

Printed Electronics - Predictions for 2011

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To examine what to expect for 2011, we must understand the spectacular successes of the recent past as well as the failures. Printed electronics has often been an industry with poor business planning and marketing. For example, in e-readers, Plastic Logic belatedly realised it could not meet Apple and Amazon head on and it said it would create a professional sector but such a niche may never exist. It failed to launch a product anyway. Those developing printed organic and inorganic flexible solar cells, most of which had life of no more than five years, obsessed about replacing power stations by meeting "grid parity" efficiency when the potential lay in consumer goods, military, healthcare and media.

Lessons from failure

Frequently, participants tried to run before they could walk or at least chose objectives that were too ambitious for the level of investment available. For example, Microemissive Displays, OLED-T and many other Organic Light Emitting Display companies are no more. Those making printed antennas and keyboards prospered.

Some have simply failed to meet the price- performance points necessary for market entry. For example, no one has taken a meaningful order for the long promised printed organic transistors, despite transistors being the engine of most electronics. That has had a severe knock on effect. For example, the printed organic memory of Thin Film Electronics AB and many printed sensors cannot fulfil their primary market potential without them.

Lessons from success

There are important lessons from the recent successes too. The Amazon Kindle e-reader is the antidote to phones and computers we cannot read in sunshine. It is partly printed with an excellent route to further weight and cost reduction using more printing. It replaces books. The Apple i-Pad is not killing the Kindle because it is not simply an e-reader and it is in color. You need a spectacularly better product in the eyes of potential users to compete effectively with either of these powerful global brands with their unsurpassed routes to market. An example would be a color e-readers tightly rolled into your mobile phone but no such product is in prospect for 2011.

Historical event - replacing silicon chips

Certain small orders for printed and partly printed electronics in 2010 were of deep significance. For example, the Kovio order for disposable electronic train tickets in Los Angeles saw formidable printed nano silicon electronics in the form of over 1000 transistors printed by ink jet and screen printing onto stainless steel foil. Being compatible with the world's most popular RFID specification ISO 14443 which was designed for silicon chips, this analog-digital circuit was a tour de force announcing to the world that a huge variety of the simpler integrated circuits can now be replaced by lower cost, more flexible and more robust printing albeit on stainless steel foil because of the high temperature anneal currently required.

Promotional

Equally significant was Dai Nippon Printing in Japan taking its first orders for multifunctional posters on the Tokyo Metro incorporating printed animated OLED and ac electroluminescent technology powered by printed organic photovoltaics. In addition, trials by Toppan Forms in Japan of interactive posters have been successful. These involved sound, activated by touching, printed ac electroluminescent and electrophoretic displays and printed organic photovoltaics for power. At a stroke, the world's existing posters, packaging and point of display material are rendered boring, relatively ineffective and an embarrassment. It is equivalent to the arrival of television: if you just make radios watch out.

Military

2010 also saw the US Air Force committing very serious money to vehicles made possible by flexible photovoltaics, notably unmanned upper atmosphere surveillance aircraft and dirigibles covered with the stuff. One order exceeded \$500 million. The benefits include light weight and flexibility. You do not put glass sheets on a balloon.

Healthcare

Much smaller sums were committed to buying printed electronic products for healthcare, with ongoing business in electronic tamper evidence and entirely printed electric skin patches. However, in the background, a great deal of work was going on to develop electronic healthcare disposables for testing and drug administration.

Forecasts

All of which brings us to 2011. Many companies that have got the message of starting with the easier printed electronics will launch simple devices based on printed diodes and conductive patterns etc. The old idea of printing a transparent conductive layer not with expensive, clever chemicals but with fine metal patterns will re-emerge and gain first major orders. Simple ink stripe RFID using low cost printed metals will gain market share. Printable copper inks will start to sell well. Novacentrix Pulseforge which anneals high temperature electronic inks on low temperature substrates will be widely deployed.

Expect one of the new electric cars to incorporate largely printed ceiling and dashboard control clusters saving 10 to 40% of cost, weight and space in 2011 and improving reliability and weather proofing. Less certain is whether the lowest cost

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printed displays, the electrochromic ones, will overcome barriers to major market entry. Some of our clients cite unappealing appearance and lack of low cost drive circuits. The limited life is not a problem for most envisaged applications.

Of course, life is of great importance in many potential applications of printed electronics and the 2-3 years of printed organic photovoltaics and five years for DSSC photovoltaics will be inadequate in some cases. For example car companies and the military demand 15 years and 20 years are needed for photovoltaics on houses or ships. Enter flexible printed copper indium gallium diselenide CIGS photovoltaics where Nanosolar and maybe others will make first major deliveries in 2011. Lifetime of these initial products are unclear as yet but long life is in prospect. Equally desirable is transparent flexible printed electronics demanded by all market sectors. The kingpins here will be the commercialisation of transparent photovoltaics, transistor circuits and batteries but, unfortunately, these are unlikely to be in major production by the end of 2011.

The tiny number of imaginative product designers familiar with printed electronics will continue to spring surprises. Expect yet more animated and interactive paper magazines in the tradition of the E-ink Esquire edition in 2008 and the color LCD with sound in an edition of Entertainment Age in 2009. We shall certainly see printed electronics in more toys, novelties, apparel and healthcare disposables.

The annual IDTechEx event Printed Electronics Europe - which will be held in Dusseldorf, Germany on April 5-6, will cover all these topics. In particular, the event features Demonstration Street - where you can see working printed electronics products in action. Register now and save with the early bird rate - see www.IDTechEx.com/peEurope [1].

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