Bhilai Institute of Technology, Durg

CURRENT TIMES

Power of Technology

The In-house Quarterly News letter of Electrical Engineering Department

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Inside Issue

Vision

To contribute to the nation, by delivering quality education and creating globally competent professionals to serve the industry and society.

Mission

To create intellectually stimulating environment for learning, research and promotion of professional and ethical values, to develop a sense of responsibility, discipline and interest amongst students in various activities leading to the welfare of the industry and society at large and to empower the students through lifelong learning for self up-gradation and societal upliftment.

Program Educational Objectives (PEOs)

PEO-1 To impart sound foundation in Mathematics, Applied Science and Engineering to the graduates, which enables them to formulate, solve and analyze the problems in Electrical Engineering.

PEO-2 To develop analyzing skill amongst graduates for technical interpretation, designing and implementation of ideas.

PEO-3 To promote students for taking up new responsibilities and challenges in multidisciplinary projects.

PEO-4 To equip graduates with integrity and ethical values so that they become responsible technocrats.

Editorial

Dear Readers,

Warm welcome to new edition of "Current Times". The present edition of the Current Times is focused on Quality Engineering education and it`s global acceptability Our department has been successfully accredited twice by NBA.

The Department has applied for the NBA Accreditation for third time. This time the evaluation will be done the basis of Washington Accord . This issue of Current times gives an insight of Outcome based education method and the significance of accreditation in modern era.

Wishing you all Good and Happy times ahead.....

Dr Nagendra Tripathi

Editor

ORGANIC LED (OLED)

An organic light -emitting diode (OLED) is a light emitting diode (LED) in which the emissive electroluminescent layer is a film of organic compound that emits light in response to an electric current. This layer of organic semiconductor is situated between two electrodes ; typically, at least one of these electrodes is transparent. OLEDS are used to create digital displays in devices such as television screens, computer monitors, 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.

Types of OLED

There are two main families of OLED : those based on small molecules and those employing polymers. Adding mobile ions to an OLED creates a light-emitting electrochemical cell (LEC) which has a slightly different mode of operation. OLED displays can use either passive-matrix (PMOLED) or active-matrix ***(AMOLED***) addressing schemes. Passive matrix OLEDS uses a simple control scheme in which you control each row in the display sequentially whereas active-matrix OLEDS (AMOLED) require a thin-film transistor backplane to switch each individual pixel on or off, but allow for higher resolution and large display sizes.

An OLED display works without a backlight; thus,it can display deep black levels and can be thinner and lighter than a liquid crystal display (LCD).In low ambient light conditions an OLED screen can achieve a higher contrast ratio than an LCD.

Who invented OLEDs ?

Organic semiconductors were discovered in the mid-1970 by Alan Heeger, Alan MacDiarmid and HIdeki Shirakawa, who shared the Nobel Prize in Chemistry in 2000 for their work. THe first efficient OLED- described as 'a novel electroluminescent device.. constructed using organic materials as the emitting elements'- was developed by Ching Tang and Steven VanSlyke.

Principle

OLEDs work in a similar way to conventional diodes and LEDs, but instead of using layers of n-type and p-type semiconductors, they use organic molecules to produce their electrons and holes. A simple OLED is made up of six different layers. On the top and bottom there are layers of protective glass or plastic. The top layer is called the seal and the bottom layer the substrate. In between those layers, there's a negative terminal(cathode) and a positive terminal (anode). Finally, in between the anode and cathode are two layer s made from organic molecules called the emissive layer and the conductive layer.

Working

To make an OLED light up, we simply attach a voltage across the anode and cathode.

As the electricity starts to flow, the cathode receives electrons from the power source and the anode loses them

Now we have a situation where the added electrons are making the emissive layer negatively charged, while the conductive layer is becoming positively charged

Postive holes are much more mobile than negative electrons so they jump across the boundary from the conductive layer to the emissive layer. When a hole meets a electron, the two things cancel out and release a brief burst of energy in the form of a particle of light - a photon. This process is called recombination and because it's happening many times a second , the OLED produces continuous light for as long as the current keep flowing.

We can make an OLED produce coloured light by adding a coloured filter into our plastic sandwich just beneath the glass or plastic top or bottom layer. If we put thousands of red, green and blue OLEDs next to one another and switch them on and off independently, they work like the pixel in a conventional LCD screen, so we can produce complex, hi-resolution coloured pictures.

What are OLED used for ?

OLED technology is still relatively new and unused compared to similar, long-established technologies such as LCD. Broadly speaking you can use OLED displays wherever you can use LCDs, in such things as TV and computer screens and MP3 and cell phone displays. Their thinness, greater brightness and better colour reproduction suggest they will find many other exciting applications in future.

Advantages

Lower cost in future : OLEDs can be printed onto any suitable substrate by an inkjet printer or even by screen printing, theoretically making them cheaper to produce than LCD or plasma displays.

Light weight and flexible plastic substrates : OLED display can be fabricated on flexible plastic substrates, leading to the possible fabrication of flexible organic light-emitting diodes for other new applications, such as roll-up displays embedded in fabrics or clothing.If a substrate like polyethylene terephthalate (PET) cabn be used, the displays may be produced inexpensively.

Better picture quality : OLEDs enable a greater contrast ratio and wider viewing angle compared to LCDs, because OLED pixels emit light directly.

Better power efficiency and thickness : LCDs filter the light emitted from a backlight, allowing a small fraction of light through. Thus, they cannot show true black. However, an inactive OLED element does not produce light or consume power , allowing true blacks.

Response time : OLEDs also have a much faster response time than an LCD. According to LG, OLED response times are up to 1000 times faster than LCD , putting conservative estimates at under 0.01ms

which could theoretically accomodate refresh frequencies approaching 100 kHz. Due to their extremely fast response time, OLED displays can also be easily designed to be strobed, creating an effect similar to CRT flicker in order to avoid the sample-and-hold behaviour seen on both LCDs and some OLED displays, which creates the perception of motion blur.

Disadvantages

Life spans : The biggest technical problem for OLEDs was the limited lifetime of the organic materials.

Colour balance : Additionally, as the OLED material used to produce blue light degrades significantly more rapidly than the materials that produce other colours , blue light output will decrease relative to the other colours of light. This variation in the differential colour output will change the colour balance of the display and is much more noticeable than a decrease in overall luminance.

Efficiency of blue OLEDs : Improvements to the efficiency and lifetime of blue OLEDs is vital to the success of OLEDs as replacement for LCD technolgy. Considerable research has been invested in developing blue OLEDs ; however blue diodes have only been able to achieve maximum external quantum efficiencies in the range of 4% to 6%.

Water damage: Water can instantly damage the organic materials of the displays. Therefore, improved sealing processes are important for practical manufacturing.

Outdoor performance : As an emissive display technology , OLEDs rely completely upon converting electricity to light , unlike most LCDs which are to some extent reflective.

Power consumption : While an OLED consume around 40 % of the power of an LCD displaying an image that is primarily black, for the majority of images it will consume 60% to 80 % of the power of LCD. However, an OLED can use more than three times as much power to display an image with a white background, such as document . This can lead to reduced battery life in mbile devices, when white backgrounds are used.

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