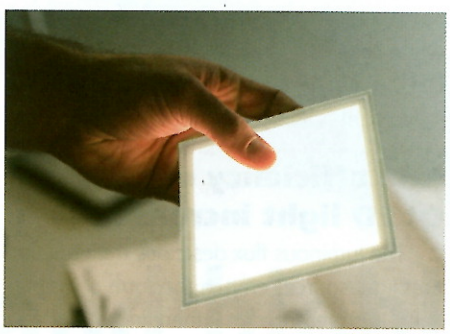
# Good and beautiful light

The success story of OLED technology continues, as their natural and warm light can be ideally used for the lighting of living and working rooms. Recently, emdedesign GmbH from Frankfurt, Germany, has brought "OMLED One" to market, the world's first OLED luminaire family

"Once someone has enjoyed the extraordinary light of an OLED lamp, this person will likely never want to exchange it for something else. Even designers are pleased with these lamps. OLED not only enables new forms, but also allows new fields of application," stresses Thomas Emde, light artist, inventor and owner of emdedesign.

In contrast to the punctual light of an LED, an OLED will always shine as a surface. Thanks to its extremely flat structure, the OLED is perfectly suited to being combined with other materials and thus enables completely new applications for light. Additionally, bendable, so-called "flexible OLEDs" can be manufactured. This is why experts see the future for OLED light predominantly in new applications such as furniture, architecture, vehicles and many more.

| Light characteristics | |
|---|---|
| Light bulb | Concentrated light |
| LED | Punctual light |
| OLED | Homogenous light surface |



**OLED light does not blind!**

## OLED light does not blind!

One of the most important properties of OLED light is that it does not blind or dazzle. The crucial factor that determines whether a light source blinds, is – among other things – its luminance. The luminance is measured in light intensity per area, in physical terms "Candela per square metre" (cd/m²).

Pure LED light reaches 50M cd/m². This high luminance blinds the human eye. In comparison, the light of a matte 60W light bulb only amounts to about 150 000cd/m².

A fluorescent lamp scores significantly better here; but still not as good as the OLED. Today's OLED light boasts a luminance of as low as 8300cd/m². OLED light does not blind, it rather "shines" like the daylight in the sky.

| Luminance (Candela per square metre) | |
|---|---|
| Sun | 1 600 000 000cd/m² |
| LED | 50 000 000cd/m² |
| Light bulb, matte | 150 000cd/m² |
| Fluorescent lamp | 15 000cd/m² |
| Clear sky | 10 000cd/m² |
| OLED | 8300cd/m² |
| Flame of a candle | 5000cd/m² |
| Paper, white at 500lx | 100cd/m² |

## Ideal for living and ambient lighting

OLED lighting boasts an outstanding quality, which can be associated with well-being and cosiness. This is mainly due to the unique technology, which generates the natural white light of the OLED. It is made possible by the "additive" light mixture of several single light colours: They are created in different, overlaying, light-emitting layers and add up together to white light. Thus, a broader colour spectrum is contained within the light, which leads to the very good colour rendering. Consequently, OLED is an ideal light source for living and ambient lighting.

The generation of white light works differently in an LED. LEDs are, depending on the semiconductor material in use, also available in different colours. White LEDs for usage in lighting materials are mostly blue LEDs with a yellow luminescent layer made of phosphor. The layer serves as wavelength converter, i.e. it transforms the originally blue light into white. Therefore, some (mostly cheap) LED lighting materials appear bluish.

When finished OLED lighting materials are used, light is generated from an immaterial surface. It is therefore possible to create lamps that work with an absolute minimum of additional materials and components. OLED lamps such as those from the "OMLED One" series do not require cooling bodies and diffusors or reflectors for glare elimination.

| Light colours (Kelvin) | |
|---|---|
| Candle | 1900K |
| Light bulb | 2700K |
| Fluorescent lamp, warm white | 2700K |
| OLED; warm white (e.g. OMLED One s5) | 2800K |
| OLED; neutral white | 4000K |
| Fluorescent lamp, neutral white | 4000K |
| Fluorescent lamp, daylight white | 6500K |
| Daylight (sun) | 6000K |

With OLEDs, different light temperatures (measured in Kelvin) can be generated. The "OMLED One" lamp family, for instance, was consciously designed as cosy and relaxing light and therefore equipped with OLED panels with warm white light temperature. There are also OLED panels with 4000K, whose neutral white light is suitable very well for working.

**Ideal for living and ambient lighting**

## The efficiency of OLED light increases

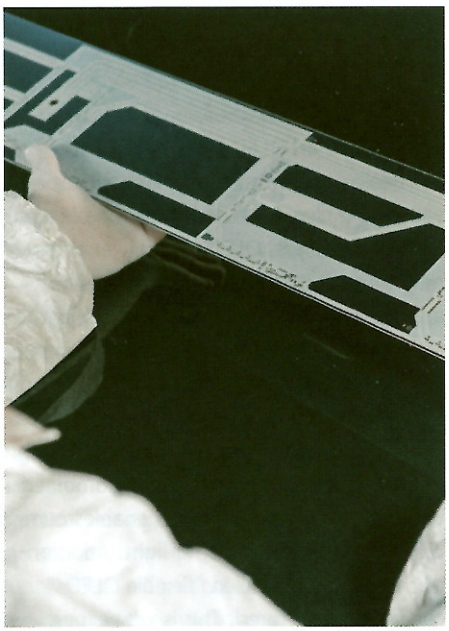
The luminous flux describes the radiation that light sources emit in the form of visible light. It is measured in lumen (lm). At an even power output (Watt), an LED lighting material offers a seven to eight times higher luminous flux compared to a light bulb. The luminous flux of the OLED lies in between these two values with 3000 lumen.

| Luminous flux (lumen) | |
|---|---|
| Light bulb, 60W | 730lm |
| OLED, 60W | 3000lm |
| LED, 60W | 6000lm |

If one relates the luminous flux of a lighting material with the power output, a value for efficiency will be the result: the light yield. The development of LEDs has raised the bar in this regard very high. Nowadays, LEDs attain nine to ten times the light yield of a light bulb. OLED, however, has in the meantime reached the already high efficiency of an energy-saving lamp. In the future, i.e. in a few years, it will reach the level of today's LEDs. Then, OLEDs will be able to attain a light yield of 100 lumen per Watt.

| Light yield (relation of light to power output) | |
|---|---|
| Light bulb | 12.2lm/W |
| 57W halogen bulb | 16lm/W |
| 18W energy-saving lamp | 58lm/W |
| 5W OLED module | 60lm/W |
| 8W LED lamp | 100lm/W |

Just like LEDs, OLEDs boast a long operating life. In the lamp family OMLED One, the operating life ranges at 30 000 hours at 70% luminous flux. Afterwards, the luminosity may sink to below 70% of the original value. However, the lamp does not need to be disposed in this case, as the modular OLED panels of the lamp family OMLED One can even be replaced.



**Patented: Electronics on glass**

## Patented: Electronics on glass

For the manufacture of the lamp family OMLED One, emdedesign uses a technology that is completely new within the lighting industry. The housing of the lamp is simultaneously circuit board and a control element made of glass. This is enabled by a new and patented manufacturing process developed in Germany, which entails the application of conductor tracks, electronic building parts, contacts and a circuitry for the dimming of the light on the high-quality white glass. In this way, a conventional board made of plastics is superfluous and the installation height of the lamp can be reduced significantly. All components of the lamp are made in Germany.

*Photos: © David Mertl @ emdedesign*
*Sources for the tables: emdedesign; Stiftung Warentest „Gutes Licht"*