For the Future of Organic & Large Area Electronics in Europe

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Organic/Plastic Electronics Research Alliance

OPERA

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"Manufacturing Organics in Europe"

Workshop Dresden, 07 04 08

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OPERA workshop "Manufacturing Organics in Europe"

- **Work package leader** : Karl Leo, DRESDEN
- **Work task leader :** Dominik Gronarz, DRESDEN
- **Objective:** A kick-off workshop of the OPERA project and a first confrontation with a heterogeneous public of stakeholders was organized April 7, 2008 in Dresden. The original concept of an opening conference was changed to a workshop setting.
- **Theme:** The quality of research in Europe in organic & large area electronics is beyond question. To translate this leading position into a new and vibrant industry sector and a multitude of excelling start-ups, will take all stakeholders to get organized. These new companies is what is needed, because Europe's giant corporations are aging.
  Opera – the acronym for Organic/Plastic Electronics Research - is a new collaborative project within the Seventh Research Framework Programme (FP7) of the Directorate General of Information Technology & Media of the European Commission, for which about € 55M is available for projects in the period 2007-2008. The overall objective is to strengthen the position of Europe as the leading force in the field of organic and large-area electronics. The Opera consortium is coordinated by the Plastic Electronics Foundation, with members to be the University of Dresden, The University of Cambridge, The Holst Centre/Eindhoven, VTT Centre for Printed Intelligence/Oulu and CibaSC/Basel
- **Location and attendance:** The workshop "Manufacturing Organics in Europe" was held at the Hotel Four Points Konigshof, Wasaplatz, 01219 Dresden with an attendance of 70 persons. The topic was chosen to highlight the opportunities available in Europe for OLAE manufacturing. The workshop had three constituent elements : a. a number of presentations, b. followed by a panel discussion with the audience, and c. rounded up by a site tour to OLAE manufacturing facilities in the Dresden technology cluster (Novaled, Fraunhofer-IPMS).
- **Programme and presentations:**
  Manufacturing of of OLED lighting devices, by Joerg Amelung, Fhg IPMS;
  High efficiency OLED - Lessons learned, by Jan Blochwitz-Nimoth, Novaled;
  Manufacturing of P-OLED Microdisplays, by Alastair Whyte, MED;
  Manufacturing electronic paper, by Konrad Herre, Plastic Logic;
  The Saxony organic valley: Where is the manufacturing going?, by Karl Leo, TU Dresden
- **Panel discussion:** After the presentations a panel discussion was held with panel members : Arto Maaninen VTT, Konrad Herre Plastic Logic, Karl Leo, IAPP, Andreas Hafner CibaSc, Ed van den Kieboom PEF.The topics discussed were : What are the "right" products for Europe? Are you afraid that the Far East can easily copy European products? Is Europe the right place for mass manufacturing? Can we compete with Asia? How will the value chain be divided? Where are the big electronics manufacturers such as Nokia, Philips, and Siemens? Second chances, for example flexible displays and OPVs?

- **Minutes of Q&A session:**

Topic :Manufacturing of OLED lighting devices
Q: Is there any influence of the copper bus-bars on the device lifetime?
A: No the surface of the copper is passivated and there is no interaction between the organic materials and the copper.
Q: For what luminance was the size of the large lighting substrates optimized?
A: They were optimized for 1000 cd/m^2. For larger luminance the optimal size gets smaller.
Q: Is the optimization only for evaporated materials or spin-coated as well?
A: The optimization is process independent.
Q; Which are the causes for hot spots?
A: Conductive particles, stack imperfections, and others. It is only related to the steepness of the IV curve.

Topic :High efficiency OLED - Lessons learned
Q: Timescale for applications?
A: (High-cost) Designer applications – 2008/2009. General illumination – 2012/2013
As first products, is it better to have small or large area devices?
Start by 10x10 cm and go to “cheap” mass production focusing on high luminosity at smaller area.

Topic :Manufacturing of P-OLED Microdisplays
Q: Why only light blue and not dark blue in displays?
A: No details. Colors optimized for display applications.
Q: Other applications?
A: Use for medical applications.
Q: Manufacturing in Dresden?
A: Yes.
Q: End production or modules?
A: Both.

Topic :Manufacturing electronic paper
Q: How can you do vapor deposition for polymers?
A: It is classified information.
Q: Why do you specifically focus on the 3.5 generation?
A: Good compromise for cost effective mass production. Smaller size is also possible.
Q: Room to scale upward the display dimensions?
A: It is “one of a kind equipment”. But upgrades are possible. However, no application can be seen for larger displays. Not used for movies or advertisement. Just used for reading pages. Low power consumption and long image lifetime are more important.

Panel Discussion

A.M. Arto Maaninen
KH Konrad Herre
KL Karl Leo
AH Andreas Hafner
C Ed van den Kieboom (Chair)

C: What are the “right” products for Europe?
AM: Not very clear but early products needed with simple structure and low cost.
KL: OLED lighting is the next product. First products will have high cost, much more than 50 cents/cm^2. OLEDs as innovative flat lighting sources can be competitive on the market. Used by architects and designers can be successful even at high prices.
C: Any designers who want to use OLEDs?
KL: Yes but it is still difficult to make a handful of working demonstrators. So it is difficult to produce more.
C: Are you afraid that the Far East can easily copy European products?
General opinion: Probably yes.
C: Is Europe the right place for mass manufacturing?
General opinion: It depends on the product. For OLEDs, close cooperation with architects and the production of tailored products is the key to survive on the market even if Korea is cheaper. It is important to make a name for yourself.
C: What is high and low cost for OLEDs?
KL: Roughly, the actual price is several thousands euro/m^2 and it has to become lower.
C: Can we compete with Asia?
KH: In Europe there already exists the know-how, which especially in the beginning lowers the development and production costs.
AM: For example, in the roll-to-roll production we do not need much manpower but skills.
C: There are two options. 1) New applications with advanced processes to lower the costs and 2) use existing technologies (transportation, robots,…) to bring the costs down. Have both perspectives to survive?
KH: In Germany, there is a problem with the high energy cost but this is balanced by better funding and networks and that is more important in the beginning. This is the reason why Germany was preferred to China for the Plastic Logics production.
C: How will the value chain be divided?
AH: Two choices…. ???
KL: Where are the big electronics manufacturers (e.g. Philips, Siemens)?
Audience: Siemens and Philips will not manufacture much in the future but they are heading towards assembling parts into end products without making them themselves.
KH: For display modules, the market strategy is still under development. Probably our products will finally arrive to market by cooperating with some big partner. For example, in mobile phones….

C: Second chances, for example flexible displays and OPVs?
KL: Not really sure. Asia is more experienced in producing active backplanes and we do not have the components to build display in Europe, does it make sense to manufacture them in Europe?
C: Do we have a chance?
Audience: Yes, we have to find niches.
A.M.: No. Roll-to-roll production/mass production like packages. No displays, but something very simple and blinking in the beginning
KL: This is infinite multiplied by zero. Which is not mathematically defined.
KH: First of all, you have to bring products to the market and then you will have plenty of new ideas.
C: W have to find the applications where we have an advantage, find partners preferably in Europe. Final question: what is going to be the next product going out form laboratories to production?
KL: Lighting is among the next products. Not mass market but production tailored to customers. Many people are waiting for that. OLEDs will be among the most efficient light sources for the future and not poisonous.

- **General conclusion:** The general conclusion was, that there are indeed many opportunities to do manufacturing in Europe. One task is to find niches. We have to find the applications where we have an advantage, find partners preferably in Europe. Final question: what is going to be the next product going out form laboratories to production? Lighting is among the next products. Not mass market, but production tailored to customers. Many people are waiting for that. OLEDs will be among the most efficient light sources for the future and will offer new opportunities in many applications.
- **Evaluation;** The feedback from the participants about the workshop was very positive.