Growth in Printed Electronics

Dr Khasha Ghaffarzadeh, Technology Analyst, IDTechEx

At the IDTechEx printed electronics and photovoltaics conference and tradeshow in Silicon Valley at the Santa Clara Convention Center, Mr Raghu Das, the CEO of IDTechEx, opened the show with his keynote speech, arguing that there lies a great untapped market opportunity in offering final integrated products. Indeed, product integrators are in the privileged position of being able to cherry pick the best materials from an ever expanding range of options. This conclusion is supported by IDTechEx statistics showing that 97% of all companies profiled are currently offering only materials and/or components, and not final products. Therefore, IDTechEx is excited to see the printed electronics world evolve towards its next step, which will witness more and more final solutions and/or products appearing on the market.

New printed electronics products

Indeed, things are already moving quickly, as testified by a range of end-user companies including Proctor and Gamble (P&G), MWV Packaging, Boeing, Decathlon SA and more. A notable example was from P&G, the world's largest consumer packaged goods company with sales of more than $80 billion, which unveiled a decorative tissue box featuring an electroluminescent (EL) display. Here the product consisted of two parts: an interchangeable tissue box featuring the display and a fixed base providing the circuitry and power required to drive the EL display. This will be in stores this season. Also interesting was the novel anti-theft packaging produced by MWV Packaging in collaboration with Vorbeck. This product, which won IDTechEx's Best Product Development award, features a low-cost printed flexible graphene conducting layer and will be used in Home Depot stores in 2012.
Boeing discussed their current use of printed electronics as a bird strike detector in aircraft.

Rollable Displays

System and device manufacturers also presented their latest progress. PolymerVision showcased their truly rollable display capable of showing animated images. This is good news for printed electronics as flexible displays could provide a platform for a plethora of printed components, enabling large new markets. These include flexible Indium Thin Oxide (ITO) replacement, printed thin film transistors (TFTs), printed OLEDs, etc. However, replacing vacuum processed devices still

remains ambitious, not least because printed TFTs will struggle in the near future to match the performance of the mature organic and the emerging metal oxide TFT technologies. For more information on Thin Film Transistors read the report from IDTechEx; "Printed and Thin Film Transistors and Memory 2011-2021" www.IDTechEx.com/tftc.

Sensor Technologies
Printed sensors and actuators are also showing very promising signs of rapid improvement. PST Sensors offered a printed silicon-based temperature sensor that could be employed as a touch screen. Peratech offered a quantum-tunnelling ink that would change its conductivity by as much as 16 orders of magnitude when pressed with a finger! The Peratech ink can be formulated in opaque, translucent and transparent formats. This technology, which won IDTechEx's Best Commercialisation Award, could extend touch screen capability to a vast array of substrates and products. Artificial Muscle, Inc showcased their morphiepulseTM technology in the "Demonstration Street" area. This technology can bring a high definition feel to touch screens by printing voltage-controlled actuators. This means that touch screens can respond back to users in a fun and intelligent way, giving rise to different vibration modes for different events.

Conductive Inks
A large variety of different conductive inks were also on show. The inks were differentiated on the basis of their conductivity and price. Nanoparticle inks (Nanogap, Nanomas, Intrinsiq, PChem, Applied Nanotech etc) claimed the higher conductivity ground with higher cost. Traditional flake-based polymer thick films (Dupont, Dow International, etc) offered low-cost and familiarity, but that came at the expense of conductivity at the same temperature. All have an opportunity depending on the application. Copper oxide nanoparticles (Novacentrix) offered truly low-cost inks suitable for high-volume applications such RFID tags, but mandate the use of special equipment to provide high-intensity light pulses. Graphene inks (Vorbeck) were also presented, plugging a gap in the market which requires low cost, moderate conductivity and flexibility.

ITO replacements
Conductive inks offering high levels of optical transparency are also becoming a viable ITO replacement option. Most notably, Cambrios announced that their silver nanowire inks are now in hundreds of thousands of Samsung cell phones. This represents a significant endorsement of their technology and a clear leapfrog towards capturing a portion of the $3 billion ITO market. Moreover, Evonik brought an exciting nanoparticle ITO ink to the play that could be printed only where needed thus doing away with the subtractive and wasteful sputter-etch process predominantly used today.
There is currently no one-size-fits-all solution on the conductive ink market. They are a variety of technologies, each sitting in its own niche based on its own attributes. Breaking into mature multibillion dollar markets traditionally served by polymer thick films is one strategy - the other is to deploy the new functionality (such as better conductors on flexible substrates) to do new things. This however still remains a challenge.

While such presentations bear testimony that printed electronics is indeed fast making significant progress and inroads into markets, they also highlight critical challenges that lie ahead. From the end user prospective, these include the fact that the current state of the market largely requires them to take on the challenge of product design and integration. And from the prospective of material/component providers, these include the delay in the realisation of high-volume markets that would enable printed electronics to realise its ultimate promise of being truly low cost.

We at IDTechEx anticipate the next few years to be fast moving as more and more partnerships are formed from across the value chain to realise products that not only attempt to substitute an existing product, but add a new functionality or concept into the market. That was certainly clear at the event. The next event in the series, also focusing heavily on market needs and adoption, will be in Berlin, Germany on 3-4 April. For more about Printed Electronics Europe 2012 see www.IDTechEx.com/peEurope [1]. For more information on printed electronics market research please visit www.IDTechEx.com/Research [2] until 2 January there is a 20% discount on all market research reports.

Source URL (retrieved on *04/19/2014 - 4:48pm*):
http://www.ecnmag.com/blogs/2011/12/growth-printed-electronics

Links:
[1] http://www.IDTechEx.com/peEurope
[2] http://www.IDTechEx.com/Research