

## HYPOLLED successfully achieves important milestones

The HYPOLLED project and its partners *Fraunhofer Institute for Photonic Microsystems IPMS* (Dresden/Germany), *Mobintech A/S* (Farum/Denmark), *Fraunhofer Institute for Applied Optics and Precision Engineering IOF* (Jena/Germany), *Universität zu Köln* (Cologne/Germany), and *University of Edinburgh* (Edinburgh/UK) announce the successful achievement of important milestones.

HYPOLLED is a collaborative project of European partners funded under the STREP scheme of the European Commission's (EC) Frame Programme 7 (FP7, ICT-2007.3.2-217067). The project is targeted towards "High-Performance OLED-Microdisplays for Mobile Multimedia HMD and Projection Applications" and commenced in January 2008. Core of the project is the development of a new, all-digital VGA OLED microdisplay, combined with optics for head-mounted displays (HMD) and micro-projection as well as a *MediaBox* for providing connectivity to DVB-T, DVB-H and WiFi.



**Figure 1: HYPOLLED microdisplay test chip and pattern operating with micro-projection optics**

The collaboration targets benchmarking of Microoled's existing WVGA and Fraunhofer IPMS' HYPOLLED VGA backplane, each in combination with both Microoled's and Fraunhofer IPMS' pin OLED stacks. That move reflects the consortium's strict orientation to OLED microdisplay market needs and exploitation.

During the Year 1 review (March 2009) EC and external reviewers had already acknowledged good project progress. Now after Month 18 the following intriguing intermediate results may be presented:

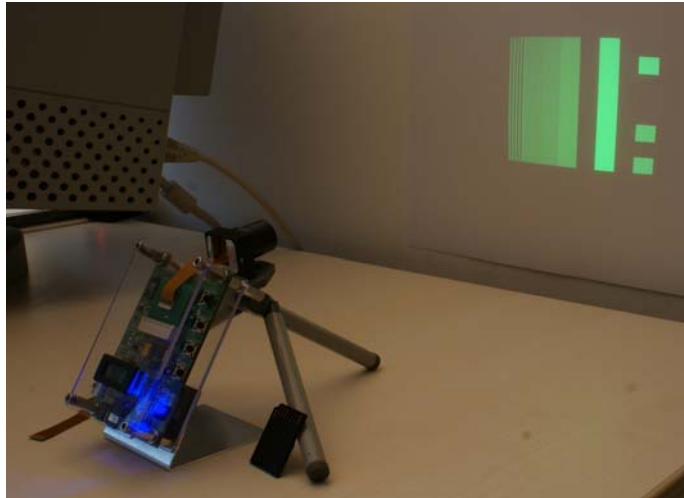
- ✓ A new all-digital VGA full-color OLED microdisplay backplane has been designed by Fraunhofer IPMS in a 0.18  $\mu\text{m}$  commercial CMOS process and is currently under prototype manufacturing,
- ✓ Micro-projector optics (matching HYPOLLED VGA microdisplay) has been developed by Fraunhofer IOF and publicly demonstrated,
- ✓ The *MediaBox* connectivity to DVB-T, DVB-H (MPEG-2/4 streaming) and WiFi has been implemented by Fraunhofer IPMS on a low-power multimedia processor platform (Samsung S3C6400) and has been demonstrated.

A datasheet of the VGA full-color OLED microdisplay has been compiled: The public version can be requested by interested parties via the HYPOLLED website ([www.hypoled.org](http://www.hypoled.org)), a more detailed version may be distributed individually under NDA (email: [info@hypoled.org](mailto:info@hypoled.org)).

Ongoing work is related to the HMD design (Mobintech), the integration of a unique RGB sub-pixel patterning approach (full color without filters, Universität zu Köln), OLED electrical modeling (University of Edinburgh) and custom design of the mobile, battery powered *Mediabox* (Fraunhofer IPMS).

The project was originally founded and co-ordinated by MicroEmissive Displays ("MED", Edinburgh/UK) and Fraunhofer IPMS. After MED had entered administration Fraunhofer IPMS overtook full co-ordination in November 2008 and investigated options for MED's substitution. Now the consortium is proud to announce collaboration with new partner Microoled SARL (Grenoble/France), who joined the HYPOLLED team in March 2009.

Several dissemination actions have been performed, addressing potential exploitation partners, the scientific community and general public. The micro-projection optics has been exhibited at SID Display Week 2009, and LASER World of PHOTONICS 2009, gaining exorbitant public interest. Upcoming presentations are scheduled at NEM Summit (Sep 28-30, St. Malo/France) and International Meeting on Information Display 2009 (IMID, Oct. 12-16, Seoul/Korea).



Further component and system outcomes are subject to presentation during SID-ME Chapter Spring Meeting 2010, to be organized by Fraunhofer IPMS and held in Dresden/Germany on March 18-19 2010 ([www.ipms.fraunhofer.de/sidme2010](http://www.ipms.fraunhofer.de/sidme2010)).

The project is managed by Dr. Uwe Vogel (co-ordinator) and Dr. Michael Scholles (Technical Manager, both Fraunhofer IPMS). Prof. Ian Underwood (University of Edinburgh, co-founder of MicroEmissive Displays) is acting as Chief Scientific and Marketing Advisor.

The HYPOLED partners wish to thank the European Commission and its Project Officer Dr. Henri Rajbenbach (email: [henri.rajbenbach@ec.europa.eu](mailto:henri.rajbenbach@ec.europa.eu)) for continued strong support of this project.

**About HYPOLED** ([www.hypoled.org](http://www.hypoled.org)): HYPOLED is a collaborative project of European partners funded under the STREP scheme of the European Commission's (EC) Frame Programme 7 (FP7, ICT-2007.3.2-217067). The project is targeted towards "High-Performance OLED-Microdisplays for Mobile Multimedia HMD and Projection Applications", commenced in January 2008 and has been originally scheduled for 2 years, an amendment for extension to 30 months (until E/Jun/10) has been approved recently.

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**About Fraunhofer IPMS** ([www.ipms.fraunhofer.de](http://www.ipms.fraunhofer.de)): 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 portfolio 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. Within the »Center for Organic Materials and Electronic Devices Dresden« (COMEDD) at Fraunhofer IPMS, the Fraunhofer-Gesellschaft focuses on research, development and pilot-production of OLEDs based on small molecules. The aim of this center is to be the European leading production-related research and development center for organic semiconductors, mainly organic light-emitting diodes (OLED) and vacuum technology.



**About Mobintech A/S** ([www.mobintech.com](http://www.mobintech.com)): Mobintech is a Danish design house focused on research, design and development of wearable and mobile computer devices and solutions. We have strong background capabilities inside hardware and software design, display solutions including Head Mounted Displays (HMD), personal display glasses, wireless interface, user interfaces, usability, ergonomics etc. Mobintech has developed several wearable computer system based on low-power CPUs and low-power operating systems. Mobintech has experience with the development of



microdisplay-based solutions ranging from SVGA resolution to QVGA resolution and based on different types of microdisplay technologies. Mobintech has extensive experience with low-power digital interface technologies. We usually partner with different providers of optics and microdisplays to create solutions.

**About Fraunhofer IOF** ([www.iof.fraunhofer.de](http://www.iof.fraunhofer.de)): Research and development at Fraunhofer IOF focuses on optical systems technology with a view to continually improving the control of light from generation via guiding and manipulation up to its application.



More than 120 employees and about 60 students are working in a modern institute building covering approximately 5000 qm<sup>2</sup> laboratory and office area. Focus of the application-oriented research is in the following fields: optical and micro-optical systems, waveguide optics, multi-functional optical multi-layer, characterizing of surfaces and coatings, optical measurement systems and sensors, fine mechanical precision systems and procedures of optics assembly. The central components of IOF expertise are optics and mechanics design. The IOF designs and produce (small volume production) of customer-specific solution for optical systems. One business unit focuses on (micro)display applications. Here the activities are not limited to multimedia applications, systems for other markets like medicine, automotive, or metrology are also addressed. Different customer specific system realizations have been realized in the past.

**About Universität zu Köln** (<http://www.meerholz.uni-koeln.de>): The research group of Prof.



Meerholz at the University of Cologne, develops and characterizes novel materials and fabrication processes for high-performance electro-optic devices based on organic materials. A team of approximately 45 researchers and PhD students with a wide scope of the scientific background ranging from organic chemistry, over physical chemistry and solid-state physics to electrical engineering allows the team to accompany new developments in the field through the entire innovation process. The group works on the forefront of research on OLEDs, organic solar cells, organic field-effect transistors, holographic imaging and bio-sensors. Among the unique competences of the group is the extensive know-how on the synthesis and use of cross-linkable organic semiconductors. These materials allow the use of cost-efficient solution based processes, such as inkjet and role-to-role printing, for the fabrication of OLEDs with very high efficiency that can otherwise only be achieved with expensive high-vacuum techniques. Since the cross-linking process is sensitive to UV light, these materials also open the way to high-resolution patterning of organic semiconductors. Recently, the group has demonstrated the world's first full-color OLED display that is based on this approach.

**About University of Edinburgh** (<http://www.see.ed.ac.uk/IMNS/>): The University of Edinburgh is Scotland's leading research university with an international reputation for world-class research across a wide range of disciplines. The Institute for Integrated Micro and Nano Systems (IMNS) brings together



researchers from integrated circuit design, system-on-chip design, microfabrication, microelectromechanical systems (MEMS) and micro-machining. The Institute's facilities include substantial design and test resources and a comprehensive class 10 silicon and MEMS fabrication capability with wafer stepper lithography. The IMNS provides significant technology services to both industrial and resrch groups and hosts the Scottish Microelectronics Centre (SMC), which is a very successful incubator. The IMNS and its original research groups have had a long history of successful research commercialisation, including the formation of a number of world-renowned companies worth many hundreds of million pounds today. These include VLSI Vision Group (now ST Microelectronics Vision Group) – founded in 1990 by Professor Peter Denyer to pioneer the development of CMOS image sensor technology, Wolfson Microelectronics – founded in 1985 by Doctor David Milne, this UEDIN spin-out began as a design house catering to Europe's leading equipment manufacturers, employing 125 people in Scotland and achieving an initial market value of £214M and MicroEmissive Displays (MED) – created as a joint spin-out from the University of Edinburgh and Napier University in 1999 to develop light-emitting polymer-based microdisplays for use in portable consumer products with its headquarters based at the SMC.

**About microoled SARL** ([www.microoled.net](http://www.microoled.net)): MicroOLED designs and develops high-performance microdisplays for near-to-eye applications. The company's core offering



consists of highly integrated microdisplays for use in video glasses for mobile HDTV, viewfinders for cameras, and professional applications. MicroOLED is uniquely positioned to enable mobile HDTV by providing high-resolution, energy-efficient microdisplays. Founded in 2007, MicroOLED is a privately-owned company whose headquarters and R&D center are located in Grenoble, France, a renowned center of excellence for chipset and nanotechnology development. Team members include specialists who contribute solid expertise in OLED technology and engineering from their tenure at Thomson, along with experts from CEA-LETI with a strong background in CMOS, packaging, and optics.