IP Enters Polymer-Chip Partnership

International Paper is teaming up with OrganicID, a developer of polymer-based microchips, to create the technology for printing low-cost RFID tags.

By Mary Catherine O'Connor

Dec. 13, 2004—OrganicID, a Colorado Springs, Colo., startup developing a nonsilicon, printable RFID tag, has announced a strategic partnership with International Paper. The paper and packaging giant will help create the printing technology behind OrganicID's polymer-based RFID chip design.

OrganicID is developing printable RFID tags from organic (carbon-based) polymers (plastics) as a low-cost alternative to silicon-based tags. The company believes that manufacturing techniques that form RFID inlays by attaching silicon chips to antennas are too expensive and will prohibit the industry from reaching the widely discussed price goal of $0.05 per RFID tag. (Currently, silicon-based RFID tags cost $0.25 to $0.45.) OrganicID says it believes that once it achieves a functioning printed RFID tag and can print it in volume, the price of an RFID inlay could drop down to around one cent.

A chip is comprised of transistors, which are layered devices made of conductive and semiconductive materials. Though silicon is an ideal semiconductor, it cannot be printed, as polymeric semiconductors can. OrganicID is designing chips made solely of polymeric conductive and semiconductive materials that it hopes to print, along with a printed antenna, on a substrate, or directly into packaging, to form RFID tags.

OrganicID was founded last year and is running on capital from Los Angeles-based ITU Ventures. At the core of the 10-person company are its president and CEO, Klaus Dimmler; vice president, Jon Barad; and chief scientist, Ananth Dodabalapur.

"OrganicID's expertise is in the design of the chip," says Barad. "International Paper is providing its printing expertise." The paper company is also providing OrganicID with some of its human resources and the use of its Packaging Development Center, a printing research and development lab in Loveland, Ohio. Members of OrganicID have already begun visiting the lab to work with International Paper researchers, and have hosted these researchers at the OrganicID facility in Colorado. Dimmler and Dodabalapur each have an extensive background working with semiconductive materials and have brought people with expertise in material electronics onto the OrganicID team. But the different properties of the polymers used to build a chip require a complex printing process, which is why OrganicID turned to International Paper for help.

"Working with companies like International Paper takes us one step closer to developing a tag that will one day be incorporated into packages much more easily and efficiently than silicon tags, and will open the door for cost-efficient item-level tracking," says Dimmler.

The partnership includes no financial commitments, and Barad says the two companies do not have any plans for a commercial partnership around any future OrganicID products. However, the companies are building a patent portfolio collaboratively, and might be coapplying for some of the patents that will address the intellectual property behind the printing of the RFID tag.

"OrganicID is making great strides in developing the world's first printable, organic RFID tag," says Alan Clark, International Paper's general manager. "We realize that OrganicID has the potential to revolutionize how RFID tags are produced, and its team, combined with our engineers, will work to make a cost-efficient tag a near-term reality."

OrganicID does not yet have a functioning prototype RFID tag, but the company has printed a basic chip that can transmit a 13.56 MHz signal. Because polymeric semiconductors have a low charge mobility, they do not function as well as silicon at high frequencies. Therefore, it is unlikely that any printed RFID tags will ever work at frequencies higher than 13.56 MHz. Barad says the company hopes to have RFID tag prototypes sometime next year and predicts it will be able to print the tags into product packaging by 2007.

A number of other companies, including Motorola and Poly IC, are also developing polymer-based RFID tags. Poly IC, a printed-electronics firm formed last year as a joint venture between the German industrial giant Siemens and German printing company Kurz, has printed a passive RFID tag that operates at 125 kHz (see Developing Tomorrow's Tags).

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