Integrated Circuits Made of Printable Polymers

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Abstract

Printed electronics will bring major advantages for simple electronic products like RFID (radio frequency identification) tags, displays and smart objects. PolyIC develops a printing process in which electrical conducting and semi conducting plastics, so called polymers, are applied in several layers on a polyester film to realize electronic functionality.

Printed electronics everywhere

These new processes and materials will make

- thin and flexible
- inexpensive and simple
- pervasive and disposable

electronics come true. PolyIC plans to sell first products made of printed electronics at the beginning of the year 2007.

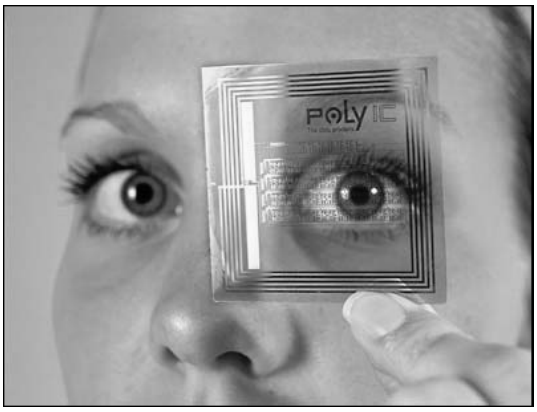

Figure 1. Polymer RFID tag demonstrator

PolyIC – the chip printers

PolyIC GmbH & Co. KG is a joint venture between Siemens AG and Leonhard Kurz GmbH & Co. KG and is located in Fuerth, Germany. PolyIC was founded in 2003.

Printed low cost RFID

Printed electronics, provided by PolyIC, enables a huge field of applications for low cost, high volume products. The best example for an application is RFID which enables the transmission of information without line of sight to a reader from a tag mounted on a product. With polymer electronics these tags can be applied onto almost every product or package, e.g. item level tagging, and can enhance the widely used optical barcode in the fields of

- brand protection
- anti-theft stickers
- electronic tickets
- logistics
- track & trace
- electronic product code,

and many more.

The main prospect is the Electronic Product Code (EPC™) which is seen as the substitution of the barcode. This vision will be addressed by PolyIC in the next several years by improving the functionality and complexity of printed electronics.

Figure 2. Electronics produced on a printing machine

Printed displays and smart objects

Printed electronics enables a huge variety of further applications, because it can make simple products “intelligent” and “interactive”. These so called smart objects are combinations of sensors, batteries, photovoltaic cells, memories, displays etc. PolyIC will integrate these elements to form products like smart cards, games, marketing products and many more. Printed electronics can also be used for display driving circuits in flexible low cost passive or active matrix displays.

Printed electronics vs. silicon

Printed electronics will not replace standard electronics made of silicon, but it will permit the realization of electronic intelligence on products, where there is no electronics today.

Printed electronics everywhere

Figure 3. Printed Electronic product code (EPC™) on items

Author Biography

Alexander Knobloch studied physics in Erlangen and has taken his doctor's degree in the printing of polymer microelectronic circuits at Siemens Corporate Technology at Erlangen. In 2003 he joined Siemens Corporate Technology and since the formation of PolyIC in November 2003 he has been senior research scientist in the PolyIC Technology department and develops the printing of the polymer RFID system.