Organic and Large Area Electronics Newsletter

Organic and Large Area Electronics Newsletter, Volume 1, Issue No 1, July 2008

Organic and large area electronics is one of the most promising fields of electronic technologies. R&D activities in this area have led to the demonstration of the main basic electro-optic functionalities. Similarly, the first commercial applications have already been announced by several EU companies. The future of this new class of technologies is expected to open up the possibilities for new products that will not compete with the existing silicon technology, but instead create a new market that could reach the size of silicon within two decades.

SUMMARY

Dear reader,

Welcome to the first issue of the Organic and Large Area Electronics Newsletter. From now on, almost on a quarterly basis, this Newsletter will keep you updated on organic and large area electronics by presenting you relevant initiatives, events and project updates in this field from a European perspective.

Our aim is to contribute to Europe's leading position in this technology through the support of R&D activities, crucial for the development and progress in organic and large area electronics. The current stage of development in this field emphasizes the importance of the creation of a European critical mass in the area and overcoming national fragmentation. Therefore, our objective is also to contribute to establish a pan European fertile research substrate and succeed in converting European R&D leadership into innovation and socio-economic growth.

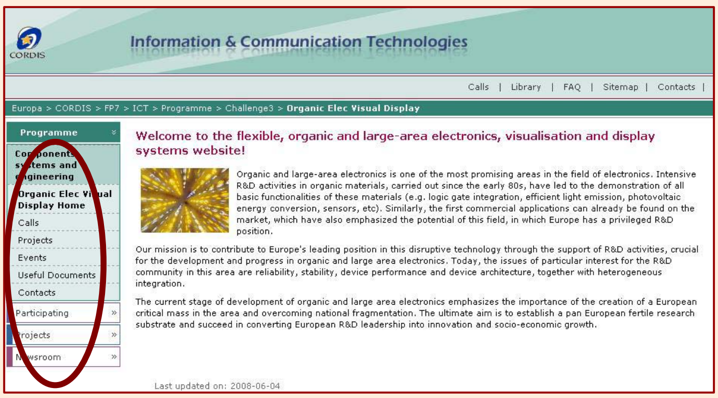
I hope you will enjoy reading this Newsletter and will find valuable information in it.

Dr. Augusto de Albuquerque

❑Organic and large area electronics website on CORDIS

http://cordis.europa.eu/fp7/ict/organic-elec-visual-display/home_en.html

Keep an eye out for further news!



The website about flexible, organic and large area electronics on CORDIS has recently been updated with the incorporation of new sections (e.g. calls, projects, useful documents and links, etc), which aim to contribute to the dissemination of the European initiatives in the field of flexible, organic and large area electronics.

In addition to the most updated information on EC funding opportunities and calls for proposals in this area, the website provides information on the FP6 and FP7 projects, events, publications, etc in the field of flexible, organic and large area electronics.

http://cordis.europa.eu/fp7/ict/organic-elec-visual-display/home_en.html

FP6 projects results (2002-2006)

A key initiative of the Sixth Framework Programme (FP6) was the development of organic and large area electronics. Within this Programme, the European Commission allocated to this field an overall budget exceeding 100 M€, distributed through specific programmes such as Information Society Technologies (IST), Nanosciences, Nanotechnologies, Materials and new Production Technologies (NMP) and Sustainable development, global change and ecosystems (SUSTDEV). The results of three of these EU-funded projects, namely CONTACT, ROLLED and FlexiDis, are presented in this first issue of the OLAE Newsletter.

❑ CONTACT: Contact printing of electronics and opto-electronics

In response to the EU initiative in organic electronics, in July 2004 the **CONTACT** consortium was formed and began a project to develop processes for the gravure printing of organic thin film transistors (TFTs).

In order to achieve, support and demonstrate the outcome of this objective the following developments and activities were started:

1. The formulation and optimisation of the three inks required to form the organic thin film transistors, i.e. gate, gate insulator and gate electrode. These inks are required to be a semiconductor, an insulator and a low resistance conductor respectively.

2. A novel high precision benchtop gravure printer capable of printing 25 micron features with a positional accuracy of 10 microns, known as the Labratester II.

3. Display demonstrators based on the outputs of items 2 and 3.

4. Novel glass clichés that would allow a relatively easy route to the optimisation of the structure of the cells that transfer the ink to the substrate during the gravure printing process, thereby leading to good control of film thickness and uniformity.

5. Project Management

The final **CONTACT** consortium consisted of 7 partners, namely Imperial College (1), Merck Chemicals (1), Norbert Schlaefli Machines (2), Technical University of Ilmenau (4), IMEC (1), Asulab (3) and Imperial Consultants (5). The main area of activity of each partner is shown in brackets. The project was truly collaborative in that all partners were involved in two or more aspects of the project. For example, Asulab assisted with the design of the novel gravure printer and Schlaefli contributed to the development of the glass clichés.

As in any highly ambitious project not all targets were satisfactorily achieved, but one of the main objectives, namely item 1 was not only achieved but taken to the next stage and improved in order to be compatible with the first process used to fabricate the liquid crystal display (LCD) that would be addressed by the gravure printed array of organic thin film transistors. After successfully developing a process for the fabrication of organic thin film transistors based on gravure printing, it was found that the first step of the process used to fabricate the LCD dissolved the gate insulator material. Consequently, a new gate insulator material was developed which proved to be stable. Using this material and other gravure printed layers led to the fabrication of a small number of organic thin film transistors that had state of the art operating characteristics.

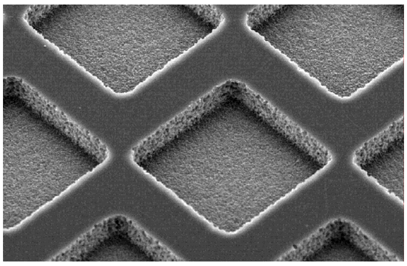


Figure 1. Photomicrograph of a part of a glass cliché fabricated at the Technical University of Ilmenau.

Another successful outcome of the project was the development of glass clichés. This novel approach enables the gravure printing of high resolution patterns of conductive inks that could be used for the gate electrode and films of the gate semiconductor having the required thickness of ~100 nm and good thickness uniformity.

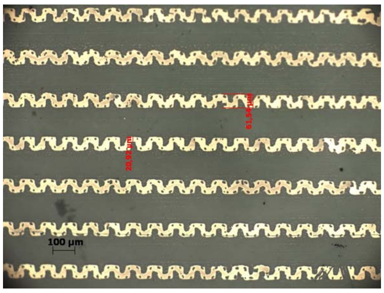


Figure 2. Photomicrograph of a conductive ink gravure printed using a glass cliché.

CONTACT
Website: http://www.contactprint-electronics.org
Timeline: 1st July 2004 – 31st September 2007
Contact person: Dr. Alan Mosley
E-mail: a.mosley@imperial.ac.uk

An aspect of the project that proved to be not achievable with the available resources was the fabrication of the Labratester II, the novel high precision benchtop gravure printer, which in turn prevented the fabrication of the main demonstration display, an organic TFT addressed twisted nematic LCD. However, Asulab were able to demonstrate a reflective full colour LCD that had been fabricated using mainly printing processes.

Figure 3. The Labratester II on show at the DRUPA 2008 exhibition.

Another positive feature is that Schlaefli has continued the development of the Labratester II, which was shown at an exhibition at the beginning of June 2008 (see Figure 3). In addition, once completed the Labratester II will be transferred to Asulab, who are prepared to work with Schlaefli on the commissioning and further optimisation of this equipment.

Overall, **CONTACT** was successful in developing materials and inks that can be used for the gravure printing of organic TFTs, novel glass clichés and for initiating the development of the Labratester II. All of these activities will contribute to the European development of organic electronics which are expected to be the next "big thing" in the world of technology.

http://cordis.europa.eu/fp7/ict/organic-elec-visual-display/home_en.html

FP6 projects results (2002-2006)

❑ FlexiDis: Flexible Displays

FlexiDis aimed to research the main technological issues for flexible displays. The demonstrators realized in **FlexiDis** included two different display technologies, namely full-color organic light-emitting displays (OLEDs), and e-paper monochrome electrophoretic displays on rollable plastic substrates.

In this way, use for the automotive industry, mobile telecommunications, and sportswear was examined.

At the end of its runtime, **FlexiDis** has achieved the following results:

- The first production-ready flexible display manufacturing method compatible with existing facilities was developed, and now runs in the Thales LCD fab;
- PolymerVision, a spin-off company, was created with a focus on rollable e-paper organic TFT displays;
- PolymerVision will release its UK manufactured Readius in 2008;
- Plastic Logic contributed to the project and is now also setting up the manufacturing of e-paper displays in Germany;
- The first flexible OLED on plastic with an active-matrix backplane was introduced, etc.

Overall, the Integrated Project (IP) **FlexiDis** has contributed to increase innovation and competitiveness of the European industry in flexible displays and to Europe's recognition as a world leader in this field.

Figure 4. Courtesy of PolymerVision

FlexiDis

Website: http://www.flexidis-project.org

Timeline: 1st October 2004 – 31st March 2008

Contact person: Dr. Eliav Haskal

E-mail: eliav.haskal@philips.com

❑ ROLLED: Roll-to-roll manufacturing technology for flexible OLED devices and arbitrary size and shape displays

ROLLED, "Roll-to-roll manufacturing technology for flexible OLED devices and arbitrary size and shape displays", is a R&D project funded by the IST program of the European Commission's 6th Framework Programme (FP6-2003-IST-2-004315). The **ROLLED** project started 1.8.2004 and will end 31.7.2008.

The project is coordinated by the Technical Research Centre of Finland (VTT). The other partners of the **ROLLED** consortium are CSEM (Switzerland), INM (Germany), UPM (Finland), Hansaprint (Finland), Ciba (Switzerland) and PolyIC (Germany).

ROLLED's goal is the development of a cost-effective, volume-scale, roll-to-roll manufacturing technology for the realization of flexible OLED devices with arbitrary size and shape pixels on web. These technologies are developed in order to achieve a good understanding of the production process flow. On the contrary to typical semiconductor light sources, OLEDs have the potential to be processed in continuous roll-to-roll processes.

ROLLED

Website: http://www.vtt.fi/proj/rolled/

Timeline: 1st August 2004 – 31st July 2008

Contact person: Dr. Arto Maaninen

E-mail: Arto.Maaninen@vtt.fi

This requires selection and modification of suitable materials, effective patterning technologies, development of the manufacturing processes and improved encapsulation technologies.

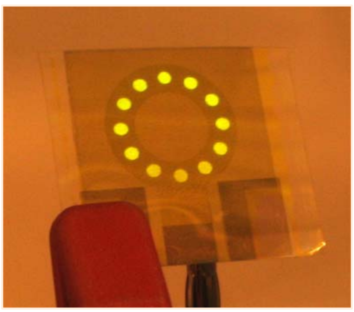


Figure 5. Roll-to-roll manufactured OLED demonstrator. Courtesy of ROLLED

The **ROLLED** consortium has developed a transparent roll-to-roll produced barrier foil in lab scale with the water and oxygen transmission rates below 0.005 g·m-2day-1. Currently, the consortium is transferring the technology to pilot scale production.

In addition, transparent conducting ITO patterns have been gravure printed on flexible foil achieving the sheet resistance ≤500 Ω/sq and transmittance >88%.

The main achievement of the project so far are roll-to-roll manufactured OLED demonstrators where 5 different layers, including Aluminium cathode, have been printed on flexible barrier foil (see Figure 5).

The device performance is in the same level as that of the devices with evaporated Al cathodes.

The consortium is also developing low work function metal inks for cathode, to improve the performance of the printed device further.

Currently, the consortium is working on the final demonstrator, which will be ready at the end of June 2008.

The demonstrator will be a pilot line printed two colour device consisting of nine printed layers.

New projects in organic and large area electronics

In FP7, the first explicitly dedicated call on organic and large area electronics was launched. With a budget of 63 million euros, it targeted innovative projects in this field. Find out detailed information on the results of this call for proposals on organic and large area electronics in this section.

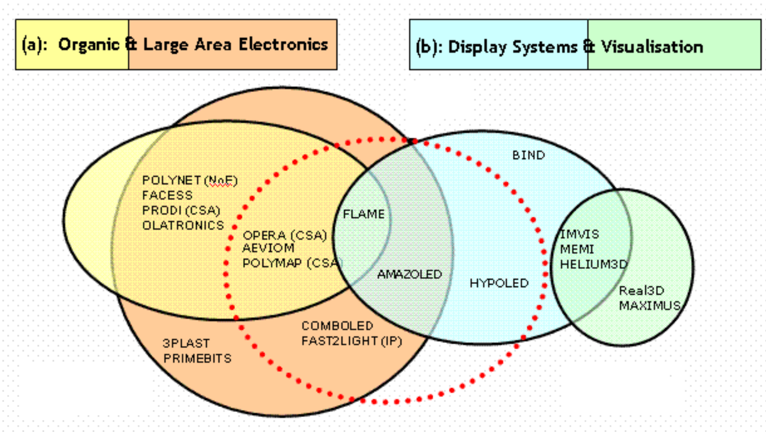
❑ ICT Calls on organic and large area electronics

In 2007, the first call for proposals addressing "Organic and large area electronics, visualisation and display systems" has led to the funding of 20 new projects in organic and large area electronics and in visualisation and display systems.

Overall this call for proposals, which was open to all types of funding schemes, received 46 proposals requesting a funding of approximately 174 million euros.

With respect to the coverage of the call, the main targets identified in the ICT work programme 2007-2008 were covered well.

The FP7 project portfolio in organic and large area electronics concentrates on large area technologies and materials for low cost manufacturing, and sub-components such as energy scavenging and storage, OLEDs, memories, sensors and flexible displays.



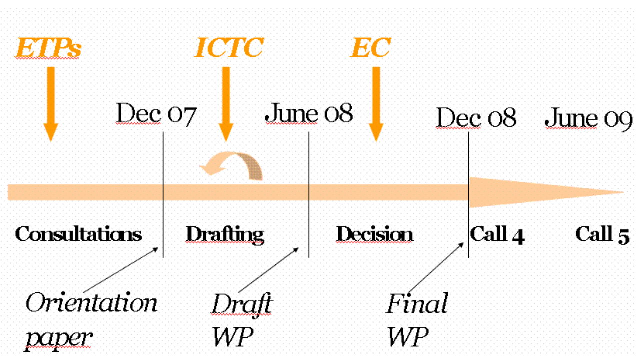
The projects in organic and large area electronics have received a major budget allocation. In addition, the distribution of the allocated budget for this call by funding scheme is the following: 75% STREPs, 16% IPs, 5% NoEs and 4% CSAs.

The area of visualisation and display systems is also amply covered, particularly the 3D target, which has mainly been addressed through OLED technology, which is bridging the two areas.

❑ ICT Work Programme 2009-2010

The ICT work programme 2009-2010 is currently under preparation.

The figure on the right shows the timeline of the next work programme.



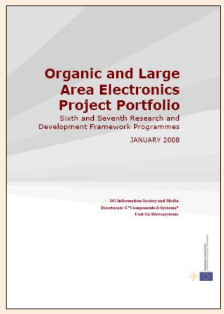
http://cordis.europa.eu/fp7/ict/organic-elec-visual-display/home_en.html

ICT Call 1 on OLAE	
Date	May 2007
Funding schemes	CP, NoE, CSA
Received proposals	46
Funded projects	20
Requested contribution	174 M€
EC total contribution	63 M€

ORGANIC AND LARGE AREA ELECTRONICS BOOKLET

During the Organic and Large Area Electronics Cluster Meeting held in Brussels on 19 February 2008, a booklet which collates the portfolio of EU funded projects in this field was distributed.

This Organic and Large Area Electronics Booklet contains the EU projects in the area, which have been launched under both the FP6 and FP7 Framework Programmes.



In total 31 projects have been funded as a result of several calls during both the 6th and 7th Framework Programmes, with a total European Union contribution to this domain exceeding € 140 million.

These R&D projects are successfully covering a complementary set of activities ranging from research on materials or technologies and systems development to new manufacturing processes.

These projects are bringing together researchers, industries and end users throughout Europe, thus cultivating a large research community in this field.

New projects in organic and large area electronics

In FP7, the first explicitly dedicated call on organic and large area electronics was launched. With a budget of 63 million euros, it targeted innovative projects in this field. As a result, 20 new projects have been funded in the area of "Organic and large area electronics, visualisation and display systems". In this section, we will present these recently launched projects in organic and large area electronics and the activities carried out within them.

Aligned with the achievement of a critical mass in organic and large area electronics there is a subset of four FP7 EU-funded projects (PolyNet, OPERA, PRODI and PolyMap), which cover actions aiming at defining European competences, services and industrial requirements in the field; thereby contributing to ease and foster the establishment of competitive clusters throughout Europe as well as to reinforce the European position in the area.

PolyNet is a Network of Excellence that aims to establish Europe in the area of organic and large area electronics as the world leader in science, technology and subsequent commercial exploitation of printing and large area electronic technologies for hetero-integration of flexible electronics.

http://www.vdivde-it.de/polynet

Industrial exploitation in this area needs a research cooperation base and a service base to foster transfer from science to industry within Europe. **PolyNet** will support these aims with three core platforms: a research cooperation platform; a service platform and a knowledge platform.

The overall objective of the Coordination Action **OPERA** is to strengthen the position of Europe as a leading force in organic electronics in the world.

http://www.opera-project.eu

A specific aim of **OPERA** is to create the conditions for the establishment of a number of competitiveness clusters in Europe. To address these issues, **OPERA** will work on these action lines: the development of a strategic framework maximizing synergy and cooperation in the sector, accelerating technological progress and the development of commercial organic electronic applications, the creation of channels of exchange of ideas and people, the development of tools for stimulating entrepreneurship, the acceleration of the development of industry standards and enhancing the visibility of the field.

The intention of the Coordination Action **PRODI** is to integrate European printing, coating and other advanced processing machinery manufacturers, production line integrators and process measurement and automation industry to work together to improve European excellence in roll-to-roll polymer and printed manufacturing equipment and production lines business.

The objectives of **PRODI** include the collection of the requirements for the new manufacturing machinery, measurements and automation systems, and generating a common future vision for the industry on R2R polymer and printed electronics manufacturing equipment and production lines and systems.

http://www.project-prodi.eu/

PolyMap is a Support Action that aims to strengthen the position of Europe as the leading force in organic electronics.

For that purpose, **PolyMap** will undertake three actions: mapping public funding in organic and large area electronics and setting up an ERA-NET, conducting a roadmap on materials and new applications, and supporting SMEs in this area.

❑ The FP7 Organic and Large Area Electronics Project Portfolio

In addition to these four projects, there is a second subset of projects, made up of 10 cooperative projects, which address various R&D challenges in organic and large area electronics, and will lead to progress in this innovative field. These projects cover a set of complementary activities ranging from technology and systems development to new manufacturing processes, and are expected to bring relevant contributions in areas such as large area electronics and materials for low cost manufacturing and subcomponents like energy scavenging and storage, memories, sensors and OLEDs and flexible displays. These projects are (see further information on these projects on our site on CORDIS):

Other projects in Organic and Large Area Electronics		
3PLAST	http://www.3plast-sensor.eu	domann@isc.fhg.de
AEVIOM	http://www.aeviom.eu	reinder.coehoorn@philips.com
AMAzOLED		huges.lebrun@fr.thalesgroup.com
CombOLED	http://bind.upatras.gr	karsten.heuser@osram-os.com
FACESS	http://www.vtt.fi/proj/facess/	jukka.hast@vtt.fi
Fast2Light	http://www.fast2light.org	mary.kilitziraki@tno.nl
FLAME	http://www.imec.be/FLAME	paul.heremans@imec.be
HYPOLED		ian.underwood@microemissive.com
OLAtronics	http://www.olatronics.org	logot@auth.gr
PriMeBits		ari.alastalo@vtt.fi

http://cordis.europa.eu/fp7/ict/organic-elec-visual-display/home_en.html

Event calendar

10-11 JULY 2008

International Symposium on Flexible Organic Electronics. The purpose of this symposium is to bring together scientists and engineers engaged in the research, development and manufacturing of flexible organic electronics, including organic/inorganic materials, flexible substrates, manufacturing processes, circuit design, flexible devices, system integration and product applications.

17-20 AUGUST 2008

IEEE Conference on Polymers & Adhesives in Microelectronics & Photonics. The Polytronic Conference will join researchers, engineers and scientists to share knowledge and experience in Polymeric Materials for Microelectronics and Photonic Applications, Adhesives in Electronics and Polymeric Electronics Packaging.

FURTHER INFORMATION

International Symposium on Flexible Organic Electronics:

Website: http://nn.physics.auth.gr/isfoe/

IEEE Conference on Polymers & Adhesives in Microelectronics & Photonics.

Website: http://www.polytronic2008.com

International Conference on Electroluminescence of Molecular Materials and Related Phenomena.

Website: http://www.icel-7.de/frs_index.asp

Forum "be-flexible" 2008

Website: https://www.be-flexible.de

2-6 SEPTEMBER 2008

International Conference on Electroluminescence of Molecular Materials and Related Phenomena. This conference aims to provide a forum to discuss innovative R&D in organic electronics and semiconductors including OLED, organic TFT, organic memory, organic based chemical and biological sensors, organic photovoltaics, etc.

2-3 DECEMBER 2008

Forum "be-flexible" 2008. This international platform is intended for an exchange of experiences of scientists, applied researchers, equipment suppliers and users. It will consist of two consecutive days with several sessions and keynote speakers focussed on thin semiconductor devices and flexible electronic systems.

❑ ICT Event Lyon 2008, 25-27 November 2008

The biennial ICT Event (formerly called the IST Event) is the most important forum for discussing research and public policy in information and communication technologies at European level.

The ICT Event presents Europe's future priorities for research funding in the ICT area, examines crucial issues of public policy for stimulating innovation and creates opportunities to establish research and business partnerships.

http://ec.europa.eu/information_society/events/ict/2008/index_en.htm

The ICT Event 2008, which is organised by the EC Directorate General Information Society and Media in cooperation with the French presidency of the EU, will bring together researchers and innovators, policy and business decision-makers working in the field of digital technologies.

It will examine: the European Union priorities in ICT research for over €2 billion of funding available in 2009-2010; the major current technological trends which impact upon strategic research planning and public research policies to stimulate research and innovation.

❑ Become a member of the Quadriga Associated Network

The **Quadriga Associated Network (see http://www.quadriga-org.eu)** is a joint initiative of four EU-funded projects, namely **OPERA, PRODI, PolyMap** and **PolyNet**. The main objectives are to foster the position of Europe as a gravitation point in research regarding organic & large area electronics, to strengthen the role of Europe as a main hub in this area, and to contribute to the creation of start-ups and knowledge-based employment.

The **Quadriga partners** are interested in deepening the connections and relationships with university research groups, institutes of applied research, companies, industry associations or any other institutions working on organic and large area electronics.

Please go to http://quadriga-org.eu/index.php?id=12&lang=EN in order to register.

Quadriga

http://www.quadriga-org.eu

Organic and Large Area Electronics Newsletter

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