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Radiation Pattern Of Led's

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Abstract:

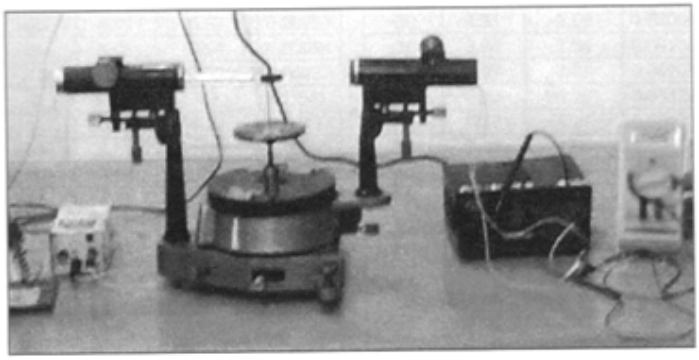
This paper presents an experimental study on the radiation pattern of different colour LED's. The present described a simple method for rapid visualization of the angular intensity distribution of an LED over a wide section of the hemisphere. In order to visualize wide angle radiation patterns, we improved the experimental set-up. The measuring system is very simple, it only consists of a unused spectrometer, white, red, blue and green colour LED, Photodiode, Power supply and digital multimeter. The measuring accuracy is good enough for visual inspection. However, the simplicity of the technique makes it easy to understand, apply and perhaps improve.

Keyword: LED, Photodiode, Radiation Pattern.

Introduction:

Light Emitting Diode is one of the most popular type of diodes and when this diode permits the transfer of electric current between the electrodes, light is produced. In most of the diodes, the light (infrared) cannot be seen as they are at frequencies that do not permit visibility. When the diode is switched on or forward biased, the electrons recombine with the holes and release energy in the form of light (electroluminescence). The colour of light depends on the energy gap of the semiconductor[1]. The white LEDs is a type of luminescent source which plays a crucialrolein applications like household lighting, indicator, automobile headlight, etc.LED gives excellent performances such as its brightness, consumption of less energy [2-5]. In red colour LED is one of the important component is phosphor, the sulphide-based phosphors and (oxy)nitride phosphors are two important red phosphors. However, the downsides of former are chemical instabilities against humidity, low luminescence efficiency, and poor resistance under extended InGaN chip irradiation. [6-8]. Blue LEDs have an active region consisting of one or more InGaN quantum wellssandwiched between thicker layers of GaN, called cladding layers [9]. Green light LED are manufactured bycombination of one or more phosphor materials to blue LEDs. Now a day's researchers have tried to develop efficient green LEDs that don't require phosphors.The main application of colour LED's is its use in remote sensing devices. Presently all remotes are based on IR LED since its wide range of radiation. The present paper deals with determination of radiation pattern of white, Green, Red and Blue colour LED's.

Experimental Setup:

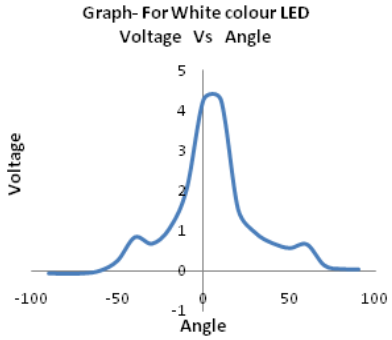


Observation Table:

Angle	White LED		Red LED		Blue LED		Green LED	
	Voltage	Current	Voltage	Current	Voltage	Current	Voltage	Current
-90	-0.05	-5E-05	-0.05	-5E-05	-0.04	-0.00004	-0.01	-1E-05
-80	-0.06	-6E-05	-0.06	-6E-05	-0.06	-6E-05	0	0
-70	-0.05	-5E-05	-0.05	-5E-05	-0.04	-0.00004	0.04	0.00004

-60	0.02	2E-05	0.03	3E-05	0.05	5E-05	0.13	0.00013
-50	0.27	0.00027	0.34	0.00034	0.2	0.0002	0.33	0.00033
-40	0.85	0.00085	0.87	0.00087	0.12	0.00012	0.7	0.0007
-30	0.69	0.00069	0.72	0.00072	0.23	0.00023	1.21	0.00121
-20	1.06	0.00106	1.04	0.00104	0.84	0.00084	1.72	0.00172
-10	2.03	0.00203	1.96	0.00196	3.11	0.00311	2.02	0.00202
0	4.28	0.00428	4.28	0.00428	4.32	0.00432	2.1	0.0021
10	4.27	0.00427	4.27	0.00427	4.32	0.00432	1.99	0.00199
20	1.54	0.00154	1.51	0.00151	3.03	0.00303	1.66	0.00166
30	0.96	0.00096	0.94	0.00094	0.81	0.00081	1.18	0.00118
40	0.7	0.0007	0.68	0.00068	0.24	0.00024	0.7	0.0007
50	0.58	0.00058	0.55	0.00055	0.14	0.00014	0.34	0.00034
60	0.67	0.00067	0.6	0.0006	0.21	0.00021	0.14	0.00014
70	0.15	0.00015	0.11	0.00011	0.05	5E-05	0.08	8E-05
80	0.06	6E-05	0.04	0.00004	0.01	1E-05	0.1	1E-04
90	0.05	5E-05	0.03	3E-05	0	0	0.1	1E-04

Fig.1.White LED



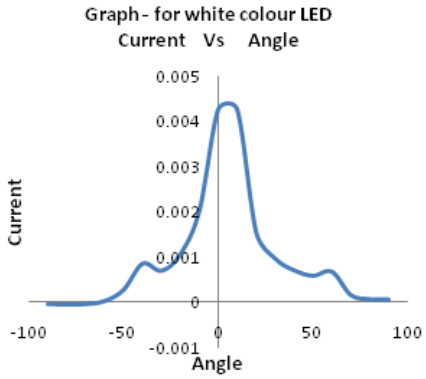
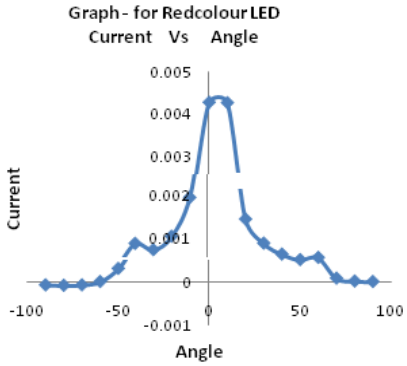


Fig.2. Red LED



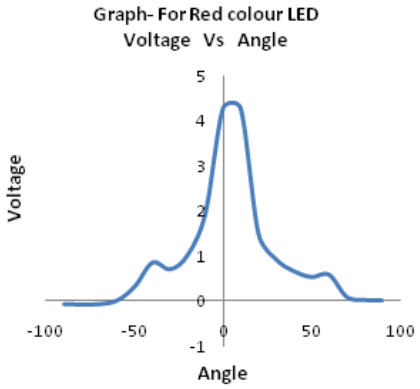
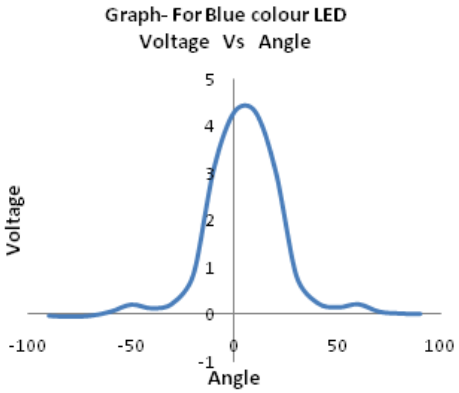


Fig.3.Blue LED



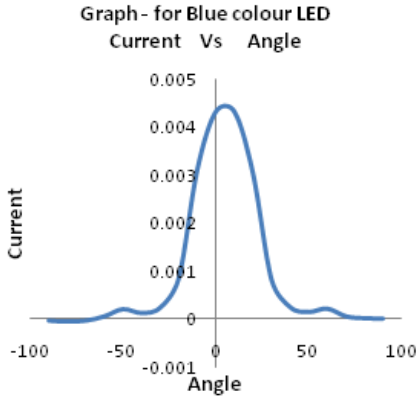
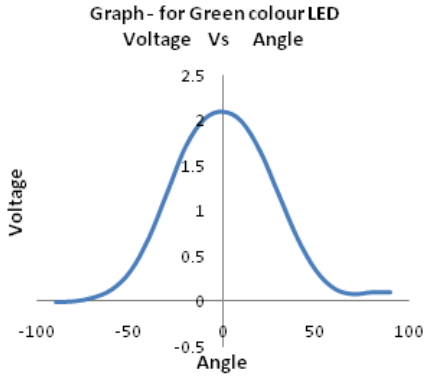
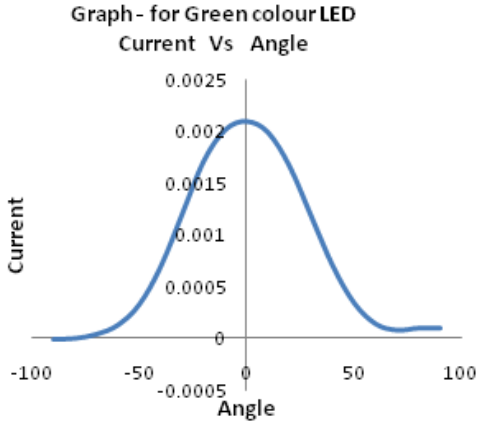


Fig. 4. Green LED





Result and Conclusion:

This method is simple and used to find radiation pattern of LED's, the above figures reveals that radiation pattern varies from colour to colour and it is found that for green colour LED has wide range radiation pattern. However, the simplicity of the technique makes it easy to understand, apply and perhaps easy to improve.

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