Organic LED Displays (OLEDs) - The Next Trend?

by Clint D
eBoer — last modified August 30, 2004 20:00

Wouldn't you like to be able to read off the screen of your laptop in direct sunlight? Your mobile phone battery to last much, much longer? Or your next flat screen TV to be less expensive, much flatter, and even flexible? Thanks to a breakthrough technology called Organic Displays, this could soon be reality.

Although the technology behind Organic LED (OLED) displays is pure chemistry, the applications are much more everyday - mobile telephone and television screens, laptop and stereo displays, car navigation systems, or even billboards.

This OLED technology is based on a revolutionary discovery that light-emitting, fast switching diodes could be made from polymers as well as from semiconductors. Starting from a standard LCD glass covered with structured ITO (Indium-Tin-Oxide), the polymer materials are applied by precision ink jet printing. Using this technology, pixels of red, green, and blue material are applied. After the patterned cathode has been applied via metal evaporation, the cell is sealed.

Philips states that the big advantage of the manufacturing process is its simplicity and therefore its potential for low cost; only a very limited number of process steps are needed. This procedure requires fewer manufacturing steps than the manufacturing of LCDs, and, more importantly, fewer materials are used. In fact, the whole display can be built on one sheet of glass or plastic, so it should be cheaper to manufacture. Philips' thin-film PolyLED technology will enable the production of full-color displays less than 1 mm thick. Combined with a large viewing angle, high brightness and contrast, and full video capability, PolyLED displays are ideal for the next generation of information displays.

The Kodak EasyShare LS633 zoom digital camera uses Kodak's innovative, award-winning AM OLED technology to display bright, sharp images for better on-camera viewing and sharing from virtually any angle.

The LS633 camera represented a major milestone in the development and manufacture of OLED displays exhibiting more vivid images and crisper video to consumer electronics. The Kodak display AM550L features 165-degree viewing on a 2.2-inch screen that is up to 107 percent larger than the LCDs on most cameras.. But at $799 for a 3.1Mega pixel camera and fixed focus it is too expensive

OLED display technology from Kodak is already found in car audio components manufactured by Pioneer and cellular phones marketed by Motorola and Sanyo . With ongoing research conducted by Kodak and its technology licensees, the applications for OLEDs continue to expand, making it clearly the display technology of the future.

Not only can they provide brighter, better images at a lower cost, but best of all: Organic Displays use a material with self-luminous properties that eliminates the need for a backlight. While backlighting is a crucial component to improving brightness in LCDs, it also adds significant cost as well as requiring extra power - which, for instance, translates into the heavy batteries in your laptop. With an organic display, your laptop might be less heavy to carry around, or your battery lasts much longer compared to a laptop equipped with a traditional LCD screen.

Polymer LEDs have several inherent properties that afford unique possibilities, such as:

* All colors of the visible spectrum are available
* High brightness is achieved at low drive voltages/current densities
* No viewing angle dependence
* Operating lifetime exceeding 10,000 hours
* High response speeds allow display of high quality video

Advantages of Plastic Electronics

One big advantage of plastic electronics is that there is virtually no restriction on size. Conventional semiconductor components have become smaller and smaller over the course of time. Silicon is the base material of all microelectronics and is eminently suited for this purpose. However, the making of larger components is difficult and therefore costly. The silicon in semiconductor components has to be mono crystalline: it has to have a very pure crystal form without defects in the crystal structure. This is achieved by allowing melted silicon to crystallize under precisely controlled conditions. The larger the crystal, the more problematic this process is. Plastic does not have any of these problems, so that semi-conducting plastics are paving the way for larger semiconductor components.

With the increasing popularity of LCD screens to replace the conventional picture (cathode ray) tube, PolyLED should emerge as another suitable candidate. A screen based on PolyLEDs has obvious advantages: the screen is lightweight and flexible, so that it can be rolled up. With plastic chips you can ensure that the electronics driving the screen are integrated in the screen itself. Other applications of the PolyLED are luminous information screens of almost unlimited size, for example alongside motorways or at train stations.

Philips and PolyLed

Since the discovery of polymer-based light emitting diode (LED) in 1989, Philips has been working on PolyLED. Today, Philips is the first to ship monochrome PolyLED displays in mass production. Philips Research is now concentrating on the development of PolyLED technologies for next-generation full-color displays and on ways of integrating PolyLEDs into flexible displays.

State-of-the-art

Launched in September 2002, the Sensotec Philishave is the first ever product equipped with a display based on superior PolyLED technology and is prominently featured in the latest James Bond movie, Die Another Day.

In 2002, SANYO, Kodak, and SKD shipped 300 OLED displays for trial use in mobile phones. In order to increase production of low temperature poly-silicon TFT LCD displays, the demand for which currently exceeds capacity and in order to establish a mass production infrastructure required for full scale mass production startup of OLED displays, a factory of Tottori SANYO Co., Ltd. was placed under the control of SANYO LCD Engineering Co., Ltd. in February of 2003. The manufacturing line used for the production of amorphous silicon TFT displays is was shifted over to the production of low temperature poly-silicon TFT displays. Production of Low temperature poly-silicon TFT displays on the converted line began in April of 2003.

Some of the challenges OLEDs have to face:

* Entering a market already dominated by a large CRT-to-LCD panel conversion process
* Breaking into the consumer mindset where viewers are still struggling to understand new technologies
* Ensuring competitive refresh rates, contrast ratios, black levels and overall performance
* Quickly meeting and exceeding price points set by current LCD/plasma technology leaders

While the last issue may be quickly resolved due the nature of the OLED manufacturing process itself, the first three items have yet to be proven and undertaken. OLED technology has to go from novelty to practical competitor in a market that is constantly evolving to exceed and extend beyond its current boundaries. LCD screens are getting faster and faster, while Plasma displays continue to drop in price and go up in performance (check out some of the latest "real-world" contrast ratios achieved by Pioneer and other manufacturers - they rival or exceed that of many high-end direct view CRTs and RPTVs).

We're not sure how fast OLEDs targeted towards home theater or computer display are going to flood the market (Kodak is banking on it happening quickly), but the dam is under stress and the onslaught of consumer devices, once the manufacturing processes are firmly established and optimized, should make for a fantastic "display" of products - one we're looking forward to monitoring.

Sources: Kodak, Philips Electronics

Organic light-emitting diode

From Wikipedia, the free encyclopedia

A 3.8 cm (1.5 in) OLED Screen

An organic light-emitting diode (OLED), also Light Emitting Polymer (LEP) and Organic Electro-Luminescence (OEL), is any light-emitting diode (LED) whose emissive electroluminescent layer is composed of a film of organic compounds. The layer usually contains a polymer substance that allows suitable organic compounds to be deposited. They are deposited in rows and columns onto a flat carrier by a simple "printing" process. The resulting matrix of pixels can emit light of different colors.

Such systems can be used in television screens, computer displays, portable system screens, advertising, information and indication. OLEDs can also be used in light sources for general space illumination, and large-area light-emitting elements. OLEDs typically emit less light per area than inorganic solid-state based LEDs which are usually designed for use as point-light sources.

A significant benefit of OLED displays over traditional liquid crystal displays (LCDs) is that OLEDs do not require a backlight to function. Thus they draw far less power and, when powered from a battery, can operate longer on the same charge. Because there is no need to distribute the backlight, an OLED display can also be much thinner than an LCD panel. OLED-based display devices also can be more effectively manufactured than LCDs and plasma displays. But degradation of OLED materials has limited the use of these materials.[1]

History

Bernanose and co-workers first produced electroluminescence in organic materials in the early 1950s by applying a high-voltage alternating current (AC) field to crystalline thin films of acridine orange and quinacrine. In 1960, researchers at Dow Chemical developed AC-driven electroluminescent cells using doped anthracene.

The low electrical conductivity of such materials limited light output until more conductive organic materials became available, especially the polyacetylene, polypyrrole, and polyaniline "Blacks". In a 1963 series of papers, Weiss et al. first reported high conductivity in iodine-doped oxidized polypyrrole. They achieved a conductivity of 1 S/cm. Unfortunately, this discovery was "lost"[clarify], as was a 1974 report of a melanin-based bistable switch with a high conductivity "ON" state. This material emitted a flash of light when it switched.

In a subsequent 1977 paper, Hideki Shirakawa et al. reported high conductivity in similarly oxidized and iodine-doped polyacetylene. Alan J. Heeger, Alan G. MacDiarmid & Hideki Shirakawa received the 2000 Nobel Prize in Chemistry for "The discovery and development of conductive organic polymers". The Nobel citation made no reference to the earlier discoveries.

Modern work with electroluminescence in such polymers culminated with Burroughs et al. 1990 paper in the journal Nature reporting a very-high-efficiency green-light-emitting polymer.[13]

Related technologies

Material technologies

Small molecules

OLED technology was first developed at Eastman Kodak Company by Dr. Ching W. Tang using small molecules. The production of small-molecule displays often involves vacuum deposition, which makes the production process more expensive than other processing techniques (see below). Since this is typically carried out on glass substrates, these displays are also not flexible, though this limitation is not inherent to small-molecule organic materials. The term OLED traditionally refers to this type of device, though some are using the term SM-OLED.

Molecules commonly used in OLEDs include organo-metallic chelates (for example Alq3, used in the first organic light-emitting device) and conjugated dendrimers.

Recently a hybrid light-emitting layer has been developed that uses nonconductive polymers doped with light-emitting, conductive molecules. The polymer is used for its production and mechanical advantages without worrying about optical properties. The small molecules then emit the light and have the same longevity that they have in the SM-OLEDs.

PLED

LEP display showing partial failure

Polymer light-emitting diodes (PLED), also Light-Emitting Polymers (LEP) and Flexible OLED (FOLED), involve an electroluminescent conductive polymer that emits light when connected to an external voltage source. They are used as a thin film for full-spectrum color displays and require a relatively small amount of power for the light produced. No vacuum is required, and the emissive materials can be applied on the substrate by a technique derived from commercial inkjet printing.[15][16] The substrate used can be flexible, such as PET.[17] Thus, flexible PLED displays may be produced inexpensively.

Typical polymers used in PLED displays include derivatives of poly(p-phenylene vinylene) and poly(fluorene). Substitution of side chains onto the polymer backbone may determine the color of emitted light or the stability and solubility of the polymer for performance and ease of processing.

PHOLED

Phosphorescent OLED (PHOLED) uses the principle of electrophosphorescence to convert electrical energy in an OLED into light in a highly efficient manner.

Patterning technologies

POLED

Patternable organic light-emitting device (POLED) uses a light or heat activated electroactive layer. A latent material (PEDOT-TMA) is included in this layer that, upon activation, becomes highly efficient as a hole injection layer. Using this process, light-emitting devices with arbitrary patterns can be prepared.

Inkjet

See "PLED" section.

Laser patterning

Color patterning by means of laser, such as RIST[21].

Backplane technologies

For a high resolution display like a TV, a TFT backplane is necessary to drive the pixels correctly. Currently LTPS-TFT (Low temperature poly silicon) is used for commercial AMOLED displays. LTPS-TFT has variation of the performance in a display, so various compensation circuits have been reported. Due to the size limitation of Excimer laser process used for LTPS, AMOLED size was limited. To cope with the hurdle related to the panel size, amorphous-silicon/microcrystalline-silicon backplane have been reported with large display prototype demonstrations. 。[23][24]

OLED Structures

Bottom emission/Top emission

Bottom emission uses transparent or semi-transparent bottom electrode to get the light through transparent substrate. Top emission uses transparent or semi-transparent top electrode to get the light through counter substrate.

TOLED

Transparent organic light-emitting device (TOLED) uses a proprietary transparent contact to create displays that can be made to be top-only emitting, bottom-only emitting, or both top and bottom emitting (transparent). TOLEDs can greatly improve contrast, making it much easier to view displays in bright sunlight.It is used in Heads up displays.

SOLED

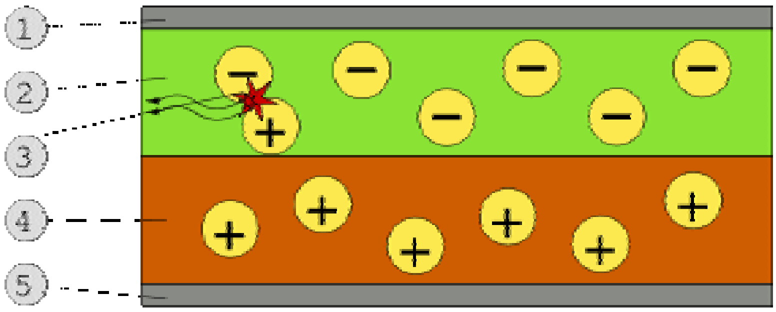
Stacked OLED (SOLED) uses a pixel architecture that stacks the red, green, and blue subpixels on top of one another instead of next to one another as is commonly done in CRTs and LCDs. This improves display resolution up to threefold and enhances full-color quality.

IOLED

In contrast to a conventional OLED, in which the anode is placed on the substrate, Inverted OLED (IOLED) uses a bottom cathode that can be connected to the drain end of n-channel TFT especially for the low cost a-Si TFT backplane useful in manufacturing of AMOLED display.

Working principle

An OLED is composed of an emissive layer, a conductive layer, a substrate, and anode and cathode terminals. The layers are made of special organic polymer molecules that conduct electricity. Their levels of conductivity range from those of insulators to those of conductors, and so they are called organic semiconductors.



OLED schematic: 1. Cathode (−), 2. Emissive Layer, 3. Emission of radiation, 4. Conductive Layer, 5. Anode (+)

A voltage is applied across the OLED such that the anode is positive with respect to the cathode. This causes a current of electrons to flow through the device from cathode to anode. Thus, the cathode gives electrons to the emissive layer and the anode withdraws electrons from the conductive layer; in other words, the anode gives electron holes to the conductive layer.

Soon, the emissive layer becomes negatively charged, while the conductive layer becomes rich in positively charged holes. Electrostatic forces bring the electrons and the holes towards each other and recombine. This happens closer to the emissive layer, because in organic semiconductors holes are more mobile than electrons (unlike in inorganic semiconductors). The recombination causes a drop in the energy levels of electrons, accompanied by an emission of radiation whose frequency is in the visible region. That is why this layer is called emissive.

The device does not work when the anode is put at a negative potential with respect to the cathode. In this condition, holes move to the anode and electrons to the cathode, so they are moving away from each other and do not recombine.

Indium tin oxide is commonly used as the anode material. It is transparent to visible light and has a high work function which promotes injection of holes into the polymer layer. Metals such as aluminium and calcium are often used for the cathode as they have low work functions which promote injection of electrons into the polymer layer.

Just like Passive-matrix LCD (PMLCD) versus Active-matrix LCD (AMLCD), OLED can be categorized into Passive-matrix OLED (PMOLED) and Active-matrix OLED (AMOLED). AMOLED requires a TFT backplane to switch ON/OFF the pixel and can make higher resolution and larger size displays possible.

Advantages

The radically different manufacturing process of OLEDs lends itself to many advantages over flat-panel displays made with LCD technology. Since OLEDs can be printed onto any suitable substrate using an inkjet printer or even screen printing technologies,[29] they can theoretically have a significantly lower cost than LCDs or plasma displays. Printing OLEDs onto flexible substrates opens the door to new applications such as roll-up displays and displays embedded in fabrics or clothing.

OLEDs enable a greater range of colors, brightness, and viewing angle than LCDs, because OLED pixels directly emit light. OLED pixel colors appear correct and unshifted, even as the viewing angle approaches 90 degrees from normal. LCDs use a backlight and cannot show true black, while an "off" OLED element produces no light and consumes no power. Energy is also wasted in LCDs because they require polarizers which filter out about half of the light emitted by the backlight. Additionally, color filters in color LCDs filter out two-thirds of the light.

OLEDs also have a faster response time than standard LCD screens. Whereas a standard LCD currently has an average of 8-12 millisecond response time, an OLED can have less than 0.01ms response time.

Disadvantages

The biggest technical problem for OLEDs is the limited lifetime of the organic materials. In particular, blue OLEDs historically have had a lifetime of around 14,000 hours when used for flat-panel displays, which is lower than typical lifetime of LCD, LED or PDP technology – each currently rated for about 60,000 hours, depending on manufacturer and model. But in 2007, experimental PLEDs were created which can sustain 400cd/m2 of luminance for over 198,000 hours for green OLEDs and 62,000 hours for blue OLEDs.[31].

The intrusion of water into displays can damage or destroy the organic materials. Therefore, improved sealing processes are important for practical manufacturing and may limit the longevity of more flexible displays.

Technology demos

Sony applications

Sony 11-inch OLED, released in Japan at the end of 2007

At the Las Vegas CES 2007, Sony showcased 11-inch (28 cm, resolution 1,024×600) and 27-inch (68.5 cm, full HD resolution at 1920×1080) models claiming million-to-one contrast ratio and total thickness (including bezels) of 5 mm. Sony plans on releasing a commercial version of this television in Japan in December, 2007.

Sony plans to begin manufacturing 1000 11-inch OLED TVs per month for market testing purposes.

On October 1, 2007, Sony announced it will sell 11-Inch OLED TVs for 200,000 yen (1,962.51 USD as of 4/1/08) from December 2007, only in Japan and with an initial production of 2000 units per month.

On May 25, 2007, Sony publicly unveiled a video of a 2.5-inch flexible OLED screen which is only 0.3 millimeters thick. The screen displayed images of a bicycle stunt and a picturesque lake while the screen was flexed.

Other companies

The Optimus Maximus keyboard currently in development by the Art. Lebedev Studio is expected to use 113 48×48-pixel OLEDs (10.1×10.1 mm) for its keys.

OLEDs can be used in High-Resolution Holography (Volumetric display). Professor Orbit showed on May 12, 2007, EXPO Lisbon the potential application of these materials to reproduce three-dimensional video.[citation needed]

OLEDs could also be used as solid-state light sources. OLED efficacies and lifetime already exceed those of incandescent light bulbs, and OLEDs are investigated worldwide as source for general illumination; an example is the EU OLLA project.[36]

On March 11, 2008 GE Global Research demonstrated the first successful roll-to-roll manufactured OLED, marking a major milestone towards cost effective production of commercial OLED technology. The 4 year, $13 million research project was carried out by GE Global Research, Energy Conversion Devices, Inc and the U.S. Commerce Department's National Institute of Standards and Technology (NIST).

Commercial uses

OLED technology is used in commercial applications such as small screens for mobile phones and portable digital audio players (MP3 players), car radios, digital cameras, and high-resolution microdisplays for head-mounted displays. Such portable applications favor the high light output of OLEDs for readability in sunlight, and their low power drain. Portable displays are also used intermittently, so the lower lifespan of OLEDs is less important here. Prototypes have been made of flexible and rollable displays which use OLED's unique characteristics. OLEDs have been used in most Motorola and Samsung color cell phones, as well as some Sony Ericsson phones, notably the Z610i, and some models of the Sony Walkman. It is also found in the Creative Zen V/V Plus series of MP3 players. Nokia has also introduced recently some OLED products, including the 7900 Prism and Nokia 8800 Arte.

On October 1st, 2007, Sony became the first company to announce an OLED television, which was released in Japan in December 2007.

Newer OLED applications include signs and outdoor lighting.[41]

The second-generation flash-based Clix mp3 player, released in April 2007 by iRiver, displays video on a 320x240 2.2" AMOLED screen of 262K color.

Samsung unveiled a 31-inch OLED TV at the January 2008 CES in Las Vegas and is promising much larger screens to come. "We have the technological ability to make 40-inch OLED," said a spokesman, before adding that it won't be until 2010 that the company will be in a position to mass produce such panels.[citation needed]

Use of OLEDs may be subject to patents held by Eastman Kodak and others; Kodak has licensed its patents to other firms for commercialization.

There is speculation that an upgraded version of the Apple iPhone will use OLED technology.

Notes

1. # ^ O. Prache, Active matrix molecular OLED microdisplays, DisplaysVolume 22, Issue 2, May 2001, Pages 49-56. [1]
13. ^ J. H. Burroughes, D. D. C. Bradley, A. R. Brown, R. N. Marks, K. Mackay, R. H. Friend, P. L. Burn, A. B. Holmes, Light-emitting diodes based on conjugated polymers, Nature 1990, 347, 539 – 541
14. ^ C. W. Tang, S. A. VanSlyke, Organic electroluminescent diodes, Appl. Phys. Lett. 1987, 51, 913
15. # ^ T. R. Hebner, C. C. Wu, D. Marcy, M. H. Lu, J. C. Sturm, Ink-jet printing of doped polymers for organic light emitting devices, Appl. Phys. Lett. 1998, 72, 519
16. # ^ J. Bharathan, Y. Yang, Polymer electroluminescent devices processed by inkjet printing: I. Polymer light-emitting logo, Appl. Phys. Lett. 1998, 72, 2660

17. # ^ G. Gustafsson, Y. Cao, G. M. Treacy, F. Klavetter, N. Colaneri, A. J. Heeger, Flexible light-emitting diodes made from soluble conducting polymers, Nature 1992, 357, 477
21 .# ^ M.Boroson et al., "Non-Contact OLED Color Patterning by Radiation-Induced Sublimation Transfer (RIST)", SID2005 Digest, p.972, 2005
http://scitation.aip.org/getabs/servlet/GetabsServlet?prog=normal&id=DTPSDS000036000001000972000001&idtype=cvips&gifs=Yes
23. # ^ T.Tsujimura et al., "A 20-inch OLED Display Driven by Super-Amorphous-Silicon Technology," SID Digest, Vol.34, pp.6-9, May 2003
24. # ^ F.Templier et al, "Development of nanocrystalline silicon thin film transistors with low-leakage and high stability for AMOLED displays", IDMC2006 Digest, p.1705, 2006
29. ^ D. A. Pardo, G. E. Jabbour, N. Peyghambarian, Application of Screen Printing in the Fabrication of Organic Light-Emitting Devices, Adv. Mater. 2000, 12, No. 17, 1249
http://en.wikipedia.org/wiki/Organic_light-emitting_diode#cite_ref-22
31. # ^ Cambridge Display Technology, Cambridge Display Technology and Sumation Announce Strong Lifetime Improvements to P-OLED Material; Blue P-OLED Materials Hit 10,000 Hour Lifetime Milestone at 1,000 cd/sq.m, March 26, 2007, retrieved on January 03, 2008
36. ^ OLLA project, EU OLLA website, retrieved on July 28 2007
41. ^ CeeLite, [4], December 6, 2007

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Tech Guide: Organic LEDs: The future of displays

03 April 2003 10:30 AM

TV screens on cornflake packets and glowing clothes? Organic LEDs lead the way to more efficient, flexible disposable displays.

A decade after the effect was first discovered, organic light emitting diodes (OLEDs) have finally made it into commercial use. Three recent significant announcements illustrate the range of applications of this new technology: Kodak has included an OLED display in a new camera, Samsung in a wristwatch GPRS mobile phone, and Taiwanese company IDTech--a joint operation between IBM Japan and Chi Mei Optoelectronics--has announced a 20 inch monitor. These announcements are significant because OLEDs have some potential advantages over other display options that could make them the technology of choice in the next two to six years.

Like the very familiar light emitting diodes in use today, OLEDs are small lumps of material that glow when a voltage is applied. Again like ordinary LEDs, they produce light of various colours, don't make much waste heat, and can be made very small. However, while traditional LEDs are made using semiconducting elements such as silicon, gallium and so on, with normal semiconductor production techniques, OLEDs are made from plastic compounds originally investigated for making amplifiers or switches. The light emitting effect was discovered almost by accident. Because plastics are much easier to work with in production, OLEDs have the potential to be used in many more ways than other displays.

There are two main classes of OLED, small molecule and polymer. Small molecule OLEDs are built up by depositing molecules of the compound onto the display itself under very low pressures, analogous to the way layers of silicon circuits are applied. Polymer OLEDs have the active molecules suspended in a liquid like pigments in paint, and can be printed onto displays using ink jets, screen printing or any of the various contact techniques used for ordinary inks. While small molecule OLED displays are limited in their size by the vacuum chambers used to make them and have the same form as most conventional displays, polymer OLEDs can be huge--Canon has talked about 500 inch displays or greater--printed onto flexible substrates and created very quickly. Resolution approaching 300 dpi is also possible, approaching the quality of ink on paper.

However, both approaches suffer from some of OLED's weaknesses. The compounds degrade quickly on contact with oxygen or water, making the production process tricky and requiring very good encapsulation technology. Also, the compounds degrade over time, limiting the maximum life of a display, while different colours degrade at different rates making the colour balance change.

None of this has dissuaded companies from investing heavily in the technology, because the upside of OLEDs is significant. As well as having the potential for many different forms of display, the technology can be much brighter, thinner and more efficient than any other type of flat screen. The overwhelming majority of flat monitors and laptop displays these days use thin film transistor liquid crystal devices, TFTLCD, which are made from arrays of pixels comprised of three switched elements letting light through red, green and blue filters. These need a very bright light behind them, as even when switched on each filter blocks around two thirds of the light passing through--and the backlight is still on even when the screen is black.

OLED displays have the same array of pixels with three elements for red, green and blue, but because each element generates its own glow at the right frequency, no light is ever made that doesn't contribute to the image. This leads to massive efficiency savings--the IDTech screen claims to use 25 watts to create 300 candela per square metre brightness. Equivalent LCDs use three times as much power. Because OLEDs don't need the backlight or nearly as many layers as TFTLCDs, they can be made much thinner, and because they don't use polarised light filters they have a much wider viewing angle. They also have a much wider working temperature range.

Despite the appearance of commercial products, these are very early days for OLEDs. Expect them first as backlights for LCDs, and in small consumer products where thinness and power consumption are at a premium, while short lifetimes aren't so important. Mobile phones rarely last more than eighteen months in use, for example. To some extent, the same considerations apply to laptops, especially now that low-power processors are leaving the screen as the major drain on battery life. The more esoteric applications--household lighting, TV screens on cornflake packets and glowing clothes--are still some way away, but few researchers in the field think that they won't happen in ten to twenty years. The future's bright--the future's OLED.
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Organic LED TVs have a rough road to market

By Antone Gonsalves
28 May 2007 12:12PM

Researchers warn organic LED technology may make only minor inroads in the global television market over the next few years.

Despite announcements from Sony and Toshiba touting the visual superiority of organic LED displays, the technology is expected to make only minor inroads in the global television market over the next few years, because of high prices and manufacturing obstacles, a market research firm said.

OLED-TV shipments worldwide are expected to increase to 1.2 million units in 2012 from 8,000 this year, iSuppli said. This would amount to a revenue increase to US$691 million (A$843 million) from less than US$1 million (A$1.2 million).

These numbers, however, reflect a very small share of the overall TV market, accounting for less than half of 1 per cent of the 242.7 million TVs expected to ship in 2011.

Sony recently drew attention to the technology by announcing plans to ship this year in Japan an 11-inch TV with an organic light-emitting diode display. Rival Toshiba responded by saying that it would accelerate plans to release a 20.8-inch TV with similar display technology.

OLED screens, used mostly in mobile phones today, have brighter pictures, higher contrast, and better color than seen on today's LCD and plasma screens, analysts report. The reason is the technology emits light, rather than depending on a backlight.

But making OLED screens in sizes of 20 inches or more, which is necessary to enter the mainstream TV market, is expected to take time, iSuppli said.

Manufacturers will need to develop the processes necessary to make the screens in large volumes, and to build the equipment needed to build the panels efficiently.

Until manufacturers can drop the per-unit cost of making the TVs, retail prices are expected to be much higher than mature options, such as LCD TVs, which are expected to cost half as much, iSuppli said. As a result, most consumers are expected to choose rival technologies, which will be available in abundance.

Today's TV market is flooded with display options, including CRT, LCD, plasma, and four types of projection systems. In addition, there's the potential for a variety of novel technologies, such as surface-conduction electron-emitter display (SED) and carbon-nanotube field emission display (FED), iSuppli said.

With so many options, makers of OLED TVs may find it difficult to attract the attention of end-product OEMs and channel vendors, iSuppli said.

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