An Overview of the Mobiles that is going to be used in Next Generation

G. Nandhini Asssistant Professor/ECE, Kiruthika. J, K. Sivasakthi
Nandha Engineering College, Erode, Tamilnadu, India.

Abstract: In this paper we explain about the different types of oled(Organic Light Emitting Diode) the emerging technol-ogy and its advantage or features over the previous technologies. It finds application in many fields mainly in the display technology. We will also see about different products which use this technology.

I. INTRODUCTION

Of late the development in technology is at its peak. There is a rapid Hike in inventions lately. How much ever the inventions are, it never stops at any point. The way of communication and the devices used for communication is become so hi-fi. For instance, people initially used devices like Telegram then landlines, Mobile phones and ofcourse now smartphones for communicating. Now the invention has stepped up and has come out with a new technology of "Flexible and Foldable displays". These displays use OLEDS. To tell in a simpler way its an upgraded version of LED. These displays can be used in Smartphones, Tablets, and TVs.

II. TYPES OF DISPLAY SCREENS USED IN MOBILE:

TFT LCD

TFT stands for Thin Film Transistor technology. TFT LCDs are the most common type of display units used across mobile phones. TFT LCD offer better image quality and higher resolutions compared to earlier generation LCD dis-plays but their limitation lies in narrow viewing angles and poor visibility in direct light or sunlight. Large TFT dis-plays consume more power and hence are not battery friendly. But since these are cheaper to manufacture these are found on budget phones, feature phones and lower end smartphones.

IPS-LCD

IPS stands for In-Place Switching. IPS-LCDs are superior to normal TFT LCD displays with wider viewing angles and lower power consumption which leads to a much improved battery life. IPS-LCDs are costlier than normal TFT LCD and hence are found only on higher end smartphones. A higher resolution (640 x 960 pixels) version of IPS LCD is used in Apple iPhone 4 and is called Retina Display because of its brilliant picture quality.

RESISTIVE TOUCHSCREEN LCD

Touchscreen LCD displays are of two types – Resistive and Capacitive. Resistive touchscreens contain two layer of conductive material with a very small gap between them which acts as a resistance. When the resistive touchscreen is touched with finger (or stylus) the two layers meet at the point of touch thus making a circuit at the point of touch. This information is recognized by the mobile's processor / chip and passed on to the mobile's OS there by triggering and event / action at the point of touch.
Resistive Touchscreens are not as responsive as capacitive touchscreens and often require a stylus to identify point of touch accurately. These are used only in lower end smartphones and feature touch phones.

CAPACITIVE TOUCHSCEEN LCD

Capacitive touchscreen technology consists of a layer of glass coated with a transparent conductor (like indium tin oxide). When a capacitive touchscreen is touched by human body (finger), an interruption is created in the screens electrostatic field (which is measurable as a change in capacitance) which is detected by phone's processor or chip

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and which in turn instructs phone's operating system to trigger and event or action accordingly. Capacitive touch sense are much better and responsive to human touch when compared to resistive touch sense and hence the user experience for touch is much better with capacitive touchscreens. Capacitive Touch sense are used in most of the higher end smartphones.

GORILLA GLASS

Gorilla Glass is a special alkali-aluminosilicate glass shield with exceptional damage resistance that helps protect mobile displays from scratches, drops, and bumps of everyday use. Many companies like Motorola, Samsung and Nokia are now using Gorilla Glass to make their mobile displays more durable and reliable. It is always better to go for a smartphone with Gorilla Glass for that added protection and peace of mind.

OLE:

OLED stands for Organic Light Emitting Diode and is a newer technology for displays of mobiles and monitors. In OLED technology a layer of organic material (carbon based) is sandwiched between two conducting sheets (an anode and a cathode), which in turn are sandwiched between a glass top plate (seal) and a glass bottom plate (substrate). When electric pulse is applied the two conducting sheets, electro-luminescent light is produced directly from the organic material sandwiched between. Brightness and color can vary depending on the electric pulse. OLEDs are much better compared to LCDs because of their exceptional color reproduction, blazing fast response times, wider viewing angles, higher brightness and extremely light weight designs.

FLEXIBLE OLEDS:

OLED is an emerging display technology that enables beautiful and efficient displays and lighting panels. Over the past year or so there has been a lot of excitement about the release of flexible displays. The mass production of flexible screens is greatly anticipated, in part because of their purported indestructible qualities - but mostly because they guarantee, bona fide, that we are living in the future we imagined as children. In this article, we take a look at flexible screens and displays and give an overview of how they work. Thin OLEDs are already being used in many mobile devices and TVs, and the next generation of these panels will be flexible and bendable.

OLED COMPONENTS:

Like an LED, an OLED is a solid-state semiconductor device that is 100 to 500 nanometers thick or about 200 times smaller than a human hair. OLEDs can have either two layers or three layers of organic material; in the latter design, the third layer helps transport electrons from the cathode to the emissive layer. In this article, we'll be focusing on the two-layer design. An OLED consists of the following parts:
Substrate (clear plastic, glass, foil) - The substrate supports the OLED.
Anode (transparent): The anode removes electrons (adds electron "holes") when a current flows through the device.
Organic layers - These layers are made of organic molecules or polymers.
Conducting layer - This layer is made of organic plastic molecules that transport "holes" from the anode. One conducting polymer used in OLEDs is polyaniline.
Emissive layer - This layer is made of organic plastic molecules (different ones from the conducting layer) that transport electrons from the cathode; this is where light is made. One polymer used in the emissive layer is polyfluorene. Cathode (may or may not be transparent depending on the type of OLED) - The cathode injects electrons when a current flows through the device. The biggest part of manufacturing OLEDs is applying the organic layers to the substrate.

III. TYPES OF OLEDS:

There are several types of OLEDs:

- Passive-matrix OLED
- Active-matrix OLED
- Transparent OLED

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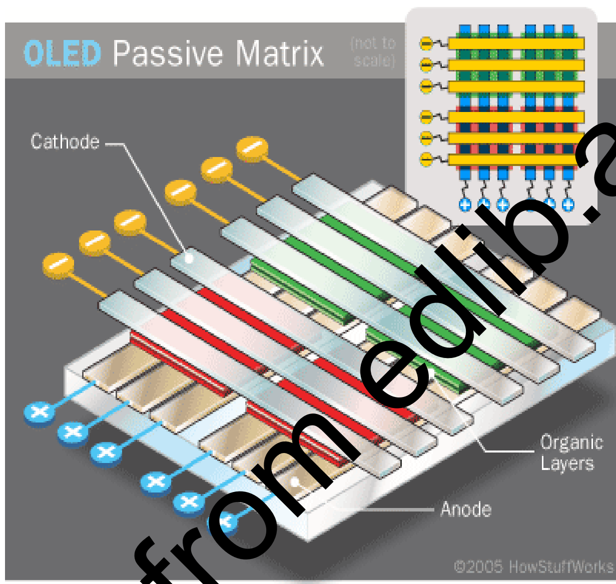
- Top-emitting OLED
- Foldable OLED
- White OLED

Each type has different uses. In the following sections, we'll discuss each type of OLED. Let's start with passive-matrix and active-matrix OLEDs.

PASSIVE-MATRIX OLED (PMOLED)

PMOLEDs have strips of cathode, organic layers and strips of anode. The anode strips are arranged perpendicular to the cathode strips. The intersections of the cathode and anode make up the pixels where light is emitted. External circuitry applies current to selected strips of anode and cathode, determining which pixels get turned on and which pixels remain off. Again, the brightness of each pixel is proportional to the amount of applied current.



PMOLEDs are easy to make, but they consume more power than other types of OLED, mainly due to the power needed for the external circuitry. PMOLEDs are most efficient for text and icons and are best suited for small screens (2- to 3-inch diagonal) such as those you find in cell phones, PDAs and MP3 players. Even with the external circuitry, passive-matrix OLEDs consume less battery power than the LCDs that currently power these devices.

ACTIVE-MATRIX OLED (AMOLED)

AMOLEDs have full layers of cathode, organic molecules and anode, but the anode layer overlays a thin film transistor (TFT) array that forms a matrix. The TFT array itself is the circuitry that determines which pixels get turned on to form an image. AMOLEDs consume less power than PMOLEDs because the TFT array requires less power than external circuitry, so they are efficient for large displays. AMOLEDs also have faster refresh rates suitable for video. The best uses for AMOLEDs are computer monitors, large-screen TVs and electronic signs.

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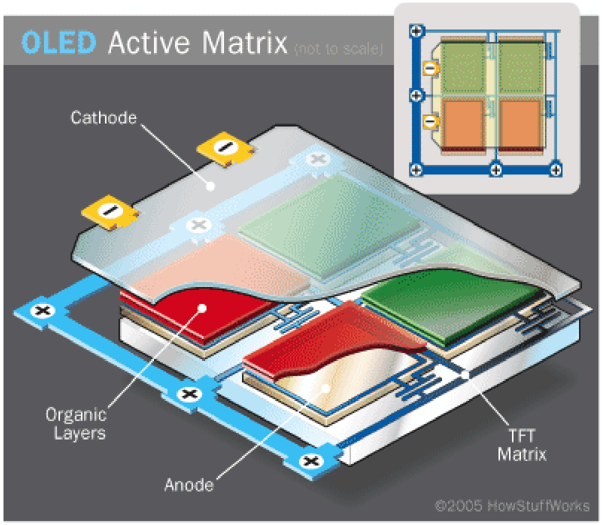

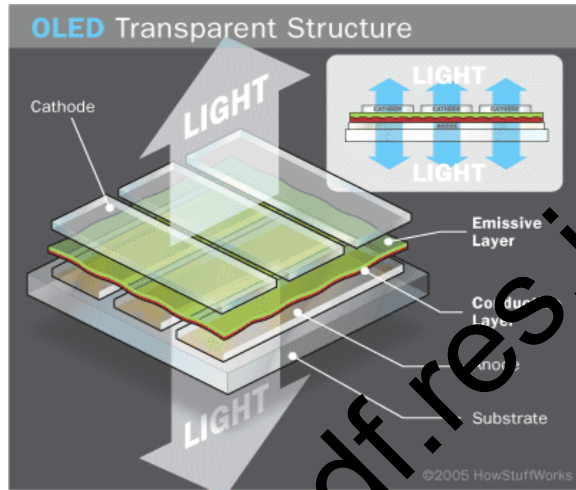

TRANSPARENT OLED

Transparent OLEDs have only transparent components (substrate, cathode and anode) and, when turned off, are up to 85 percent as transparent as their substrate. When a transparent OLED display is turned on, it allows light to pass in both directions. A transparent OLED display can be either active- or passive-matrix. This technology can be used for heads-up displays.

FOLDABLE OLED

Foldable OLEDs have substrates made of very flexible metallic foils or plastics. Foldable OLEDs are very light-weight and durable. Their use in devices such as cell phones and PDAs can reduce breakage, a major cause for re-turn or repair. Potentially, foldable OLED displays can be attached to fabrics to create "smart" clothing, such as out-door survival clothing with an integrated computer chip, cell phone, GPS receiver and OLED display sewn into it.

WHITE OLEDS

White OLEDs emit white light that is brighter, more uniform and more energy efficient than that emitted by fluores-cent lights. White OLEDs also have the true-color qualities of incandescent lighting. Because OLEDs can be made in large sheets, they can replace fluorescent lights that are currently used in homes and buildings. Their use could potentially reduce energy costs for lighting. In the next section, we'll discuss the pros and cons of OLED technology and how it compares to regular LED and LCD technology.

IV. HOW DO OLEDS EMIT LIGHT?

OLEDs emit light in a similar manner to LEDs, through a process called electro phosphorescence.

The process is as follows:

1. The battery or power supply of the device containing the OLED applies a voltage across the OLED.
2. An electrical current flows from the cathode to the anode through the organic layers (an electrical current is a flow of electrons). The cathode gives electrons to the emissive layer of organic molecules. The anode re-moves electrons from the conductive layer of organic molecules. (This is the equivalent to giving electron holes to the conductive layer.)
3. At the boundary between the emissive and the conductive layers, electrons find electron holes. When an electron finds an electron hole, the electron fills the hole (it falls into an energy level of the atom that's missing an electron). When this happens, the electron gives up energy in the form of a photon of light.
4. The OLED emits light.
5. The color of the light depends on the type of organic molecule in the emissive layer. Manufacturers place several types of organic films on the same OLED to make color displays.

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6. The intensity or brightness of the light depends on the amount of electrical current applied: the more current, the brighter the light

V. OLED vs LCD

OLED displays have the following advantages over LCD displays: Lower power consumption Faster refresh rate and better contras Greater brightness - The screens are brighter, and have a fuller viewing angle Exciting displays - new types of displays, that we do not have today, like ultra-thin, flexible or transparent displays Better durability - OLEDs are very durable and can operate in a broader temperature range Lighter weight - the screen can be made very thin, and can even be 'printed' on flexible surfaces

VI. OLED Advantages and Disadvantages

The LCD is currently the display of choice in small devices and is also popular in large-screen TVs. Regular LEDs often form the digits on digital clocks and other electronic devices. OLEDs offer many advantages over both LCDs and LEDs:

- The plastic, organic layers of an OLED are thinner, lighter and more flexible than the crystalline layers in an LED or LCD.
- Because the light-emitting layers of an OLED are lighter, the substrate of an OLED can be flexible instead of rigid. OLED substrates can be plastic rather than the glass used for LEDs and LCDs.
- OLEDs are brighter than LEDs. Because the organic layers of an OLED are much thinner than the corresponding inorganic crystal layers of an LED, the conductive and emissive layers of an OLED can be multi-layered. Also, LEDs and LCDs require glass for support, and glass absorbs some light. OLEDs do not require glass.
- OLEDs do not require backlighting like LCDs work by selectively blocking areas of the backlight to make the images that you see, while OLEDs generate light themselves. Because OLEDs do not require backlighting, they consume much less power than LCDs (most of the LCD power goes to the backlighting). This is especially important for battery-operated devices such as cell phones.
- OLEDs are easier to produce and can be made to larger sizes. Because OLEDs are essentially plastics, they can be made into large, thin sheets. It is much more difficult to grow and lay down so many liquid crystals.
- OLEDs have large fields of view, about 170 degrees. Because LCDs work by blocking light, they have an inherent viewing obstacle from certain angles. OLEDs produce their own light, so they have a much wider viewing range.

VII. Problems with OLED

OLED seems to be the perfect technology for all types of displays, but it also has some problems:

- Lifetime - While red and green OLED films have longer lifetimes (46,000 to 230,000 hours), blue organics currently have much shorter lifetimes (up to around 14,000 hours)
- Manufacturing - Manufacturing processes are expensive right now.
- Water - Water can easily damage OLEDs.

VIII. CURRENT AND FUTURE OLED APPLICATIONS

Currently, OLEDs are used in small-screen devices such as cell phones, PDAs and digital cameras. In September 2004, Sony Corporation announced that it was beginning mass production of OLED screens for its CLIE PEG-VZ90 model of personal-entertainment handhelds. Kodak was the first to release a digital camera with an OLED display in March 2003; the Easy Share LS633.Several companies have already built prototype computer monitors and large-screen TVs that use OLED technology. In May 2005, Samsung Electronics announced that it had developed a prototype 40-inch, OLED-based, ultra-slim TV, the first of its size. And in October 2007, Sony announced that it would be the first to market with an OLED television. The XEL-1 will be available in December 2007 for customers in Japan. It lists for 200,000 Yen -- or about $1,700 U.S. Research and development in the field of OLEDs is proceed-

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ing rapidly and may lead to future applications in heads-up displays, automotive dashboards, billboard-type displays, home and office lighting and flexible displays. Because OLEDs refresh faster than LCDs -- almost 1,000 times faster -- a device with an OLED display could change information almost in real time. Video images could be much more realistic and constantly updated. The newspaper of the future might be an OLED display that refreshes with breaking news and like a regular newspaper, you could fold it up when you're done reading it and stick it in your backpack or briefcase.

CONCLUSION

These OLEDs can not only be used in mobiles but also in TVs, TABs, Home lightings, etc. Since they have a good lighting effect compared to other displays they can be used in different fields according to the need. As the OLED is so thin and flexible they will have a wider application even in future. This OLED is also been expected to be used by many people all around the world

(i.e) it's expected to have good popularity and welcomed by people.

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