

FYSC23

Semiconductor lab

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Abstract

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1 Introduction

Semiconductors are becoming more and more important for our society. One important application of semiconductors is light emitting diodes (LEDs) [1] which are used in e.g. displays and lighting, but also have application in medicine. LEDs also show a much better efficiency than earlier lightbulbs, thus decreasing energy consumption [1], something which is becoming increasingly more important. The basic part of the LED, the pn-junction, is also used in solar cells and can be used to produce energy from light [1].

2 Theory

3 Experiment

3.1 Part 1

Wavelength white LED: 454.17 nm integration time 70 ms averaging every 10th measurements

Mesurment	V_{in} (V)	V_{across} (V)	I_{circuit} (mA)	Intensity (counts)
1	1	1.14	0.0	5.00
2	1.8	1.96	0.0	8.00
3	2.2	2.41	0.00	4.70
4	2.5	2.56	0.36	590.30
5	2.9	2.66	3.11	4377.70
6	3.3	2.72	6.21	7979.50
7	3.7	2.76	9.24	10846.90
8	4.4	2.84	15.24	16080.10
9	5.3	2.93	24.5	21958.10
10	6.5	3.02	35.2	27642.20
11	7.3	3.08	42.6	30184.80
12	8.3	3.15	52.0	33590.00
13	9.1	3.20	59.0	36153.70

Table 1: tab:part1

3.2 Part 1

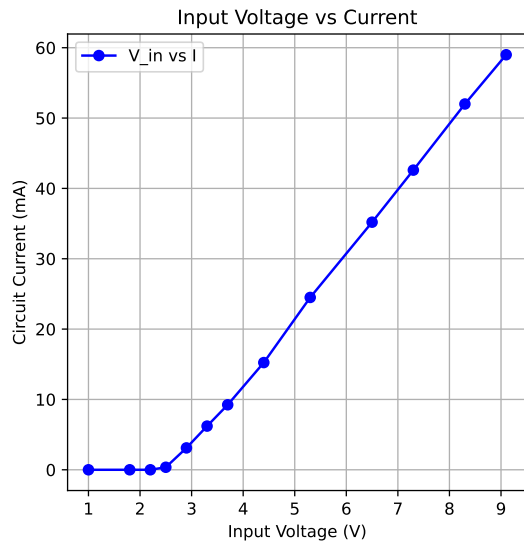
Wavelength white LED: 596.85 nm integration time 2 ms averaging every 10th measurements

Before: V_{in} was 5.0 V, V_{across} 2.06 V, I_{circuit} 30.8 mA and the intensity 2663.70

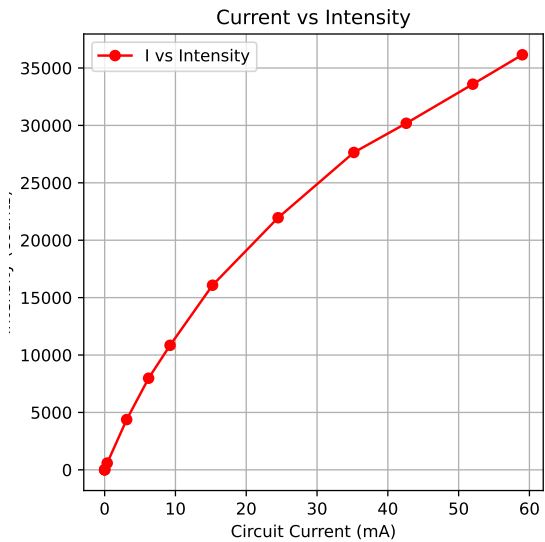
After: V_{in} was 5.0 V, V_{across} 4.44 V, I_{circuit} 7.7 mA and the intensity 10752.70

4 Result

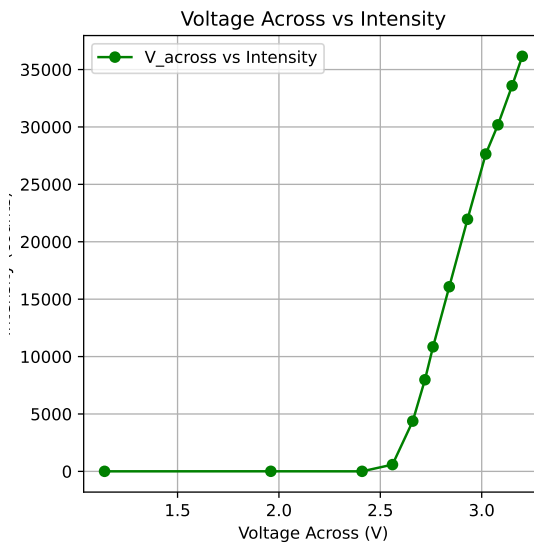
4.1 Part 1



(a) Spring



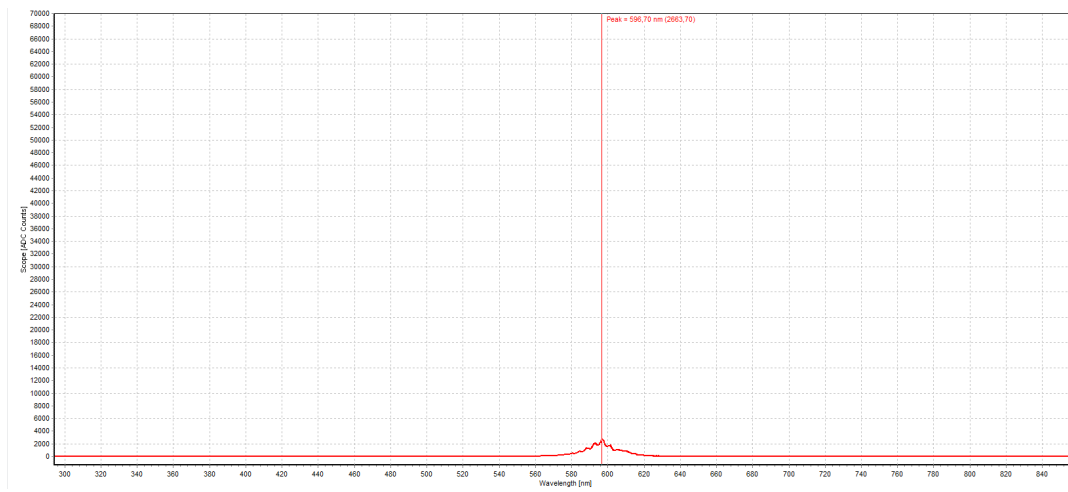
(b) Summer



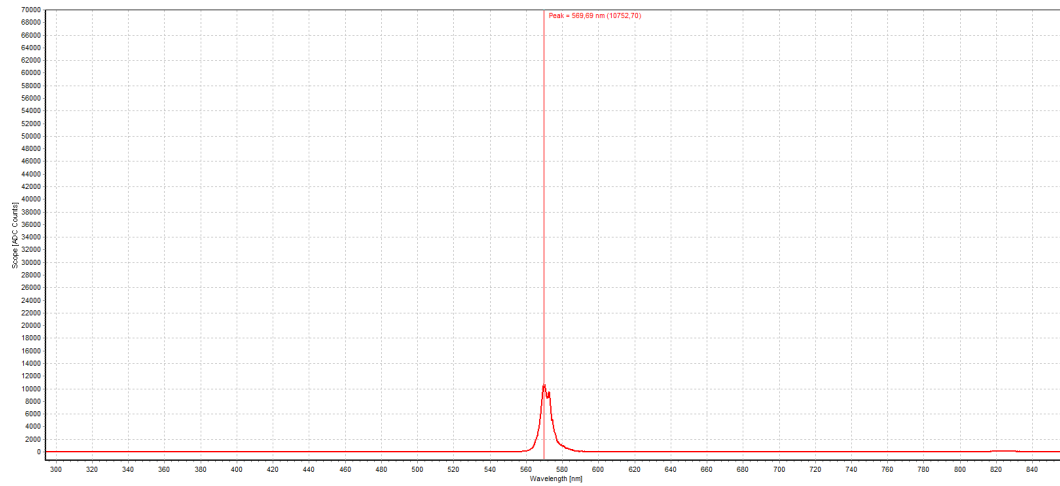
(c) Autumn

Figure 1: Histograms for different seasons.

4.2 Part 2



(a) Spring



(b) Summer

Figure 2: ...

4.3 Part 3

Detector/Emitter	Red	Green	Blue
Red	Output	No output	No output
Green	Output	Output	No output
Blue	Output	Output	Output

Table 2: tab:part3

5 Discussion

6 Conclusion

References

- [1] Philip Hofmann. *Solid State Physics: An Introduction*. Wiley-VCH, 2nd edition, 2015.