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A REVIEW PAPER ON: STUDY OF ORGANIC LIGHT EMITTING DIODE

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ABSTRACT - *As the time has progressed many changes have occurred in the field of display technology. For display light Emitting Diode (LEDS) and Liquid Crystal Displays (LCDS) are used but they have certain problems. Hence the discovery of OLED can overcome the problem associated with them. OLED is an electronic device consists of thin films of organic molecule sandwiched between two thin conductive electrode films which create light by applying electricity. OLEDs are self luminous as it is composed of thin film of organic compounds. It can have two or three layers of organic material. LED has a viewing angle up to 160 degrees and the power consumption is only up to 2 to 10 volts. This low consumption of power provides maximum efficiency and helps to minimize heat and electricity interference in electronic devices. Hence are sharper, thinner cheaper, and flexible.*

***Key Words*: light emitting diode, liquid crystal display, organic LED; displays; organic material.**

1. INTRODUCTION

OLE is a new technology based on electroluminescence. The Organic materials have many advantages over their inorganic counterparts. An organic light emitting diode (OLED) may be solution Processed, allowing the fabrication of devices such as circuits,displays,and radio frequency identification devices on plastic substrate, and deposition by unconventional means, such as screen and inkjet printing. OLED has a simple fabrication process and reduced distortion according to the geometric form of displays. It does not require backlight and viewed from different angle. Hence OLEDs have thin and compact display.

2. ORGANIC LIGHT EMITTING DIODE

An OLED is an electronic device consists of thin film of organic compound that emits light from solid when electric current is passed. It uses molecule based carbon which emits light hence known as electro phosphorescence.

The displays require very little power, i.e., only 2-10 volts. OLED technology uses substances that emit red, green, blue or white light. Without any other source of illumination, OLED materials present bright, clear video and images that are easy to see at almost any angle. Enhancing organic material helps to control the brightness and color of light. OLEDs are used to create digital displays in devices such as television screens, computer monitors, and portable systems such as mobile phones, handheld game consoles and PDAs. A major area of research is the development of white OLED devices for use in solid-state lighting applications.

3. WORKING PRINCIPLE:

OLED are thin film multi-layer devices consisting of a layer of organic materials situated between two

electrodes, the anode and cathode, all deposited on a substrate. The organic molecules are electrically conductive as a result of delocalization of pi electrons caused by conjugation over part or the entire molecule. The voltage bias from 2.5 to 20V is applied. The Active layers are very thin so the electric field in the active layers is very high about 105-107V/cm.Therefore the charge carriers inject across the active layer interfaces. The electrons are injected from the cathode and holes from the anode. The charge carriers meet and recombine. In this recombination process the energy is released and the molecule or a polymer segment in which the recombination occurs, reaches an exited state. Some molecule or polymer segment release energy as photon or heat. The suitable dopants are added, which release the energy more efficiently as photons.

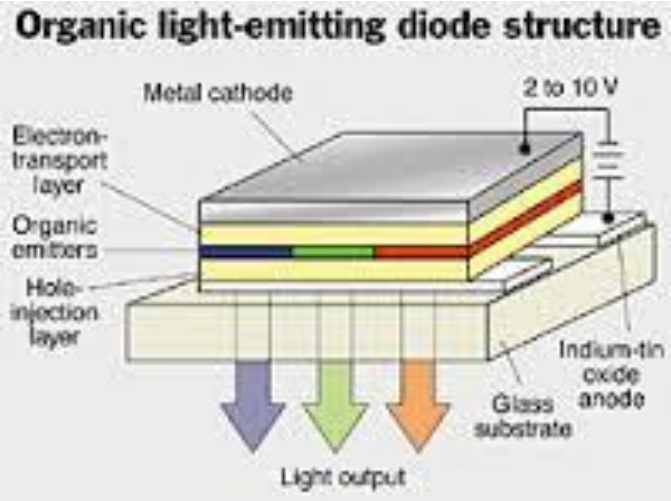

Fig -1: OLED Structure

4. ADVANTAGES

Weight and Substrates: OLED is light weighted and its displays can be fabricated on flexible plastic substrates such as polyethylene terephthalate (PET), which is used for many new applications, such as roll-up displays.

Cost: OLEDs are inexpensive and they can be printed onto any suitable substrate by an inkjet printer or even by screen printing than LCD or plasma displays.

Viewing angles and Brightness: OLED pixels emit light directly therefore enable a wider viewing angle compared to LCDs. The pixel color of OLEDs appears unshifted and correct, even as the viewing angle approaches 90° from normal.

Power efficiency and Thickness: LCDs cannot show true black as they filter the light emitted from a backlight, allowing a small fraction of light through. However, OLEDs does not produce light or consume power, thus allowing true blacks.

Response time: The response time of OLEDs is faster than an LCD. Using response time compensation technologies, the fastest modern LCDs can reach as low as 1ms response times for their fastest color.

5. COMMERCIAL USES

The technology based on OLED is used in various applications such as displays used in mobile phones and portable digital media players, car radios and digital cameras etc. This portable application provides high light output of OLEDs for readability in sunlight and low power drain. Portable displays are also used intermittently, so the lower lifespan of organic displays is less of an issue.

6. CONCLUSIONS

Organic light emitting diode is more energy efficient which makes electronic viewing more convenient. Hence it is the revolution in the field of illumination. So OLED technology is expected as a key technology in the development of flexible displays. It offers many advantages over both LEDs and LCDs, as they are thinner, lighter and more flexible than the crystalline layers as in an LED or LCD.

7. FUTURE SCOPE

In the field of OLEDs research and development has lead to many future applications like in the automotive dash boards, heads up display, billboard type displays. As OLEDs response time is faster than LCDs, OLED display could change real time information. Video images can be constantly updated and can be more realistic. Due to its wide viewing angle than LCDs it can replace LCDs in future therefore it become key technology in the field of flexible displays development.

REFERENCES

[1] J. Kalinowski, Emission Mechanisms in Organic Light-Emitting Diodes, Organic Electroluminescence, Taylor & Francis, Boca Raton, 2005.

[2] J. Godlewski, M. Obarowska, Organic light emitting devices, Opto-Electronics 15/4 (2007) 179-183.

[3] M.J. Ma□achowski, J. □mija, Organic field effect transistors, Opto-Electronics Review.

[4] T. Urabe, The outstanding potential of OLED displays for TV applications, SID Society for Information Display 24/9 (2008) 14-17.

[5] J.S. Yoo, N. Choi, Y.-Ch. Kim, I.-H. Kim, S.-Ch. Byun, S.-H. Jung, J.-M. Kim, S.-Y. Yoon, Ch.-D. Kim, I.-B. Kang, I.-J. Chung, Technological considerations for manufacturing flexible active-matrix OLED displays, Society Information Display 24/9 (2008) 26-31.