

Press Release

Dresden, May 11, 2009

The German OLED research association CARO presents innovations in OLED device integration technology for automotive applications

On the Plastic Electronics Asia 2009, from June 8 to 10 in Taipei, Taiwan (Shangri-La's Far Eastern Plaza Hotel), the Fraunhofer Institute for Photonic Microsystems IPMS will present two recent project results realized inside the German OLED research association CARO. The acronym »CARO« stands for »Car OLED«, which points out the focus of this R&D project with the target to develop highly efficient and highly reliable OLED devices for customer specific automotive applications (displays as well as signage devices).

Design study: Steering-wheel with an integrated OLED signage device

Inside the CARO project two of the project partners, namely Optrex Europe GmbH and Fraunhofer IPMS, together with the styling-studio G.Pollmann GmbH, recently developed a study based on a commercial steering-wheel with a car manufacturer neutral functional representation. In the center of this steering-wheel a white-emitting circular OLED signage device is integrated.

In today's vehicles liquid crystal displays (LCDs) are widely used in the instrument cluster, the central infotainment, and the climate control unit. The study of the CARO partners and the company G.Pollmann GmbH represents a potentially new area of application for displays. In nearly every vehicle the emblem of the corresponding car manufacturer is integrated in the central position of the steering-wheel. Here an OLED display opens up a variety of new ideas and concepts for interior designers. Due to the thin construction depth of OLED displays the integration of other components into the steering-wheel will not be influenced, in particular for the airbag enough installation space will be remaining, e.g. under the display. In addition OLEDs have the advantage that they potentially could be completely built on the basis of plastics. Already by opening the car doors the OLED could be activated and light up the emblem of the car manufacturer. Is the ignition switched on the emblem will be dimmed or completely switched off. Furthermore the display could be used to show warning instructions during the drive or take over further functions of today's instrument clusters.

The CARO partner Optrex Europe GmbH was responsible for the layout of the display, the manufacturing and the subsequent contour cut of the textured OLED substrate, as well as for the interconnection of the display including the implementation of different animations (each of the shown segments could be separately addressed). The processing of the OLED device itself was performed at the Fraunhofer IPMS in one of the existing OLED manufacturing lines. The styling-studio G.Pollmann GmbH created the concept of the study, built up the demonstrator and carried out the integration of the OLED display.



Study of a steering-wheel with an integrated circular OLED signage device.
Photo: Optrex Europe GmbH, Babenhausen, Germany

Multi-line addressing (MLA) for passive-matrix (PM) OLED displays: A breakthrough in the realization of highly reliable OLED displays

Part of the CARO project partners, namely Optrex Europe GmbH, Fraunhofer IPMS, Chair of Microelectronics (Saarland University), and Novald AG, recently developed a 160 x 80 pixel PM OLED display, based on a high temperature stable and long-living Novald PIN OLED® layer stack and driven by a new and worldwide unique OLED driver. The main feature of this PM OLED driver is the implemented innovative MLA scheme, called SELA (Summed Equiline Addressing). Today's standard PM OLED displays will be driven by a single-line addressing scheme. Instead of that the SELA mode realized within the CARO research association allows the parallel driving of multiple rows, and consequently can effectively prevent high current amplitudes occurring in standard single-line addressing.

The reduction of the driving current amplitude results in an extension of the operating lifetime of the displays. Depending on the visual content, on the number of parallel driven rows (2-4), as well as on the overall display rows, an improvement of the operating lifetime up to one order of magnitude is expected. Moreover the power consumption will be reduced. Alternatively the SELA scheme enables higher display brightnesses or at the same brightness the realization of PM OLED displays with a higher resolution. By that saving of energy the SELA scheme also contributes to the realization of a »green« OLED display system integration.

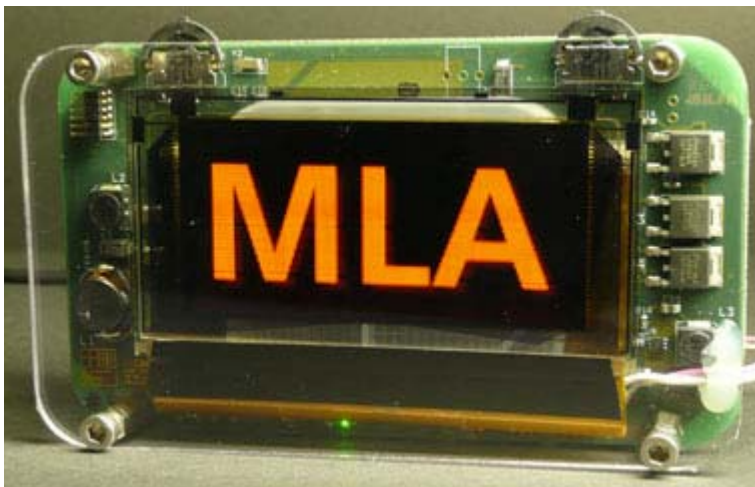
The OLED MLA driver (»OC3.1«) developed by the Fraunhofer IPMS was designed for highly reliable applications, requested e.g. from the automotive industry. The driver is specified for operations between -40°C and +125°C, exhibits an OLED drive voltage up to 25 V, and a column source current up to 2 mA. In particular the latter can currently not be fulfilled by any commercially available PM OLED driver. The various underlying SELA algorithms were developed at the Chair of Microelectronics at the Saarland University.

In addition to the innovative addressing concept and the new OLED MLA driver, a high temperature stable and long-living orange emitting PIN OLED layer stack was developed by Novald AG. In automotive applications high reliability at 85°C operational temperature and highly stable brightness (often only 20% reduction over lifetime is allowed) is required. The newly developed OLED stack offers an operating lifetime of currently 5.300 hours at 85°C and 20% brightness drop at an initial brightness of 600 cd/m².

The CARO partner Optrex Europe GmbH was responsible for the layout of the display and in particular for the subsequent manufacturing of the textured 160 x 80 pixel dot-matrix substrate. At the Fraunhofer IPMS the deposition and encapsulation processes were performed as well as the module assembly.

The technology demonstrator will also be presented during the upcoming SID Display Week 2009 in San Antonio, Texas, USA, on the German pavilion, booth no. 101-4. In autumn 2009 the first presentation in the Far East is planned during the IMID 2009 in Seoul, South Korea.

We thank the Federal Ministry for Education and Research within the OLED 2015 programme under contract 01BD 0680 - 0688 (project CARO) for funding.



160 x 80 pixel PM OLED display based on an orange emitting Novald PIN OLED® and driven by the newly developed OLED MLA driver (»OC 3.1«, Fraunhofer IPMS)
Photo: Optrex Europe GmbH, Babenhausen, Germany

About CARO

The acronym »CARO« stands for »Car OLED«, which points out the focus of this R&D project with the target to develop highly efficient and highly reliable OLED devices for customer specific automotive applications (displays as well as signage devices). The CARO consortium involves seven partners, among which two from industry, two universities and three research institutes, namely: Optrex Europe GmbH, Novaled AG, Technical University of Braunschweig, Saarland University, Fraunhofer Research Institution Polymeric Materials and Composites PYCO, Fraunhofer Institute for Applied Polymer Research, and Fraunhofer Institute for Photonic Microsystems. The CARO consortium is one of the research associations within the BMBF initiative »OLED 2015« (phase 1). Optical technologies stand for growth and economic success "made in Germany". This means competitiveness, economic growth and employment in Germany. The BMBF supported optical technologies with a funding of about 280 million Euros until 2007. Organic LEDs are particularly promising as energy-saving and flexible sources of light. Within the new funding initiative »OLED 2015« the BMBF made about 100 million Euros available over a period of five years.

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About Optrex Europe GmbH

Optrex Europe GmbH based in Babenhausen, near Frankfurt/Main, Germany, is the leading manufacturer and supplier of high performance, customised passive matrix type LCD panels and LCD modules for automotive applications, as well as for industrial and telecommunication markets. In 2002 the product portfolio was extended to active matrix driven LCDs (TFT displays). Parallel to the continuous improvement and new development of LCD technologies Optrex Europe GmbH is also working in the R&D area of OLED technologies since several years, and is currently the leader of the CARO consortium.

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About G.Pollmann GmbH

The styling-studio G.Pollmann GmbH was founded in November 1981. From the beginning the design of vehicle components is one of the primary areas of expertise. Since more than 27 years roughly 80% of all orders are coming from the automotive and automotive supply industry as well. The company is actively working in different areas: light-alloy wheels, steering-wheels, instrument clusters, driver assistance systems, ventilation systems, control units, headlights, rear lights, retractable hardtops, car tires, and many others more. In the last years the different customers enable the realisation of a variety of design studies and concept cars, a few of those could be found at www.g.pollmann-gmbh.de.

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Fraunhofer Institut für Photonische Mikrosysteme (Fraunhofer IPMS)

At the Fraunhofer IPMS, 250 employees work on electronic, mechanical, and optical components as well as their integration into the tiniest »intelligent« devices and systems. The product pallet is geared toward customers who want to expand the functionality of their products with the implementation of OLEDs and microsystems (MEMS, MOEMS, CMOS), which offer innovative system characteristics and ever-shrinking dimensions. The unique competency of Fraunhofer IPMS lies in the use of light, i.e. in the application of optical attributes and components.

Fraunhofer IPMS covers a wide range of industrial applications. Services range from product conception through development, right up to pilot production in internal labs and clean rooms – from a single device up to complete system solutions.

In the »Center for Organic Materials and Electronic Devices Dresden« (COMEDD) at Fraunhofer IPMS, the Fraunhofer-Gesellschaft concentrates on research, development and pilot-production of OLEDs based on small molecules. The aim of this center is to be the European-wide leading production-related research and development center for organic semiconductors focussing on organic light-emitting diodes and vacuum technology.

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Novaled AG

Novaled AG is a world leading company in the OLED field specialized in high efficiency long lifetime OLED structures and an expert in synthetic and analytical chemistry. The company offers complete solutions to the organic electronic markets, commercializing its Novaled PIN OLED® technology along with its proprietary OLED materials. Novaled has developed long term partnerships with major OLED players worldwide. Based on more than 400 patents granted or pending, Novaled has a strong IP position in OLED technology, and was named No. 1 on a list of coming world market leaders by the German newspapers Handelsblatt and Wirtschaftswoche. Main investors are eCAPITAL, Crédit Agricole Private Equity, TechnoStart, TechFund and CDC Innovation. For details please visit the [website](#), also accessible in a [Japanese](#) or a [Korean](#) version.

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About Chair of Microelectronics, Saarland University

The Chair of Microelectronics of Saarland University works on control technologies of displays. One research focus is the reduction of the power consumption and the lifetime improvement of PM OLED displays. Novel addressing and driving schemes were developed, which significantly expand the application window of PM OLED displays. Furthermore, research on driving technologies of active-matrix (AM) OLED displays is being performed. The goal is to enhance the power efficiency and the manufacturing yield.

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