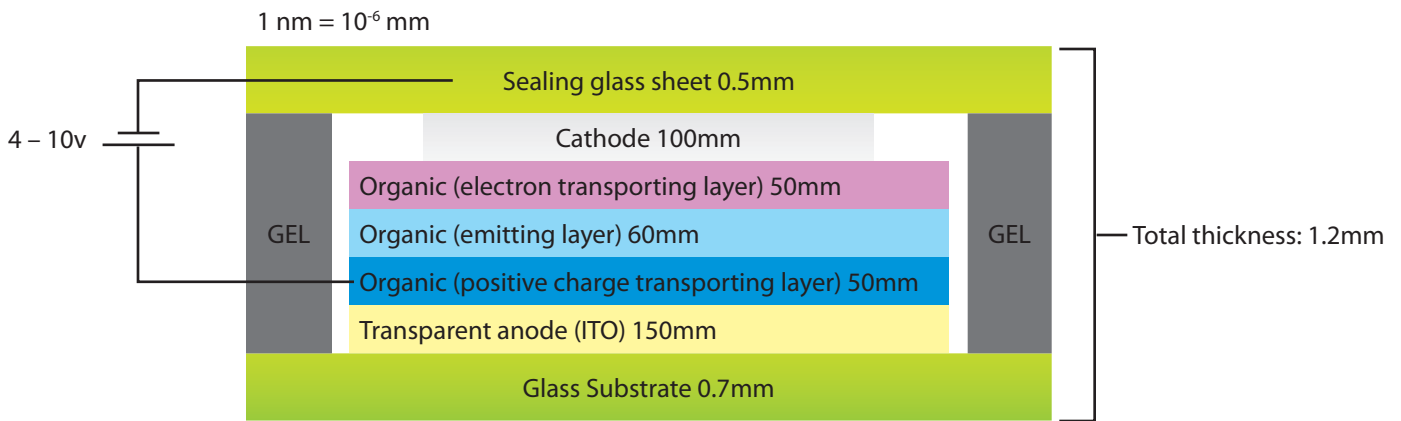




A Revolution in Lighting Technology: The Fundamentals of OLEDs

► The Basics of OLED

Organic light emitting diodes (OLEDs) are very thin sheets of organic materials printed on top of glass or plastic. These unique, highly sustainable organic materials emit brilliant White or colorful light when an electrical charge of 4 –10 DC volts is applied (*see schematic figure below*). OLED is a flat light source, emitting diffused light without glare from a potentially large active area. Major advancements in brightness, efficiency, and quality of light in recent years have paved the way for OLED technology to become a leading force in general illumination applications.



► Features

OLED technology offers several advantages over conventional lighting. First is its slimness. The thickness of the whole OLED panel for lighting applications reaches just 1mm. Such a characteristic may allow OLED lighting to be placed directly on ceilings rather than using fixtures that are suspended from them. In addition, OLED's flexibility may allow lighting fixtures to operate effectively when designed for spaces with limited conditions. The natural transparency of organic materials makes the OLED as sheer as standard glass or plastic when the power is turned off. Imagine a window or wallpaper that lights up during night time. Roll-to-roll sheets of paper-thin flexible, transparent plastic provide an entirely new way to illuminate a home or business.

Other features are:

- **Efficiency:** 54 – 124 lm/W Minimal heat generation (Source: Dresden University and Novaled Corp.)
- **Fully Dimmable:** 100% – 1% Dimming
- **Lifetime:** 17,000 –25,000 hours to 70% of initial luminance (1000cd/m2)
- **Variety of Colors:** Entire visible color spectrum is achievable
- **High Quality of White:** CRI: 80–95
- **Color Temperature:** 2700K–5500K
- **Low Voltage:** 4 –10v, compatible with various renewable energy sources
- **Environmental Friendly:** Soluble in regular solvent for further treatment

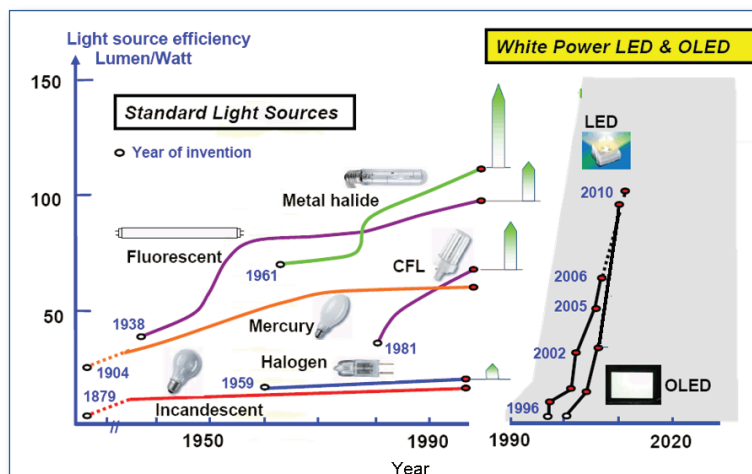


► Existing Applications of OLED

Currently OLED technology is mainly utilized in display applications or cell phones, MP4s, and flat screen TVs.

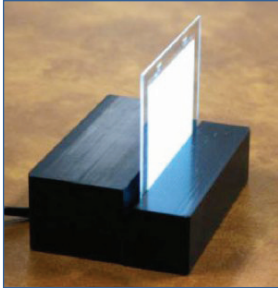
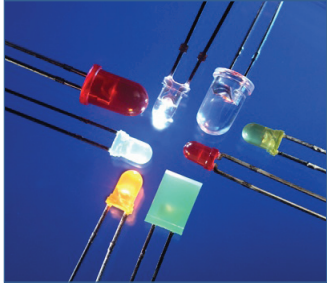
	<p>Nokia cell phone: Using 2.6-inch 16 million colors OLED</p>		<p>Samsung: Transparent and .05mm thick “flapping” OLED displays</p>
	<p>Samsung: 12.1-inch OLED laptop</p>		<p>Sony X Series Walkman: Using a 3-inch OLED touch screen</p>
	<p>Sony: 11-inch OLED TV</p>		<p>Zune HD portable media player: Using a 3.3-inch OLED touch screen</p>

During the past decade, OLED efficiency has been dramatically improved. The breakthrough of 100 lm/W of OLED efficiency was first accomplished by Universal Display Corp. USA in June 2008. And the benchmark efficiency reported by Dresden University and Novald in Germany is 124 lm/w (May 2009). With these substantial efficiencies, many companies and governments have begun to recognize the enormous potential of OLED and its usage for a broad range of applications, as the next generation of innovative lighting sources emerges. The lifetime of OLED is improving steadily. Currently an OLED can achieve a lifetime potential of 17,000–25,000 hours, with 70% of initial brightness for a variety of colors. (Source: Osram)



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► Differences between OLED and LED

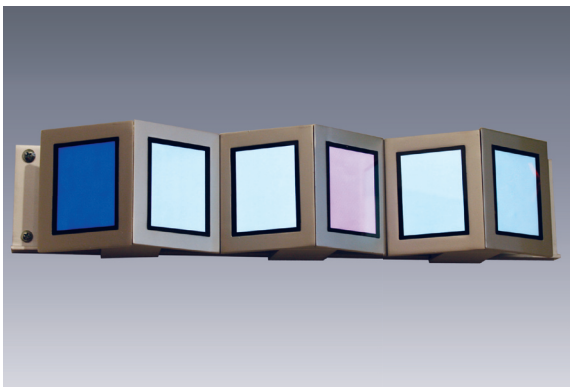
OLED	LED
Flat light source	Point light source
No glare effect	Has glare effects, needs light distribution elements
Made of organic material, soluble when disposed	Made of synthetic materials
More efficient heat dissipation, no need for heat sink	Needs heat sink
Able to form transparent flat light panel	
Able to form on flexible substrate	
Potentially cheaper to fabricate	
	

► WAC Lighting OLED Prototypes

During the 2009 Lightfair in Jacob K Javits Convention Center, New York, WAC Lighting showcased two OLED lighting prototypes: a mini-chandelier and a wall sconce. With these innovative and energy efficient prototypes, WAC has illustrated its "Responsible Lighting" brand standard while introducing a New Era of Lighting Technology and Sustainability.

OLED wall sconce

- Color changeable
- 3 inch per OLED panel
- 2mm thick



OLED mini chandelier

- Transparent
- 1 inch per OLED panel
- 0.18w per OLED panel
- Dimmable 100% – 1%



► WAC Sees OLED as The Future of Lighting

The latest OLED lighting technology demonstrates that it has well surpassed traditional incandescent bulbs, in terms of efficiency and life. WAC Lighting expects that these attractive OLED light sources will begin to appear in commercial lighting products within the next two to five years, when challenges such as manufacturing costs and design practicalities, are resolved. The market research company, IDTechEx, forecasts that OLEDs will translate into a Billion Dollar Market by the year 2011. OLED has the potential to make new-generation lighting fixtures with dramatic, elaborate and imaginary designs that are completely different from existing ones. Imagine an OLED window, which is transparent during daytime but emits light to illuminate indoor spaces during the night (*See photos below*). As an innovator dedicated to cutting-edge lighting technologies, WAC believes that the unique features of OLED will brighten the future of generations to come with unprecedented designs, efficiencies, sustainability and quality.



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