European Project Reaches Milestone Bidirectional Communication for Thin-film RFIDs, Enabling Item-level RFID Tags

PRZOOM - mewswire - San Francisco, CA, United States, 02/22/2012 - Imec, Holst Centre and their partners in the EU FP7 project ORICLA have fabricated the world's first RFID (radio frequency identification) circuit made in low-temperature thin-film technology that allows reader-talks-first communication.

The technology behind this prototype is indispensable to create RFID tags that are cheap enough and have enough performance to be used as intelligent item-level tags on the packaging of retail consumer goods. Such tags can be used to provide buyers with information on e.g. price, characteristics, or freshness, or to allow vendors to implement automated billing and inventory management.

Thin-film RFID chips are made on plastic foil, with organic or oxide thin-film semiconductors. Until now, RFID tags with such thin-film chips on plastic were based on a tag-talks-first principle: as soon as the RFID tag gets powered from the RF field of the RFID reader, it transmits its code to the reader. But in retail applications, many tags will try to contact the reader at the same time, requiring an effective anti-collision mechanism. Such a scheme has never before been implemented; tag-talks-first RFID anti-collision measures have been limited to about maximum 4 tags and come at the cost of a slow reading time.

"With this technology," says Paul Heremans, imec director large-area electronics and coordinator of ORICLA,"we are for the first time able to realize a reader-talks-first low-temperature thin-film transistor (TFT) RFID circuit. When the RFID reader first powers and contacts the tag, it transmits a clock and identification data. The tag then uses this data and clock to determine when to send its code. This mechanism for the first time allows implementing a practical anti-collision scheme for thin-film RFID tags."

For this new RFID tag, a complementary hybrid organic-oxide technology was used, combining a 250°C solution-processed n-type metal-oxide TFT with typical charge carrier mobility of 2cm2/Vs with a pentacene p-type TFT with mobility of up to 1cm2/Vs. A high-k Al2O3 dielectric was used, which increases the transistors’ current drive.

Thin-film electronics are circuits that are made up of organic and metal-oxide molecules. They have the potential to be produced very cheaply, with print-like processes on thin plastic sheets. One of the driving forces of this industry is the ambition to create intelligent chips on plastic were based on a tag-talks-first principle: as soon as the RFID tag gets powered from the RF field of the RFID reader, it transmits its code to the reader. But in retail applications, many tags will try to contact the reader at the same time, requiring an effective anti-collision mechanism. Such a scheme has never before been implemented; tag-talks-first RFID anti-collision measures have been limited to about maximum 4 tags and come at the cost of a slow reading time.

The realization of this technology is supported by the EU FP7 project ORICLA. The project partners are the project coordinator imec (Belgium), Holst Centre – TNO (The Netherlands), Evonik Industries AG (Germany), and PolyIC (Germany).

About imec

Imec (imec.be) performs world-leading research in nanoelectronics. Imec leverages its scientific knowledge with the innovative power of its global partnerships in ICT, healthcare and energy. Imec delivers industry-relevant technology solutions. In a unique high-tech environment, its international top talent is committed to providing the building blocks for a better life in a sustainable society. Imec is headquartered in Leuven, Belgium, and has offices in Belgium, the Netherlands, Taiwan, US, China, India and Japan. Its staff of about 1,900 people includes more than 500 industrial residents and guest researchers. In 2010, imec's revenue (P&L) was 285 million euro. Further information on imec can be found at imec.be.

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About Holst Centre

Holst Centre (holstcentre.com) is an independent open-innovation R&D centre that develops generic technologies for Wireless Autonomous Sensor Technologies and for Flexible Electronics. A key feature of Holst Centre is its partnership model with industry and academia around shared roadmaps and programs. It is this kind of cross-fertilization that enables Holst Centre to tune its scientific strategy to industrial needs.

Holst Centre was set up in 2005 by imec (Flanders, Belgium) and TNO (The Netherlands) with support from the Dutch Ministry of Economic Affairs and the Government of Flanders. It is named after Gilles Holst, a Dutch pioneer in Research and Development and first director of Philips Research.

Located on High Tech Campus Eindhoven, Holst Centre benefits from the state-of-the-art on-site facilities. Holst Centre has over 170 employees from 28 nationalities and a commitment from over 30 industrial partners.

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