PRINTING ELECTRONICS REPORT
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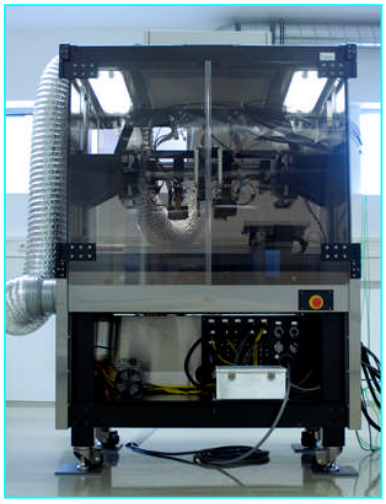
ET TRENDS

NEWS

The Printer In Printed Electronics (PE) - There's no doubt that the printer will play a critical role in this emerging PE market. NanoIdent Technologies is one of the first firms to produce sensors using printed electronics technology in volume quantities. The company uses both inkjet and screen printing. The inkjet head is specially customized for NanoIdent from Dimatix. The screen press was also modified to suit the company specifications. Because the company management has a long background in semiconductor photodetectors, the they decided to target the semiconductor sensor market as its initial goal. NanoIdent acknowledges that it has a team of printing experts on staff to optimize the printing process.

PolyIC is another PE pioneer. They were founded as a joint venture between Siemens AG and Leonhard Kurz GmbH & Co. KG, a large German printer company who is emerging as the major outsourced printer for both Konarka (organic PV) and PolyIC. The relationship has been touted as an ideal partnership, combining the expertise of electronics and printing, hot stamping and coating. The Organic Electronics Conference (OEC) in Frankfurt, Germany, had a rollout of PolyIC's first products, one in the field of RFID. These are just a few examples of the partnership between printing and electronics expertise that is needed for printed electronics to be a success. There are other examples of roles that the printers are developing. GSI, formerly Graphic Solutions International, LLC, is a printing firm established as a print broker in Burr Ridge, Illinois. Until 1997, it was primarily a provider of both flexo and screen printed industrial graphics products. It examined the potential of functional printing, moved to new premises and began screen-printing conductive ink traces for the medical market. It is now actively involved in printing RFID antennas and batteries and integrating them into active RFID tags. RSI ID Technologies was a label printer specializing in bar codes. Today it is one of the few vertically integrated manufactures of RFID labels in the United States, with sales over $10-million and a 40% market share in its technology area. It did what so many printers today are doing, looked for different market opportunities outside the traditional printer model. Some printers today are offering value-added services such as database management and design or finishing services to their customers to increase their profitability. In this case, RSI ID turned to RFID as a market opportunity. In the future, there will be more printers stepping up to become involved. Source: NanoMarkets.

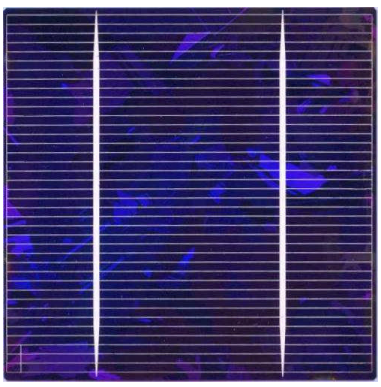


Printed Electronics for Mobile Phones - Printed Electronics covers printed circuits with printed electronics [***We've known how to print circuits using inks for many decades - no printed active devices, then its just good old PTF***]. PE is said to be the basis for emerging $300-billion business embracing transistors, memory, displays, solar cells, batteries, sensors, lasers and much more. This new electronics will appear as adhesive tape, wallpaper, billboards, labels, skin patches, smart packaging and books because it will be foldable, conformal, wide area, ultra low cost, edible, rollable, transparent and biodegradable as needed. There are transparent transistors, batteries, solar cells and more on the way and Kodak has recently patented edible RFID on medicine. And it will be pivotal to the future of mobile phones. [***But how much of the IDTechEx spiel is wishful thinking?]***

The RFID enabled mobile phones, using the global Near Field Communication standards, will rapidly become the preferred way of buying products and services wherever they are. No one in the mobile phone industry should ignore how Printed Electronics will completely change their industry Thanks to PE, mobile phones will have large snap back keyboards, chargers and color video displays and some of the displays will work well in sunlight. The rest of the world will copy the 40-million Japanese currently using phones to get onto transport and buy things in shops and at smart posters and one billion RFID enabled phones will eventually be sold every year. Printed electronics is also said to be shaping the way that renewable energy is captured and utilized. **[*But conventional electronics is satisfying the needs, today, and the entrenched technology is not easy to displace. But NFC, a newer, short-range wireless connectivity technology, evolved from a combination of existing contactless identification and interconnection technologies.***

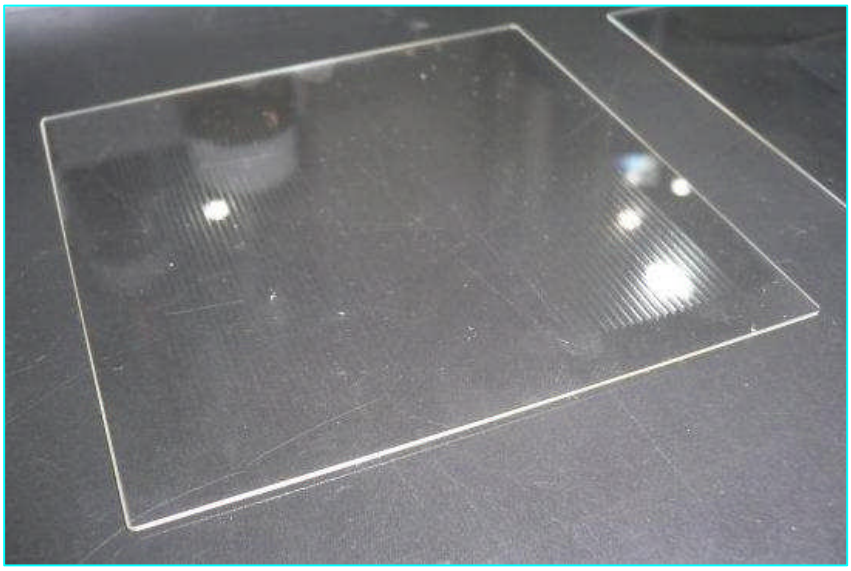
It operates at 13.56 MHz and transferring data at up to 424 Kbits/second. The NFC forum, with 130 members is located in the USA, and it is not a Japanese-only deal.]

The development of organic solar cell technology has made tremendous progress even since we entered this market just two years ago. Customers will use PE-based technology in applications such as OPV (organic photovolataic) chargers for cell phones and laptops. The efficiency of these cells is progress very quickly. There are plenty of startups in this field. Solarmer Energy (El Monte, CA) was founded through private equity funding in 2006, and obtained exclusive licenses on key patents from the University of California, Los Angeles (UCLA) as its seed IP. Solarmer is developing translucent, flexible and low-cost plastic solar cells which are versatile and aesthetically pleasing. Their novel technology uses conjugated organic polymers as the active material, and as a result, the plastic solar cells have the potential to be lightweight and easy to manufacture on a large-scale at a much lower cost than traditional silicon and other thin-film PV cells. Solarmer has established a state of the art research and development center and its corporate office in El Monte and is currently recruiting engineers, scientists and managers to build a world class R&D and management teams. Some of the challenges for the plastic solar cell technology are the low efficiency compared to silicon solar cells (only 5% vs. 16-18%) and shorter lifetimes. Solarmer intends to focus on these aspects during the course of next 2-years through aggressive in-house R&D and through strategic collaboration with industry leaders who share our vision. Source: Electronics Weekly/IDTechEx



Printed Batteries - The value of the thin-film and printed battery market will reach $5.6-billion by 2015. Thin-film and printed batteries, with their customizable shapes, flexible form factors and ultra-low weight, are enabling new functionality to be added to a broad range of electronic products, such as smartcards, RFID and sensors, both increasing their usefulness and the size of their addressable markets. While many of the players in this space are smaller firms, several big name firms including Air Products, Dow Chemical, Intel, and NEC have invested in this area, underscoring its strategic importance. In this technology segment, volume is everything, in terms of both manufacturability and sales prospects. Thin-film and printable batteries can be delivered at attractive price points when produced in significant quantities and with the right processes. For technologies such as RFID, sensors, smart cards and medical devices that are also high volume and cost sensitive, the ability for manufacturers to add cheap power sources is crucial. When you also factor in the ability for these batteries to extend these applications beyond their current usage, battery manufacturers can create a winning proposition for their customers. In terms of market potential, the NanoMarkets report projects that the thin-film and printed battery markets will be driven primarily RFID which by 2015 will generate US$4.6 billion revenues, smart cards which will generate US$346 million in revenues, and sensors which will create US$434 million in revenues. The printing will have a growing role in the next generation of smart batteries resulting in the growth in demand for zinc manganese dioxide or carbon zinc inks. The study also predicts that there will be a growing number of alternatives for the dominant LiPON electrolytes, with improved conductivity and thermal properties. While thin-film batteries using conventional lithium-based materials will remain the dominant factor, non-lithium battery revenues will grow to US$2.5 billion by 2015. Source: NanoMarkets [be cautious of the estimates from this company as they are often unrealistically high]

TECHNOLOGY



Ulvac exhibited ITO (Indium Tin Oxide; conductive) wiring formed on a glass substrate by inkjet printing at FPD International 2007. The glass substrate measures 100 x 100mm. The wiring width is 100μm. Although some manufacturers exhibited Ag or Au wirings formed by inkjet printing thus far, this is the first time that an ITO wiring made by this method is put on display. The ITO ink was developed by Ulvac Materials Inc. The particle diameter of the material is small enough to reduce clogging. In addition, the material features a long life resulting from the high dispersibility of particles. The solvent used is decahydronaphthalene. The applied ink will turn from black to transparent when it is heated at 230°C under reduced pressure. The product has a problem of high electric resistance. While the sheet resistance of ITO formed by sputtering is 50Ω/sq that of ITO formed by inkjet printing reaches 400Ω/sq, which is one order of magnitude higher. Tech On.