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Large, but nevertheless micro – high resolution OLED microdisplay for virtual reality applications

Fraunhofer FEP will present a new generation of OLED microdisplays at the SID-Mid-Europe Chapter Spring Meeting, running from 13th to 14th of March 2017 in Dresden. The conference will focus on "Wearable and Projection Displays". A number of top-level and interesting speakers will give talks on markets, technologies, systems and applications in the fields of micro and small area display technologies.

With applications ranging from gaming to professional uses such for assembly, maintenance information supply, and pilot training in flight simulators, virtual reality glasses and their supporting systems are becoming more and more established, whilst at the same time also initiating and facilitating developments in new fields. A crucial aspect of virtual reality presentations is the display technology. Here, OLED microdisplays are receiving growing attention due to their technological advantages.

The LOMID project

The Fraunhofer FEP has long-term experience and a vast knowledge of the development and fabrication of customized OLED microdisplays for various applications. Within the EU-funded H2020 project LOMID (Large cost-effective OLED microdisplays and their applications) which is led by scientists at the Fraunhofer FEP, a new generation of large area OLED microdisplays has been developed which focusses on both virtual-reality (VR) and augmented-reality (AR, the latter will be tested within the project in visual prosthetics).

In the LOMID project, flexible OLED microdisplays of exceptionally large area (13 mm × 21 mm) with a screen diagonal of 24.9 mm (~1") will be manufactured at challenging high yields (>60%). This will be achieved by developing a robust silicon-based chip design enabling both high resolution (1200×1920 (WUXGA) with pixel sizes of 11 µm × 11 µm for a pixel density of 2300 ppi) and highly reliable manufacturing of the backplane.

Mike Thieme, project manager at LOMID contributor X-FAB, says: "Economical processes (e.g. based on 0.18 and 0.35 µm lithography) are being developed at the CMOS silicon foundry and special attention will be given to the interface between the top metal electrode of the CMOS backplane and the subsequent OLED layers. In order to keep the CMOS manufacturing at low cost, numerous design rules have been pushed to their limits."

Additional challenges such as conformability of the OLED microdisplays will be addressed to allow a bending radius of 50 mm. Along with these new functionalities, the durability of the devices when bent has to be guaranteed and be comparable to that of rigid devices. This will be addressed by improving the OLED robustness and by modifying the device encapsulation to simultaneously fulfill stringent barrier requirements (WVTR < 10-6 g/d m2) and to provide sufficient mechanical protection.
The high interest in large area microdisplays is demonstrated by the strong participation of industrial partners.

The partners

X-FAB Dresden GmbH & Co. KG will manufacture the CMOS backplane wafers, which will be used by MicroOLED S.A.S. for OLED microdisplay fabrication. These microdisplays will be applied by Limbak SL for virtual reality glasses. The research organization CEA-Leti develops processes to realize the bendability and an appropriate encapsulation, while Fraunhofer FEP focuses on the IC design of the CMOS wafer. The University of Leipzig works on inorganic transparent FET materials, and the University of Oxford develops prosthetics for people with impaired vision. The company Amanuensis is assisting the consortium with coordination, dissemination and exploitation activities.
The project will run until 31.12.2017 and will provide a high-performance OLED microdisplay with new functionalities addressing a wider range of applications.

SID-ME Chapter Spring Meeting 2017 "Wearable and Projection Displays"

First prototypes of the project OLED microdisplays and a presentation on the state-of-the-art of the technology and developments will be given by Dr. Beatrice Beyer (LOMID coordinator, Fraunhofer FEP) on the SID-ME Spring Meeting 2017 from 13th – 14th of March 2017 in Dresden/Germany.

Dr. Uwe Vogel, General Chair of SID-ME Spring Meeting 2017, Director of Fraunhofer FEP's division "Microdisplays & Sensors": "Within the frame of the chapter meetings of the Society for Information Display SID this conference „Wearable and Projection Displays" focuses on technologies for micro and small-size displays, back- and frontplane technologies, embedded sensors, and addresses aspects like hardware/software design and system integration. We are pleased to have attracted renowned speakers from all over the world in advance (i.a. Siemens, Microsoft, Microoled, Kopin, and Universities of Cambridge, Strathclyde & Edinburgh), to give talks on markets, technologies and systems, addressing application fields from automotive, medicine, sports, security and smart devices, education and training."

Along with the conference in the Quality Hotel Plaza Dresden a poster session will be held. On the second day (14.03.17), the SID-ME Chapter Best Student Award will be given.

Abstracts for talks and/or posters can be submitted until 09.01.2017. An abstract template and further information are online available. The registration for the conference and latest information on the program can be found here: www.fep.fraunhofer.de/sidme17.

LOMID is a research project, which has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No. 644101.

More information about the LOMID project can be found here: www.lomid.eu

The LOMID consortium

- Fraunhofer FEP
- University of Oxford
- University of Leipzig
- CEA-Leti
- MICROOLED S.A.S.
- Limbak SL
- X-FAB Dresden GmbH & Co. KG
- Amanuensis GmbH

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Test and qualification vehicle of the LOMID chip with a screen diagonal of 2.5 cm and a resolution of 1920 × 1200 (WUXGA)
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