

A Survey on Wavelength Based Application of Ultraviolet LED

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ABSTRACT

The most important factor of LED and any other sources of light depends upon wavelength. Hence, wavelength plays a major role in different applications. So, it becomes necessary to know nature of materials, to produce lights with different wavelengths. The present paper focuses on a study of ultraviolet LED and its applications. The paper describes more specifically UV-A, UV-B and UV-C types. Applications of security, sterilization and herpetology have been discussed.

Keywords : Ultraviolet LED, Electromagnetic Spectrum of Wavelengths.

I. INTRODUCTION

The new crop of LED gel lamps on the market have caused a bit of confusion as to the benefits and differences between UV-LED and the standard UV lamps which have been used for many years. So, what is an UV light, anyway? All lights are categorized by their different wavelengths, which you can see in Electromagnetic spectrum. For visible region it might be taken as 400nm to 780nm and when ultraviolet light occurs between roughly 100nm to 400nm; and UV light is further divided into groups A,B,C. A key note to understand is that UV-LED lights are actually UV light also, because they emit light that is within ultraviolet spectrum. The paper is organized as follows: in section II work related to UV-A, UV-B and UV-C is discussed; and section III presents materials used to produce ultraviolet-LED, its applications and study of energy saver.

II. METHODS AND MATERIAL

A. Related Works

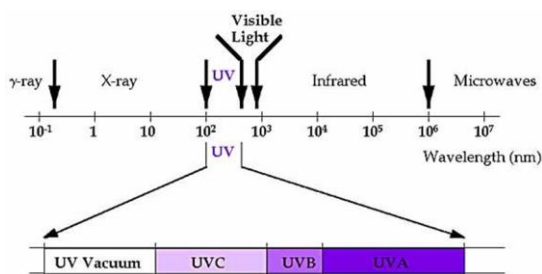


Figure 1. Electromagnetic spectrum of UV

Table 1. Wavelength Range

UV	Wavelength (nm)
UV vacuum	100 to 200
UV-C	200 to 280
UV-B	280 to 315
UV-A	315 to 400

From figure 1 we can easily identify the range of Ultraviolet(100nm to 400nm) through spectrum and table 1 shows the sub divided UV-spectrum wavelength range. Each and every wavelength range has specific applications.

Mirei Mori [8] proposes that UV-A LED is able to inactivate bacterias such as Enteropathogenic Ecoli, Vibrio parahaemolyticus, Staphylococcus aureus and Salmonella enterica serovas enteritidis. Through this we can be able to protect ourselves from such kind of bacterias and being safe because UV-A has a long wavelength-range among the UV-spectrum. Also UV-vaccum has a short wavelength-range, which may also be applicable.

Sawyer [1] constructed AlGaN doped UV-B LED, which are used worldwide in medical field and UV-C is nearly invisible to the naked eye, but it has many practical applications.

B. Materials for Ultraviolet LED

There are several materials to produce ultraviolet light. The following materials are used in UV-LED, to produce corresponding wave lengths :

- Diamond – 235nm
- Aluminium gallium nitride – 220nm
- Boron nitride – 215nm
- Aluminium nitrate – 210nm
- Aluminium gallium indium nitride – 210nm

Janay Frazier [5] proposes that diamond doped LED can be used for herpetology because reptiles required long wave UV-LED to metabolized calcium for bone and egg production. The AlN and AlGaInN doped LED are used for micro-fabrication technology and environment science, both demand light source with shorter emission wavelength [2], [6], [7]. It can be used to authenticate documents like driver license, passport, credit card and currency.

Guowang Li [4] proposes that BN doped LED can be used as laser, optical storage, photocatalysis, ophthalmic surgery, nanosurgery and sterilization. Therefore, It can be able to kill unwanted microorganisms, to indicate deposits of organic materials that need to be removed and to convert pathogens, pollens, mold spores, viruses and bacteria into harmless by products.

III. CONCLUSION

So far, the discussions were about the emission of Ultraviolet lights based on wavelengths. Both Ultraviolet lamps and UV-LED may have same applications because of their same range of wavelength (100nm to 400nm),but UV-LED saves energy upto 50% to 70% rather than Ultraviolet lamps. Hence, UV-LED will be most promising source for many applications.

IV. REFERENCES

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