their innovation cycle. The official launch took place in Grenoble on January 23, 2015.

Smart systems, or the so-called “More than Moore” applications, are expanding much faster than the semiconductor industry. Their compound annual growth rate (CAGR) is already higher than 15%, with a total market in 2015 already expected to reach US$60 billion (Source: Yole Développement).

In Gateone, Fraunhofer IPMS together with seven other European Research and Technology Organizations adopts a common process to reduce the risk associated with the adoption of new smart system technologies. Inspired from industry standards for product development, in partnership with SMEs, this process aims to reach the first gate of innovation.

The starting point is Gate zero, with a portfolio of more than 200 ideas or use cases. These use cases are supported by advanced state of the art technologies selected for their differentiation, IP and maturity. Fraunhofer IPMS will bring in the expertise regarding micro scanning mirrors, pressure sensors, Capacitive Micromachined Ultrasonic Transducers (CMUTs) and integrated capacitors. The offer is to work with SME to consolidate a business case and develop the necessary demonstration for a “hands-on” experience of the technology. This partnership is free of charge for the SMEs, no investment and no bind attached.

Gateone (Project ID: 644856) is supported by the European Commission and an Horizon 2020 innovation action led by company BluMorpho. The project started in January 2015 and will last for three years.

Further information can be found here: www.gateone-project.eu
INDUSTRY PARTNER DAY 2015 – 10 YEARS APPLIED RESEARCH IN NANOELECTRONICS

Fraunhofer IPMS-CNT Celebrates 10th Anniversary with Industry Partner Day

Since its founding with strategic partners AMD and Infineon on May 31, 2005, the Fraunhofer Center Nanoelectronic Technologies CNT has evolved from a novel facility within the Fraunhofer-Gesellschaft into a fixture establishment in the Silicon Saxony semiconductor region. After ten years, the CNT symbolizes the typical Fraunhofer example for applied science in the area of 300 mm technology development.

With over 50 employees working in high-k devices, non-volatile memories, interconnects and nanopatterning, the CNT is a recognized research and development partner to major regional manufacturers such as Globalfoundries and Infineon. The expansion of the service portfolio to include a screening center for semiconductor-factory resources and the establishment of a test platform for semiconductor suppliers such as BASF have enabled the CNT to win numerous strategic customers and thus provide a sound basis for the coming years.

Integrated into the Fraunhofer Institute for Photonic Microsystems IPMS as one of five divisions at the beginning of 2013, the CNT still remains at the Infineon Technologies AG Königsbrücker Straße location with its own cleanroom and laboratory space. After many years under the direction of Prof. Peter Kücher, the CNT division has been led by Dr. Romy Liske since the integration.

The Center Nanoelectronic Technologies CNT researches and develops innovative materials and processes on silicon wafers with diameters of 200 and 300 mm for producers, suppliers and development partners. For this purpose, more than 40 industry-compatible process and analysis tools are available in the modern 800-square meter, Infineon-standard cleanroom.

The CNT invites you all to attend Industry Partner Day providing insight to the development cooperation in the fields of high-k devices and interconnects as well as industry technology trends on June 11, 2015, at the Königsbrücker Straße location. Among others, speakers and industry representatives from Globalfoundries, X-Fab, BASF and Entegris will be participating in the event.

Free registration online now at: www.ipms.fraunhofer.de

Program

June 11, 2015, 9:00 - 14:30
Fraunhofer IPMS-CNT, Königsbrücker Str. 178, 01099 Dresden

09:00 Welcome and Opening
   Prof. Dr. Hubert Lakner, Director Fraunhofer IPMS, Dresden

09:15 Globalfoundries in Dresden - Future Perspectives
   Dr. Rutger Wijburg, Globalfoundries

09:35 Introduction CNT Highlights
   Dr. Romy Liske, Fraunhofer IPMS

09:55 Technology Challenges at 28 nm and Beyond
   Dr. Maciej Wiatr, Globalfoundries

10:45 Dresden Plating Lab - Industry Cooperation Model for Mutual Benefit
   Dr. Dieter Mayer, BASF

11:10 Gentle Physical Photoresist Removal with Intelligent Fluids®
   Dr. Dirk Schumann, Bubbles & Beyond GmbH

11:35 Real Time True Surface Monitoring for ALD Processes
   Dr. Hassan Gargouri, Sentech

13:00 Semiconductor Memories: Current Status and Options for the Future
   Prof. Dr. Thomas Mikolajick, TU Dresden, NaMLab gGmbH

13:25 Energy Efficient Non-volatile Memory Manufacturing (nv SRAM)
   Dr. Stephan Günther, Anvo Systems GmbH

13:50 The EU ECSEL Project ADMONT – Status, Experiences and Prospects
   Dr. Karl-Heinz Stegemann, X-FAB Semiconductor Foundries

14:15 Get Together / CNT Window Tour
The development activities of Capacitive Micromachined Ultrasonic Transducers (CMUT) technology and applications at Fraunhofer IPMS are moving forward since the start at the end of 2012.

Several CMUT designs covering the frequency range between 1 MHz and 50 MHz were built and characterized at the facilities assembled at the Institute. The wide range of designs allows to address manifold applications with different requirements. Some of the applications in mind are focused on the development of CMUTs for the acoustic spectroscopy, imaging applications, e.g. medical, non-destructive testing (NDT), etc.

In order to understand the behavior of the CMUTs for the different applications, the researchers developed purposed-built test facilities and characterization programs. These include wafer level electrical impedance measurement systems as well as chip level immersed acoustic characterization methods. The homogeneity of the resonances measured (in air) was within 5% compared to the center frequency, confirming that the CMUT fabrication process at Fraunhofer IPMS’ clean room provides high quality CMUTs. The chips were also characterized in immersion (under water). For this, the wafers were diced, and the chips were mounted on a carrier, making sure all electrical signals were electrically insulated from the fluid. The acoustic performance (generated pressure, acoustic field shape, etc.) were measured for devices covering the frequency range 1 - 50 MHz.

The match between the simulated performance and measurement results from the fabricated CMUTs, in combination with the homogeneous results measured obtained in the wafer level measurements means that Fraunhofer IPMS masters the design and fabrication of CMUTs applicable in a wide range of possible applications.

It gathers researchers and engineers from all over the world to exchange knowledge, ideas, results and perspectives on Micromachined Ultrasonic Transducers, that offer promising new applications in the medical, commercial, and consumer fields.

The 14th MUT conference will take place in Dresden, Germany, from May 19 - 20, 2015.
WIRELESS 12.5 GBIT/S BOARD-TO-BOARD COMMUNICATION REPLACES HF CONNECTORS

The Fraunhofer IPMS has developed a transceiver based on Li-Fi technology which replaces HF connectors on printed circuit boards and uses infrared light to improve board-to-board communication. High-frequency signals are commonly transmitted between two circuit boards via HF connectors. Higher data rates require more complex connector constructions in order to reliably send signals. Unfortunately, it is often the case that delicately-structured HF connectors are expensive and in practice, mechanically fragile. Contacts often become bent or loose and connectors can be replugged only a limited number of times.

The Fraunhofer IPMS has designed a Li-Fi transceiver module to replace vulnerable HF connectors on printed circuit boards and thus ensure reliable board-to-board communication (see picture on the right). Infrared light is used as a wireless transmission medium for the exchange of high volumes of data, making it possible to transmit in excess of 12.5 GBit per second. Data can be transmitted in half and full duplex mode. The Fraunhofer IPMS transceiver provides the same functionality as wires or connectors and is up to ten times faster than current wireless solutions using radio frequencies.

FAST OPTICAL POWER CONTROL WITH LIQUID CRYSTAL WAVEGUIDES

Variable optical attenuators (VOAs) and optical switches are employed for remote optical power control and the distribution of optical signals in fiber-optic networks. Scientists at the Fraunhofer IPMS have developed broadband, bi-directional, fast (sub-microsecond) and reliable VOAs and optical switches based on a unique, innovative concept of electro-optical waveguides with a liquid crystal core integrated on a silicon backplane. These VOAs and switches can be conveniently programmed by directly applying voltages on individually addressable electrodes. In a novel device design concept, the electric field distribution – used to shape the waveguide – can be tuned to allow the propagation of either one or both linear polarization modes. The devices – developed for polarization maintaining and polarization insensitive applications – feature low insertion loss thanks to on-chip mode-matching couplers, low PDL and a continuously tunable wide optical attenuation range. Interrogation instruments for fiber optic sensors can greatly benefit from the Fraunhofer IPMS optical power control and switching solution in MHz range. Furthermore, these devices can be used in DWDM applications for channel selection, power manipulation and stabilization.

Part of the development has been carried out within the project Electro-Optical Waveguides based on Liquid Crystals for Integrated Optical Switching (EOF-IOS), contract No. 13N12442, funded by the German Federal Ministry of Education and Research in the program Photonic Research in Germany and the research initiative “Wissenschaftliche Vorprojekte” (WiVorPro).
Almost everyone is familiar with RFID transmitter-receiver systems, which are used for the automatic and no-touch identification and localization of objects or living things using radio waves. Researchers from the Fraunhofer IPMS have developed a freely-programmable UHF transponder tag that is fitted with sensors and that can measure physical parameters such as temperature, humidity or pressure. Such tags can for example, be placed in the masonry or behind a drywall during the construction or renovation of buildings; once they are installed, they take regular moisture measurements to monitor possible building damages or hygiene-related issues. They can also be installed in asphalt during the construction of roads, in order to measure the sometimes significant change in temperature between the various road sections. This is particularly beneficial for winter service departments, as costs for sand/salt and service personnel can be minimized without compromising safety, while also preventing the type of asphalt damages that are normally associated with the excessive use of sand/salt.

The potential of UHF sensor transponders to improve quality along with cost and time savings and thus open the way for new applications is enormous in view of the advantages that this transponder technology offers: transponders are small, robust, easy to handle and cost-effective. In addition, they can be used not just to deliver data in real time and without contact with the assistance of a reading device for their entire service life, they can also be supplied with the required energy. A transponder integrated into the road surface could “harvest” its entire energy from a vehicle that spreads sand/salt, for example. Thanks to the flexibility of the transponder system, which consists of an antenna, transponder chip and sensor, and features an integrated I²C or SPI interface for connecting any external sensor, this Fraunhofer technology is an interesting option for a variety of possible uses.

**UPCOMING EVENTS**

**MUT 2015**
Dresden, Germany  
May 19 - 20, 2015
ART’OTEL Dresden

**Sensor+Test**
Nuremberg, Germany  
May 19 - 21, 2015
Nuremberg Exhibition Center, Hall 12, Booth 12-537

**Sensors Expo & Conference**
Long Beach, USA  
June 9 - 11, 2015
Long Beach Convention Center, Booth 339

**CNT Industry Partner Day 2015**
Dresden, Germany  
June 11, 2015
Fraunhofer IPMS-CNT

**LASER**
Munich, Germany  
June 22 - 25, 2015
Munich Exhibition Center, Hall B3, Booth 341

[www.ipms.fraunhofer.de/en/events.html](http://www.ipms.fraunhofer.de/en/events.html)

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