

PRESS RELEASE

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SMOOTHING THE WAY FOR ECONOMIC FLEXIBLE OLEDs

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The dream of low-cost, energy-efficient lighting on a big scale becomes tangible thanks to barrier coating systems for flexible OLEDs developed by Fraunhofer researchers

Organic light-emitting diodes (OLEDs) are nowadays synonymous with next generation lighting, which could replace common light-bulbs in a couple of years. They convert electricity very efficiently into light of high quality. However, existing OLEDs on the market are costly and mostly deposited on rigid materials such as glass. The development of flexible, organic light-emitting diodes, which can be manufactured on an industrial scale, promises economies of scale and accordingly broader marketing of the environmentally sound and highly efficient devices.

Scientists from two renowned Fraunhofer Institutes from Dresden (Germany) assembled flexible, large-area organic light-emitting diodes with barrier layer systems which are necessary for long device lifetimes. The Fraunhofer Institute for Photonic Microsystems IPMS and the Fraunhofer Institute for Electron Beam and Plasma Technology FEP for the first time manufactured a flexible OLED in a roll-to-roll production and encapsulated the device in a subsequent inline-process. This process design would allow the production in a single plant. The steps were developed in the frame of the project ROLLEX (roll-to-roll production of highly efficient light-emitting diodes on flexible substrates, support codes 13N8858 and 13N8857), funded by the German federal ministry of education and research (BMBF). Professor Karl Leo, director of the Fraunhofer IPMS, confirms: »The successful assembly of an OLED in a roll-to-roll process means a breakthrough on the way to highly efficient and competitive devices. The achievement of this project proves the capacity of Dresden as a focal point for research in organic electronics.«

A major component of flexible organic LEDs is the homogenous encapsulation of luminescent layers with transparent barrier layer systems. Permeation of only small amounts of humidity or oxygen shortens the lifetime of the devices drastically, which explains the strong need for barrier systems protecting the luminescent materials on a large area without defects. However, the barrier layers should not absorb the emitted light and should not interfere with the colors of the light.

The researchers of the Fraunhofer Institutes deposited OLED materials on a cheap aluminum foil in a roll-to-roll pilot plant, further encapsulated the luminescent foil with a barrier layer system, patented by the Fraunhofer FEP, without compromising its luminosity. Dr. Christian May, head of the business unit »Organic Materials and Systems« at the Fraunhofer IPMS, is pleased about the promising project: »Developing the flexible OLED, experience from both institutes have been united in an optimal way. I am avid that we integrated the effective barrier layer systems developed from the Fraunhofer FEP into the OLED-technology of the Fraunhofer IPMS.« Dr. Nicolas Schiller, head of the business unit »Coating of flexible products« at the Fraunhofer FEP adds: »The coating processes are all done in a roll-to-roll modus with a continuously moved substrate which opens up strong potential to reduce costs.«

The technology developed by the two Fraunhofer Institutes marks a milestone on the way towards an industrial manufacturing of flexible OLEDs. Besides OLEDs, also other devices, such as organic solar cells or memory systems, could be realized in intermediate terms.

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The work is going to be continued by the Dresden Institutes in a bigger consortium.

More information on the achieved results can be found under
www.rollex-projekt.de
www.ipms.fraunhofer.de/en/comedd

as well as information about the Fraunhofer IPMS and Fraunhofer FEP under
www.ipms.fraunhofer.de/en
www.fep.fraunhofer.de/enu

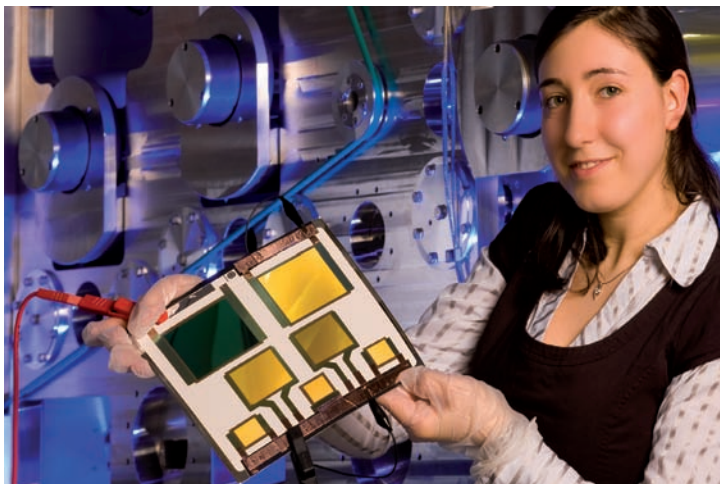
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Researcher from the Fraunhofer IPMS is presenting a flexible OLED with the new barrier layer system

Pictures in printable resolution (CMYK, 300 dpi) can be found under
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