White LED’s Future Lamps

Surabhi Choudhary , Student

Department of Electrical Engg

 SGGSIE&T, Nanded-431606, India

Abstract **— This paper is about how the development of white light LEDs has led to significant increase in market for a range of brand new applications. High efficiency of these LEDs have given us solutions for room lighting, automotive headlights and backlighting for LCD displays and street lightning too .The advantages of their reduced energy requirements are apparent – For example, the running time of battery operated devices such as mobile phones and notebook computers can be extended considerably. A crystal measuring just a few millimeters is positioned on a reflector which conducts the light with total accuracy .The reflector and crystal are affixed to a bracket containing the electrical contacts .The bracket with the crystal and reflector is typically encapsulated in epoxy resin.**

I. INTRODUCTION

LED is a semiconductor crystal that emits visible light when charged with electricity .The light-emitting diode (LED) is not only one of the most energy-efficient lamps available today, but also adds a personal touch to lighting design . When a light-emitting diode is forward-biased (switched on), electrons are able tore combine with electron holes within the device, releasing energy in the form of photons. 

Fig. 1. Conduction of LED and its Band gap .

This effect is called electroluminescence and the color of the light (corresponding to the energy of the photon) is determined by the energy gap of the semiconductor. An LED is often small in area (less than 1 mm2), and integrated optical components may be used to shape its radiation pattern.  LEDs present many advantages over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. LEDs powerful enough for room lighting are relatively expensive and require more precise current and heat management than compact fluorescent lamp sources of comparable output Light-emitting diodes are used in applications as diverse as aviation lighting, automotive lighting, advertising, general lighting, and traffic signals. LEDs have allowed new text, video displays, and sensors to be developed, while their high switching rates are also useful in advanced communications technology. Infrared LEDs are also used in the remote control units of many commercial products including televisions, DVD players, and other domestic appliances. The white color of the LED light is generated by converting a blue diode with a fluorescent layer.

II. EFFICIENCY

Energy efficiency of light sources is typically measured in lumens per watt (lm/W), meaning the amount of light produced for each watt of electricity consumed. This is known as luminous efficacy. The efficiency of LEDs is constantly changing. Currently the best power-LEDs have an efficiency of 120 lm/W. We expect the light output of white LEDs to increase even more, for general lighting purposes. The LED range extends from small signal to the latest high-power LEDs. LED-based lighting sources are of high luminous efficiency . Luminous efficiency is a term expressing the luminous flux per unit electrical input power. if perfect solid-state lighting devices can be fabricated, the same level of luminance can be achieved by using merely 1/20 of the energy that incandescent lighting source requires. An LED street light based on a 901 mille watt output LED can normally produce the same amount of (or higher) luminance as a traditional light, but requires only half of the power consumption. LED bulbs can reduce your energy usage by 80% . They use up to 75% less energy than regular bulbs and last up to 40 times longer.



Fig. 2. Luminous efficacy of all lightening bulbs

III. APPLICATIONS

LED lighting systems have been used to light up buildings, bridges and monuments. Due to their flexibility and the possibility to set any desired colour, LEDs offer lighting solutions, which are not possible with any other existing technologies, such as colour wall washing, sharp light lines and avoiding light pollution on windows. In the field of exterior lighting within the automobile, the light emitting diode (LED) is becoming more and more significant

IV. ADVANTAGES.

* The lifetime of LED street lights is usually 10 to 15 years, three times the life of current technologies adopted. The much less frequent need to service or replace LEDs means low maintenance cost.
* LEDs can be dimmed when less street lighting is needed, such as late at night, and at dusk or early dawn
* All other types of lighting (except incandescent) require ballasts, additional electronic and/or electromagnetic components, in which some power is consumed.
* LEDs don’t contain mercury or lead, and don’t release poisonous gases if damaged.
* Other types of street lights use a reflector to capture the light emitted upwards from the lamp, but LED lamp assemblies (panels) do not require reflectors and can be designed to provide the desired coverage without a refractor.
* High efficiency = low energy consumption

V. DISADVANTAGES

* LED lights remain too expensive to replace the cheap incandescent lights. An LED version of a 100-watt incandescent light-bulb, for instance, still costs roughly $80, compared with around $3 for a traditional incandescent.
* LEDs are not inherently white light sources so they make excellent spot and flood lights, but are less effective as general lights.
* Color rendering properties of cool white

LEDs are insufficient for some applications

VI. FUTURE SCOPE

In the coming years, the light output of LEDs will continue to increase, enabling mass–market general lighting applications from approx 2010 onwards. The first effective general LED solutions to replace incandescent will appear on the market over the next two to three years, but initially they will be relatively expensive.

 VII. SUMMARY

* LED’s are improving very speedily ,commercial performance of LED’s is 100 lm/W range is beginning , in next five years it should happen ~180 lm/W.
* It is clear from all discussions that Led’s will replace general Illumination soon.
* Full conversion at 150 lm/W will reduce electricity used for lightning by ~50% and will save more than 100 nuclear reactors.
* Due to its handiness and easy availability many people have switched to LED’s.
* Due to more lumens, lower cost and higher efficiency it is of key importance.

VIII. REFERENCES,

1. LED light sources (light for the future) - Abstract - Journal of Physics D: Applied Physics – IOPscience.cpm
2. IEEE Xplore - The topologies of white LED lamps&#39; power drivers

ieeexplore.ieee.org.

1. Light-emitting diode - Wikipedia, the free encyclopedia

en.wikipedia.org

1. Luminous efficacy - Wikipedia, the free encyclopedia

en.wikipedia.org

1. White LED lights with 135 Lumens per Watt About Ten Times Better than Incandescent

nextbigfuture.com

1. A Bright Future For LED Illumination

electronicdesign.com

1. Disadvantages of White LED | eHow.com

ehow.com

1. New Applications Using White LED for Frontlighting

papers.sae.org