

Hessian Ministry of Economics, Transport,
Urban and Regional Development

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Hessen-Nanotech NEWS

LOPE-C
Large-area,
Organic & Printed Electronics
Convention

JOIN US FOR THE UPCOMING INTERNATIONAL
EVENT OF THIS EMERGING INDUSTRY

May 31 - June 2, 2010
Congress Center | Messe Frankfurt, Germany

International Conference and Exhibition for
the Organic and Printed Electronics Industry

 www.lope-c.com  messe frankfurt

LOPE-C - International
Summit on Organic and
Printed Electronics

OE-A - International Network
for the Organic and Printed
Electronics Industry

Companies in Focus:
Merck, FUJIFILM Dimatix,
TU Darmstadt, PolyIC,
Evonik Industries,
Botest Systems

DFF - Network of the
European Display Industry

Special Edition
for the LOPE-C Convention
hosted by Organic Electronics
Association (OE-A)

Hessen – there's no way around us.

Dear Hessen-Nanotech NEWS Reader,

Editorial



We will soon be able to print electronic components on a large scale. Printed photovoltaic cells for providing mobile computers with power are already available on the market today. Manufacturers are currently developing methods to increase efficiency and durability of these photovoltaic mini power plants, so that they can soon be put to use on roofs and building facades. Photovoltaics could take a major step toward cost-effectiveness through affordable production of printed solar cells.

However, the possibilities of printable electronics offer various other perspectives as well: In the future, flexible luminescent wallpaper made of organic light-emitting diodes (OLED) will provide offices and living space with light and color, or will present moving images on energy-saving, large-format, paper-thin displays.

Additionally, "printing" electronic elements will play an important role in promoting the spread of Radio Frequency Identification (RFID), as it promises to make the production of complex RFID labels affordable. This improvement will not only simplify mass logistics in merchandizing, but will also upgrade product safety and trademark protection. Within this context, intelligent pack-

aging and disposable diagnostic devices for medical technology are further examples of applications for printed electronics.

The German State of Hessen plays a significant role in the development of technologies and applications. Innovative companies such as Merck and academic institutes such as the Technical University of Darmstadt are leaders in research. The "Organic Electronics Association (OE-A)", as the leading international industry association, must also be commended for its world-wide coordination of developments from its headquarters in Frankfurt. The OE-A, in cooperation with Messe Frankfurt Ausstellungen GmbH (MFA) invites you to the world summit for the field of organic and printed electronics in Frankfurt, Germany from May 31 - June 2, 2010. With the LOPE-C 2010 Large-area, Organic & Printed Electronics Convention a significant part of our future will again be taking place in Hessen.

Dieter Posch

Hessian Minister of Economics, Transport, Urban and Regional Development

LOPE-C

International Summit on Organic and Printed Electronics

Announcement

LOPE-C
Large-area,
Organic & Printed Electronics
Convention
May 31 - June 02, 2010
Congress Center, Messe Frankfurt, Germany
www.lope-c.com



Top-level industry speakers address product marketing, merchandizing as well as prospective end-user applications and provide an outlook on commercialization of organic and printed electronics at LOPE-C.

The LOPE-C 2010 - Large-area, Organic & Printed Electronics Convention will take place at the Congress Center of Messe Frankfurt from May 31 to June 2, 2010 as the leading international conference and exhibition for this emerging industry. LOPE-C is organized by the OE-A (Organic Electronics Association) in cooperation with Messe Frankfurt Ausstellungen GmbH (MFA).

With more than 130 presentations and 75 exhibitors, LOPE-C will be the largest event for the organic and printed electronics industry. More than 800 international participants are expected to attend.

Leading representatives from industry and academia will introduce the latest applications and



Exhibiting companies present their products and technologies to an interested audience at LOPE-C

developments within the field. With its numerous world premieres LOPE-C emphasizes its position as the main event of the field. A business conference and poster sessions round out the program. End-users from aviation, the automobile industry, packaging, energy technology as well as brand owners will highlight future application possibilities.

The LOPE-C 2010 exhibition is set to figure as the most complete overview of the rapidly evolving worldwide manufacturing capacity for organic and printed electronics. The significantly expanded LOPE-C 2010 show floor featuring 75+ exhibitors will demonstrate the latest developments.

The broad range of commercial topics will include hands-on demonstrations of products and manufacturing processes, as well as a timely exploration of how best to target and cultivate the prospective

Major topics at LOPE-C are:

- **Devices:** OTFTs, OLEDs, EL, sensors, batteries, memories, etc.
- **Materials:** organic and inorganic, carbon and nano materials, semiconductors, conductors, dielectrics, substrates
- **Processes:** printing and other large-area mass patterning techniques, etc.
- **Equipment:** printing, vacuum deposition, patterning, coating, test & measurement, assembly and others
- **Production:** roll-to-roll and in-line processes
- **Applications:** flexible and rollable displays, lighting, photovoltaics, RFID, consumer electronics, sensors, smart objects and textiles, etc.
- **Services:** R&D, prototyping, manufacturing, venture and equity capitalization, etc.
- **End users:** issues of packaging and logistics, consumer electronics, transportation, brand management, pharmaceutical and medical applications, etc.

end-users of organic and printed electronics (consumer goods, packaging and logistics, brand support, pharmaceutical and medical uses).

■ barbara.kaelberer@mfa.messefrankfurt.com



Top-Level speakers from industry and academia emphasize the industry's grand themes and set the tone of the conference.

German Flat Panel Display Forum (DFF)

Network of the European Display Industry

The DFF - the Flat Panel Display Forum - is the industry-led association of more than 60 member companies and institutions from all parts of the flat panel display value chain. The DFF brings together European expertise in flat panel displays - research experts and materials, components and equipment supplier base work together with display manufacturers, system integrators and end users in order to share experiences and knowledge to promote the European display community.

The vision of DFF, the Flat Panel Display Association within VDMA, is to enable its members to attain and sustain a leading position in flat panel display (FPD) industries. DFF catalyses and expands a network of excellence across the entire value chain, leading to new business opportunities.

No matter what part of the added-value chain you are active in and irrelevant of what display technology or application catches your interest, the DFF has something valuable to offer you! Meet your potential customers and suppliers. Benefit from collaboration and networking. Understand the technology and market dynamics of the flat panel display industry. Obtain free access to our regular working group meetings, quarterly newsletters, conference and trade show reports and flat panel display market information.

■ dff@vdma.org
www.displayforum.de



Digital Signage is a growing market for large-area displays

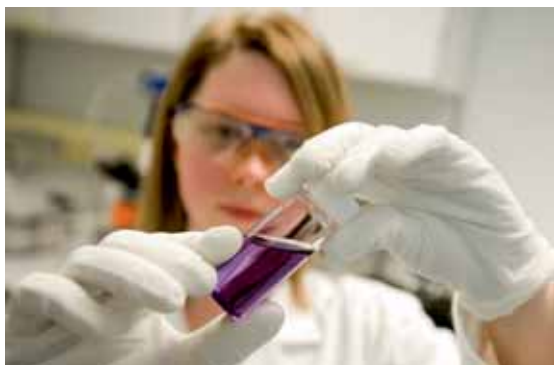
Merck KGaA

Novel materials for a new generation of printed electronic devices

Company in Focus



Merck is a strong partner to the Organic Electronics (OE) business with a pioneering spirit and expertise derived from many years of experience in development, scale up and production of advanced materials for high-tech applications in the opto-electronic industry. From our state-of-the-art R&D centres through to large scale manufacturing facilities in Darmstadt, we have a well-established global supply chain and infrastructure with the capability to provide high performance semiconducting materials in ready-to-use, easily processable formulations. Those formulations can be widely applied for making organic electronics devices, such as organic light emitting diodes (OLED), organic field effect transistors (OFET) and organic photovoltaic cells (OPV).



Merck focuses on development of novel materials and customised formulations and supports customers bringing innovation into application.

A primary motivation for OE technology is the appeal of the potentially low cost solution based fabrication process, and the freedom of size, form factor and application architecture. Additive printing process such as ink-jet, gravure and flexographic is utilised to deposit a sequence of organic layers, ultimately leading to a highly integrated stack of active components. According to different application area and selected printing method, the printable formulations can combine features with rheological requirements for electronic devices to optimise their performance.

The lateral feature sizes of the printed layers range from wide area coatings as in photovol-



taics and OLED lighting to pixelated arrays in high resolution organic transistor backplanes and OLED frontplanes with layer thicknesses in 50 nanometres scale. In addition, ambient printing conditions and standard printing equipments are applied upon customers' requests.

Merck has invested heavily in dedicated research laboratories in Darmstadt, Frankfurt and Chilworth, UK, encompassing synthetic chemistry labs, device preparation and electrical (-optical) characterisation with ink formulation and printing capabilities.

For example, in the Advanced Technologies Centre (Chilworth, UK), Merck established a globally recognised printing platform which has supplied the industry with highly sophisticated and customised semiconducting materials and formulations from 2006. Most recently, Merck has extended Chilworth facilities to include new laboratories which will further expand its material offerings. The first new laboratory will develop materials for OPV devices and flexible solar panels for use in a wide range of applications. The second new laboratory will be used to develop and test formulations for colour e-paper devices in flexible display applications. Those new materials feed Merck's new product pipeline and the investment in new laboratories will increase our new business opportunities.

■ Merck KGaA
www.merck.de

FUJIFILM Dimatix, Inc.

Drop-on-Demand Printing Comes of Age for Electronic Applications



FUJIFILM Dimatix, Inc. is a founding partner and member of the Organic Electronics Association (OE-A). Our state-of-the-art MEMS fabrication facility in Santa Clara, California U.S.A. has produced the first high-tech silicon printheads. We have continued to expand our R&D facilities, and the result is an industry first with printheads that work with functional materials required for organic electronics. We support customers in this materials deposition market with both printheads and printers. Our Dimatix Material Printers have become the gold standard for inkjet printing R&D. Our research team at FUJIFILM Dimatix endeavors to produce products that enable the commercialization of inkjet printing processing applications for electronic device development.

As an additive process, inkjets are enabling manufacturing processes that are cost effective and less

wasteful than many standard subtractive processes. FUJIFILM Dimatix piezoelectric drop-on-demand inkjets have been integrated into equipment to increase manufacturing capabilities with concomitant reduction in manufacturing costs by increasing precision, reliability and volume control. These tools have demonstrated reliability and productivity in the manufacturing of color filters, OLED displays, organic TFTs, RFID components, touch screen displays and other emerging technologies.

FUJIFILM Dimatix has developed a new R&D printer complementing its existing DMP-2831 to aid industrial and university laboratories in making breakthroughs in materials science for digital fabrication techniques using inkjet printing. Successfully meeting major design specifications, the DMP-3000 is an inkjet deposition system that is capable of printing a wide range of functional fluids from both experimental cartridge-based print-heads with small volumes and high performance print-heads appropriate for industrial and high throughput applications. Technological breakthroughs for print-heads are continuously required to accelerate the development of functional materials printing. FUJIFILM Dimatix will stay at the leading edge of printhead development to support printing systems in organic electronic device development.

■ FUJIFILM Dimatix, Inc.
www.dimatix.com

Technical University of Darmstadt

Printing Technologies for Organic Electronics

The "Institut für Druckmaschinen und Druckverfahren - IDD", (institute for printing science and technology) at the Technical University of Darmstadt is developing with a research group of about 20 researchers advanced printing technologies for functional materials and devices.

The work is funded within the scope of the "Spitzencluster Forum Organic Electronics" of the Rhine-Neckar metropolitan region which is promoted by the BMBF (German Federal Ministry

of Education and Research). The project's goal is the development of innovative printing technologies for smart labels, displays and OLEDs. The scientific approach of a process model for printed electronics is new. Cluster partners are Merck, BASF, SAP, Bosch, Heidelberger Druckmaschinen and PolyIC, among others.

■ Institut für Druckmaschinen und Druckverfahren der Technischen Universität Darmstadt
www.idd.tu-darmstadt.de



Screen printed electroluminescent panels produced at IDD which consist of up to seven layers of different functional inks.



Printed electronics on roll produced by PolyIC

PolyIC is a leading developer of polymer electronics technology and moreover a future supplier of printed electronic products and components. The two product lines are called PolyID® and PolyLogo®. The activities are focused on providing innovative low cost electronics for mass markets.

PolyIC concentrates on its expertise in materials, new adapted chip design methods as well as mature mass production processes (roll-to-roll printing) for the development of this new technology with the goal of large-volume production.

The leading application for PolyIC is RFID (radio frequency identification). The wireless data transfer technology has the potential to be used in various electronics applications being thin, flexible, robust and low-cost.

A prime example for the innovation potential of printed electronics is the most recent development of PolyIC: high-resolution, conductive structures on transparent film that are produced in a roll-to-roll production process. These conductive structures can be used as an alternative to ITO (Indium Tin Oxide) films in display, touch sensor or electric heating element applications. The new PolyIC technology is to produce transparent, conductive layers with structured and thin conductive paths made of metal with high conductivity and transparency. These conductive structures are applied on a thin and flexible film in a roll-to-roll process.

Compared to ITO technology, the new PolyIC process offers various essential advantages: individual layouts due to customer requirements in high-resolution will replace cost-consuming structuring methods that are necessary when using ITO films. High transparency in a huge wavelength range and an individual, customer-specific sheet resistance can be realized. The PolyIC films can be produced in a roll-to-roll mass production process in high volume and are cost-effective in their applications.

Another example of PolyIC's products is functional re-writable polymer memory products produced in a high-volume roll-to-roll printing process. These memory products enable next-generation interactive toys, games and more.



Transparent, conductive structures with a customized layout on thin, flexible film

The re-writable memory together with a reader/writer provides a platform for Toy and Game designers to create the next generation of interactive and evolvable toys and games where the memory could be linked to the online world. Now, companies can add interactivity to their existing product lines as well as create entirely new toys and games with added value for both consumers and brand owners. In particular, brand owners can tailor their marketing to the behaviour of the consumers and also provide them with unique features, collections and offers. With these printed memories the opportunities are unlimited.

The printed memories are done in collaboration with Thin Film Electronics ASA.

■ PolyIC GmbH & Co. KG
www.polyic.com

Evonik Industries

Evonik Industries AG is the creative industrial group from Germany, which operates in three business areas: Chemicals (formerly Degussa), Energy and Real Estate. Evonik is a global leader in specialty chemicals, an expert in power generation from hard coal and renewable energies, and one of the largest private residential real estate companies in Germany. The company's strengths are creativity, specialization, continuous self-renewal, and reliability.

In this position Creavis Technologies & Innovation, the strategic research unit of Evonik's Chemicals Business Area, addresses the establishment of profitable and sustainable new businesses for Evonik and their focus is to enhance the Evonik portfolio by building high-value businesses in new technologies and/or new markets.

Evonik combines its experiences in traditional synthesis, formulation and scale-up with thor-



ough understanding of devices and application technology.

In the field of printed electronics Evonik is supplying new solution processable n-type inorganic oxidic semiconductors and matched dielectrics. These systems can be processed by a variety of printing technologies and applied in RFID-tags or several display technologies.

■ Evonik Industries AG
www.evonik.com

Evonik's Science-to-Business Nanotronics - Research for electronic markets of the future

Botest Systems

Botest Systems GmbH, located just outside of Wuerzburg, Germany, is a technology company founded in 2001. The company is active in development, manufacturing and marketing of test and inspection systems for various high-tech industries.

Its OLT OLED Lifetime Test System features extended testing capabilities and a flexible system concept to provide a comprehensive tool for advanced measurements of OLED lifetime parameters. It is designed to measure the most important device characteristics simultaneously. Emission color and temperature are monitored in addition to the standard parameters luminance, current, and voltage.

The LIV Functionality Test System is designed for functionality testing and initial characterization



of OLEDs and OPVs as well as for basic lifetime tests. Its dedicated test software allows easy operation of the system in R&D as well as in production and quality control. Its measurement capabilities will be extended to other applications, e.g. organic transistors, organic sensor, and PC controlled SMU.

For spatially resolved characterization of organic semiconductors Botest developed the PCT Photoelectric Test System. This system constitutes an essential tool for in-depth characterization and local performance analysis of organic semiconductor devices. As all other test systems, the PCT is customized to customer specific requirements.

By close cooperations with leading research institutions in Germany and Europe in the different fields of organic semiconductors Botest can fulfill any special customer requirements in the area of science, R&D, and production of organic electronics.

■ Botest Systems GmbH
www.botest.com



www.botest.com

Organic Electronics Association (OE-A)

International Network for the Organic and Printed Electronics Industry

The OE-A (Organic Electronics Association) is a working group within the German Engineering Federation (VDMA). It was founded in December 2004. OE-A is the key international industry association for organic and printed electronics and represents the whole value chain of this emerging industry. Our members are leading international companies and institutions, ranging from component and material suppliers, equipment and tool suppliers, producers/system integrators and end-users to R&D institutes. More than 130 companies from Europe, North America, Asia and Australia are working together to promote the establishment of a competitive production infrastructure for organic and printed electronics. OE-A's vision is to build a bridge between science, technology and applications.

Networking - Our International Approach

Creating the right partnerships is essential to companies and research institutes and OE-A's strength is its global reach. With quarterly Working Group Meetings in Europe and in North America as well as with roundtables in Asia, OE-A supports its members with an effective networking and communication platform, fostering collaboration and promoting information exchange among all players along the value chain worldwide.

Market and Technology Information / Roadmap

Making the right decisions depends on being well-informed. It's all about keeping track of today's ever increasing information flow. OE-A provides its members with up-to-date market and technology information. Dedicated Working Groups focus on applications and technologies and help to create a roadmap for organic and printed electronics. This roadmap is published bi-annually by the OE-A and provides companies, institutes, investors and public authorities with planning guidelines for entrance into this emerging industry.

Increasing Your Visibility

The OE-A promotes the innovations of its members through a multitude of media outlets. The OE-A brochure including detailed information about our members and their competencies is distributed worldwide. We represent our members at international trade fairs and conferences and the OE-A arranges member contacts with the international press.

LOPE-C - OE-A's Annual Conference and Exhibition

With LOPE-C we provide the premier marketplace for organic and printed electronics. LOPE-C is the central event for manufacturers, investors, engineers and scientists in organic and printed electronics.

■ www.oe-a.org



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