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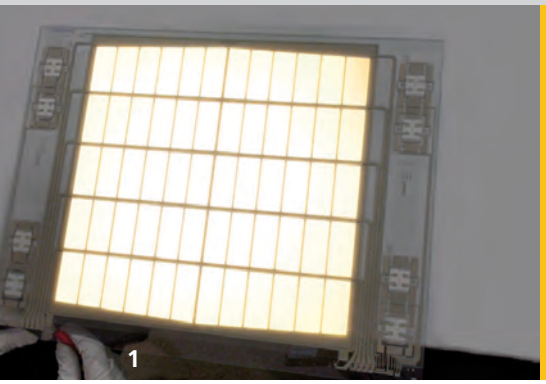
FRAUNHOFER INSTITUTE FOR ORGANIC ELECTRONICS, ELECTRON BEAM AND PLASMA TECHNOLOGY FEP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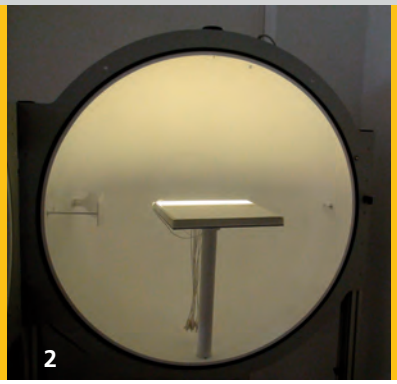
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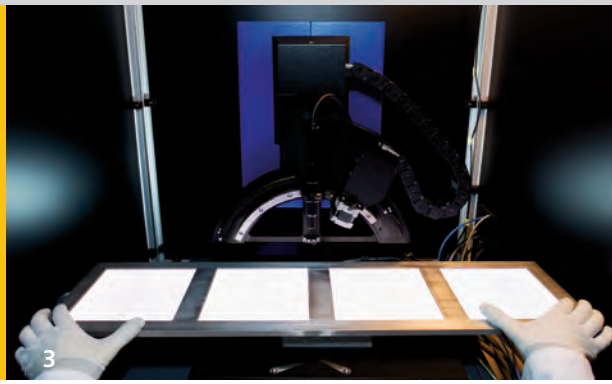
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1 *330 × 330 mm² lighting panel*
2 *Integration sphere with 330 × 330 mm² panel*
3 *Measuring of the electrooptical characteristic*

SERVICE FOR OLED CHARACTERIZATION

Fraunhofer Institute for Organic Electronics, Electron Beam and Plasma Technology FEP

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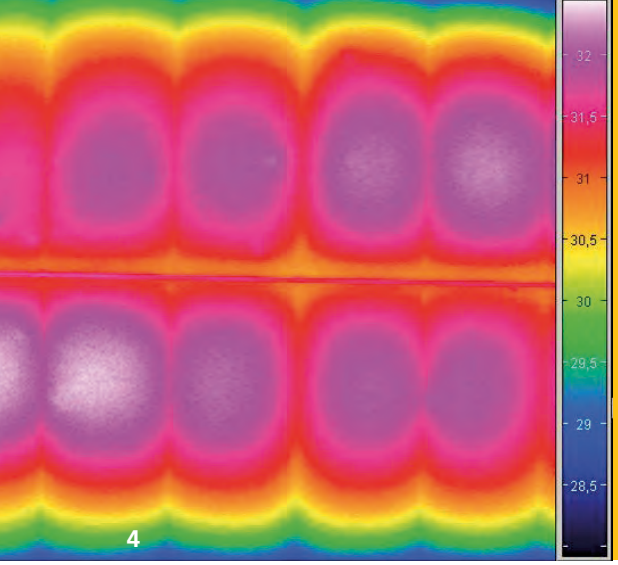
OLED (Organic Light Emitting Diode) – is one of the most promising new technologies for future lighting applications. OLED technology is the very first one in lighting history enabling really planar and, at the same time, highly efficient light sources. It overcomes the common limitations of point-like light sources, like incandescent lamps or LEDs. Using the outstanding functionality of OLED to allow high-efficiency large-area light sources will establish new branches in the lighting market. Furthermore, OLED technology opens new possibilities for the integration of lighting into transparent or flexible lamp systems. This will give rise to completely new opportunities for illumination in the future.

First OLED-lighting modules and applications are already on the market now. Beside the cost level there will be one vital criterion for a successful market penetration:

Meeting the demands of the customer-specific lighting modules by an application-driven adjustment of all illumination features like brightness, non-glaring and angular distribution of emission as well as color temperature and color rendering.

This requires the control and tuning of these lighting features already during R&D of the OLED technology as well as the lighting modules. For this purpose comprehensive equipment for manufacturing and characterization of OLED panels and modules is available at Fraunhofer FEP.
The common measuring setup for photometric characterization is using a more or less point-like emitting area or applying a pin diaphragm. The characterization of OLED and OLED modules additionally requires the determination of the lighting features on a large area, which can be carried out at Fraunhofer FEP.



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Available measuring equipment

The following measuring equipment is available at Fraunhofer FEP:

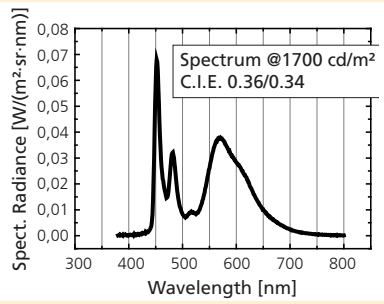
- CCD-array spectrometer for determination of photometric parameters of the OLED devices in the visible range
- Video photometer for determination of the homogeneity of the luminance distribution
- 1 m integration sphere for determination of the absolute luminous flux
- IR imaging system for thermal analysis of large-area devices
- UV/vis spectrophotometer for measurements of transmission and reflection
- Fluorescence spectrometer for measurements of emission and excitation spectra
- Elaborate measuring systems for determination of the operational lifetime of OLED devices
- Climatic chambers for determination of the shelf lifetime of OLED devices

This equipment enables a comprehensive characterization of large-area OLED lighting modules. The following parameters are provided:

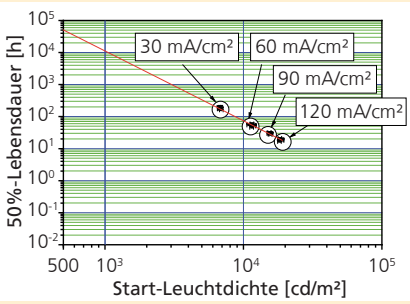
- Electro-optical characteristic within the visible range (380 to 800 nm) including spectral and angular distribution
- Luminance, quantum efficiency, luminous efficacy, color temperature, and color point (e.g. following CIE1931)
- Homogeneity of the luminance on large area
- Direct measurement of the absolute luminous flux for panels up to about 1000 cm² active area
- High resolution IR images on large area
- Transmission and reflection in the visible and near-infrared range
- Emission and excitation spectra of organic materials within a spectral range of 200 to 850 nm
- Determination of the luminance degradation, color shift as well as the drop-down rate of OLED devices under long-term operation
- Long-term measurements under standardized climatic conditions for the determination of the shelf lifetime of OLED devices

This measurement portfolio is not only provided as a customer service, but it is also an essential part of the customer-specific R&D and fabrication of OLED panels and modules.

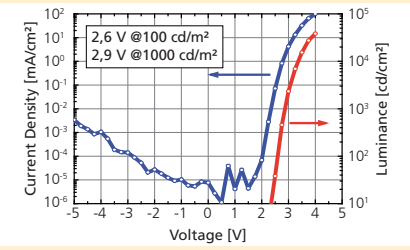
OLED spectra



Determination of operational lifetime



Luminance- / Current – voltage characteristic



4 *IR image*

5 *Long-term measurements during reliability tests*

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