

EMERGING OLED TECHNOLOGY PUTS ON AN IMPRESSIVE DISPLAY

As technology progresses, it seems as though there would eventually be a cap on the ability to advance any further. However, despite the flood of emerging technologies within the last 20 years, there seems to be no immediate slow-down in this emphatic drive for progress. If anything, the pace of growth and expansion has only increased. There are a variety of fields in which this fascinating growth can be witnessed. Among these, the field of display technologies is just beginning to receive a large audience of interest.

As desktop computers and handheld devices first started becoming popular, the type and relative quality of the display being used was not a high priority for most users. In fact, as long as it was readable, and preferably in color, most users were quite happy with almost anything. However, this is all changing, perhaps mostly due to the strong driving force of the entertainment industry.

As users become more involved in interactive games, listening to music, and watching DVDs, the importance of having a high-quality monitor or display becomes a top priority. We can even see this developing in devices such as PDAs and Cell Phones. Users want to be able to conveniently accomplish more with increasingly smaller devices. An important part of this is the ability to see what you want in a way that is not only adequate, but brilliant and exciting.

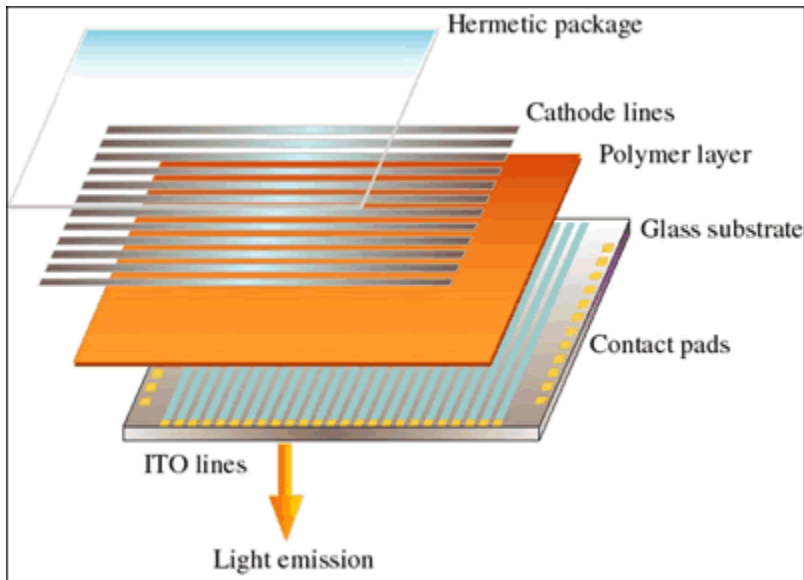
Due to the increased market, developers have been able to devote greater resources to the research of high-tech displays. One of the greatest break-through technologies in this field is that of the Organic Light Emitting Diode (OLED). Sanyo Electric and the Eastman Kodak Company were among the first development teams to begin work on this project [1]. The basic idea was to use organic material that would actually emit light in order to reduce cost and power, and to increase portability. The OLED displays are an impressive realization of this objective.

To shed some light on current display technology (no pun intended), many displays (particularly for small or mobile devices) use Liquid-Crystal Displays (LCDs). These monitors use two sheets of polarized material that enclose a liquid-crystal substance. Behind all of this is a back-lighting that allows for the actual image to display on the screen. In order to provide the actual appearance of an image (including color) an electric current is sent through the solution, which then aligns specific crystals to block out certain frequencies of the backlighting to display an image on the screen [2].

In contrast, one of the main features of the OLED display is the fact that no back lighting is necessary. Instead, OLEDs use a process called electrophosphorescence. In this process (shown in figure 1 [3]), a series of thin, organic films are inserted between two conductors (an Anode and Cathode). When an electrical current is applied to the conductors, a bright light is emitted from the organic material [4]. This eliminates the need to have backlighting, and is also more efficient in using power. If a backlight were used, a constant source of relatively high power would need to be emitted in order to sustain the viability of the image display. By using an OLED to actually emit the image,

the need for this amount of power is reduced so that only enough power to drive the image is consumed by the device.

Figure 1 Provided by DuPont Displays [3]



The benefits of the OLED display are tremendous when compared with “traditional” display technology. Through the use of organic materials, the cost of mass production will be substantially lower than that of producing LCD displays. Due to the lack of extra electronics in creating a backlighting, the devices will be much more portable than current monitors. This will allow engineers much more space inside of devices such as PDAs and Cell Phones so that extra features may be added, longer-life batteries might be installed, or simply that the device can be even more portable.

The efficient use of power is also an important benefit of the OLED display. By reducing power, batteries will naturally last longer in mobile devices, thus saving on energy. The displays will also allow for a much greater viewable angle than LCDs. As many laptop users have noticed, an LCD screen will display colors differently from

various angles of the screen. In fact, the colors at the top of the screen will look differently than those nearer the bottom. OLEDs allow for a viewable range of approximately 160 degrees, which is much higher than that of LCD. Some other advantages include: increased brightness, faster display rate, better durability, and better operating temperature ranges [4].

As this intriguing technology emerges, we will surely see improvement in many areas of visual technology. Once the initial research and development costs of the product have lessened, we can also expect that high-quality displays will reduce in cost to the consumer. It is truly exciting to be able to witness the development of technology within so many different fields. The audio/visual industry has come along way in bringing entertainment and information to life. This will prove to be another important step in the high-tech revolution.

References:

[1] Kodak—<http://www.kodak.com/country/US/en/corp/researchDevelopment/productFeatures/oled.shtml>

[2] Sixto Ortiz Jr. “New Monitor Technologies are on Display” Computer, February 2003 pg 13

[3] DuPont Displays—<http://www.dupont.com/displays/oled/>

[4] Wave-Report OLED tutorial—<http://www.wave-report.com/tutorials/oled.htm>