Experiment Number 6
Photoconductivity
EP3290

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1 Aim

Recording the current-voltage characteristics of a CdS photo resistor.

2 Apparatus Required

a. Polarizer

b. Lens

c. Power supply

d. Multimeter

e. CdS photo resistor

f. analyzer

3 Theory

Photoconductivity is the phenomenon in which the electrical conductivity of a solid increases through the absorption of light.
For example, in CdS photo-resistor of this experiment, as light is supplied the absorbed energy enables the transition of activator electrons to the conduction band and the formation of holes takes place in the valence band which the electrons leave behind holes are considered to be positively charged.
When the voltage is applied to the resistor, photocurrent flows through it. Now, we determine the relation between the current and voltage at constant flux(we'll fix it by fixing the angle) and then at constant voltage by changing the flux in CdS resistor.

4 Observations

4.1 Constant Flux at $\theta = 15^\circ$

S.No	Voltage(V)	Current(mA)
1	0	0
2	0.5	0
3	1	-0.01
4	1.5	-0.02
5	2	-0.03
6	2.5	-0.04
7	3	-0.05
8	3.5	-0.06
9	4	-0.07
10	4.5	-0.08
11	5	-0.09
12	5.5	-0.1
13	6	-0.11
14	6.5	-0.12
15	7	-0.13
16	7.5	-0.14
17	8	-0.15
18	8.5	-0.17
19	9	-0.18
20	9.5	-0.19
21	10	-0.2
22	10.5	-0.22
23	11	-0.23
24	11.5	-0.24
25	12	-0.25
26	12.5	-0.26
27	13	-0.27
28	13.5	-0.28
29	14	-0.29
30	14.5	-0.3
31	15	-0.31
32	15.5	-0.32
33	16	-0.33

Interpolated Function:- $-0.0143672 + 0.0216444x$
slope:- 0.0216444

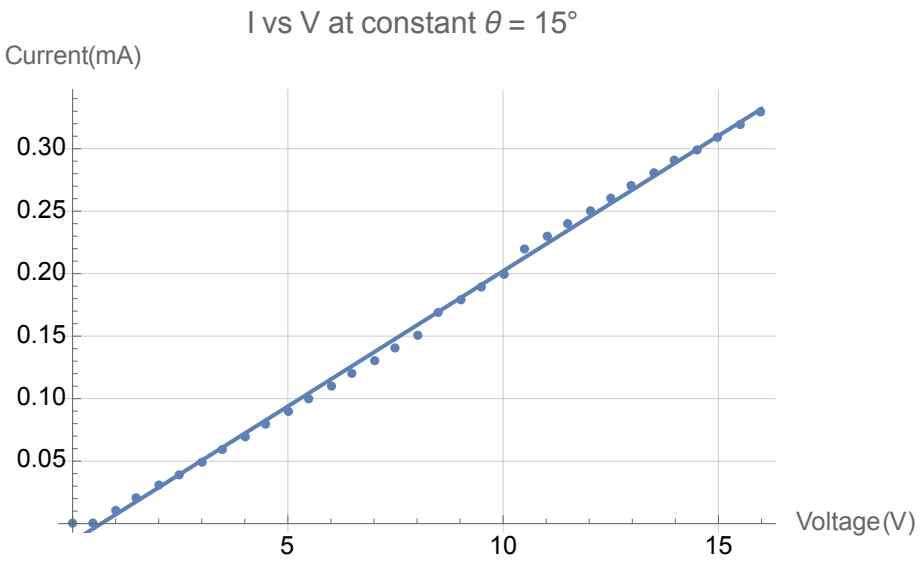
I vs V at constant θ = 15°
Current(mA)
0.30
0.25
0.20
0.15
0.10
0.05
5
10
15
Voltage(V)

Figure 1:

4.2 Constant Flux at $\theta = 45^\circ$

S.No	Voltage(V)	Current(mA)
1	0	0
2	0.5	0
3	1	0
4	1.5	-0.01
5	2	-0.02
6	2.5	-0.03
7	3	-0.03
8	3.5	-0.04
9	4	-0.05
10	4.5	-0.06
11	5	-0.06
12	5.5	-0.07
13	6	-0.08
14	6.5	-0.09
15	7	-0.1
16	7.5	-0.1
17	8	-0.11
18	8.5	-0.12
19	9	-0.13
20	9.5	-0.14
21	10	-0.14
22	10.5	-0.15
23	11	-0.16
24	11.5	-0.17
25	12	-0.18
26	12.5	-0.18
27	13	-0.19
28	13.5	-0.2
29	14	-0.2
30	14.5	-0.21
31	15	-0.22
32	15.5	-0.23
33	16	-0.24

Interpolated Function:- $-0.0113191 + 0.0154679x$
slope:- 0.0154679

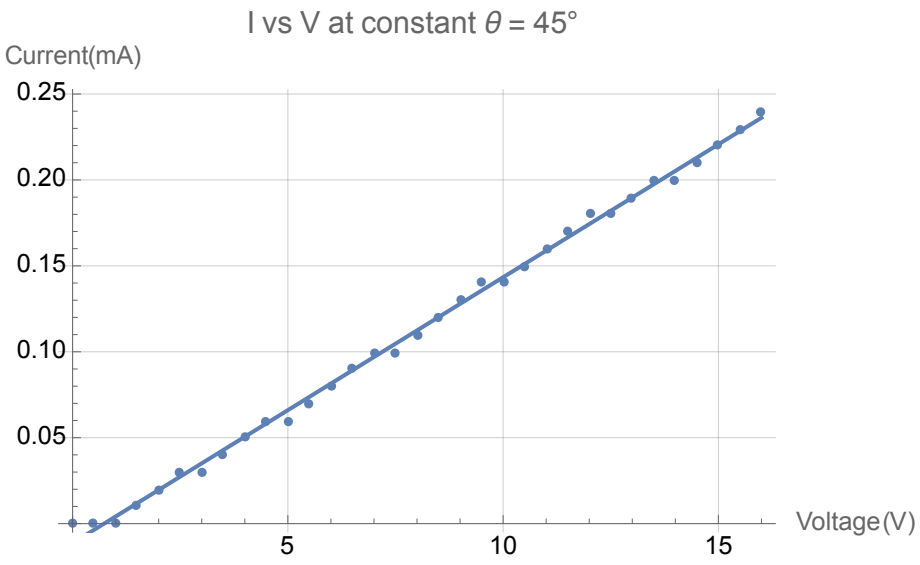
I vs V at constant θ = 45°
Current(mA)
0.25
0.20
0.15
0.10
0.05
5
10
15
Voltage(V)

Figure 2:

4.3 Constant Flux at $\theta = 75^\circ$

S.No	Voltage(V)	Current(mA)
1	0	0
2	0.5	0
3	1	-0.01
4	1.5	-0.01
5	2	-0.02
6	2.5	-0.03
7	3	-0.04
8	3.5	-0.05
9	4	-0.06
10	4.5	-0.07
11	5	-0.08
12	5.5	-0.09
13	6	-0.1
14	6.5	-0.1
15	7	-0.11
16	7.5	-0.12
17	8	-0.13
18	8.5	-0.14
19	9	-0.15
20	9.5	-0.16
21	10	-0.17
22	10.5	-0.18
23	11	-0.19
24	11.5	-0.2
25	12	-0.2
26	12.5	-0.21
27	13	-0.22
28	13.5	-0.23
29	14	-0.24
30	14.5	-0.25
31	15	-0.26
32	15.5	-0.27
33	16	-0.28

Interpolated Function:- $-0.0115865 + 0.0180013x$
slope:- 0.0180013

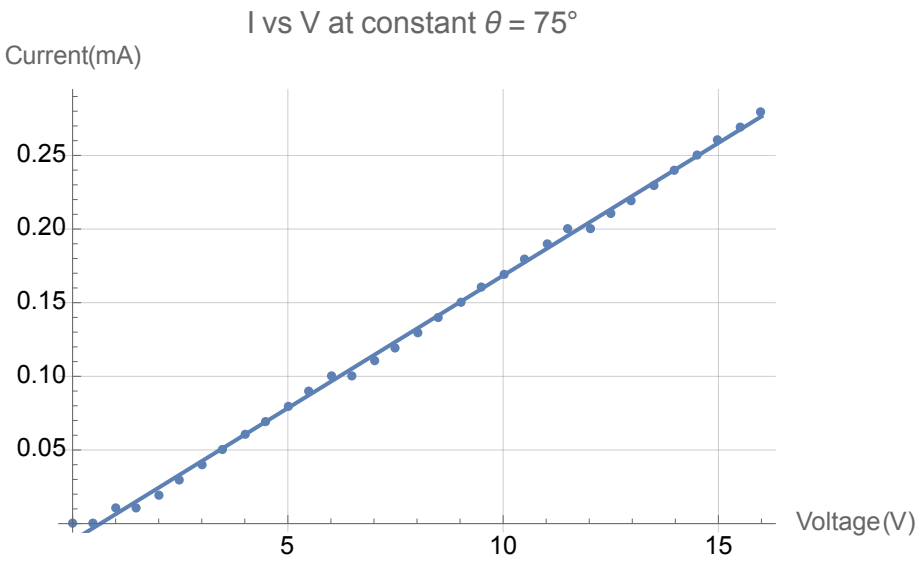

Figure 3:

4.4 Constant Voltage

S.No	θ	V = 4V Current(mA)	V = 8V Current(mA)	V = 15V Current(mA)
0	0	-0.1	-0.1	-0.16
1	10	-0.08	-0.08	-0.13
2	20	-0.07	-0.07	-0.11
3	30	-0.05	-0.05	-0.09
4	40	-0.04	-0.03	-0.09
5	50	-0.02	-0.02	-0.09
6	60	-0.01	-0.02	-0.08
7	70	-0.01	-0.02	-0.08
8	80	-0.01	-0.04	-0.11
9	90	-0.01	-0.05	-0.13
10	100	-0.02	-0.06	-0.17
11	110	-0.03	-0.08	-0.22
12	120	-0.04	-0.1	-0.26
13	130	-0.05	-0.11	-0.3
14	140	-0.06	-0.13	-0.35
15	150	-0.07	-0.15	-0.39
16	160	-0.07	-0.16	-0.4
17	170	-0.07	-0.15	-0.39
18	180	-0.06	-0.13	-0.36

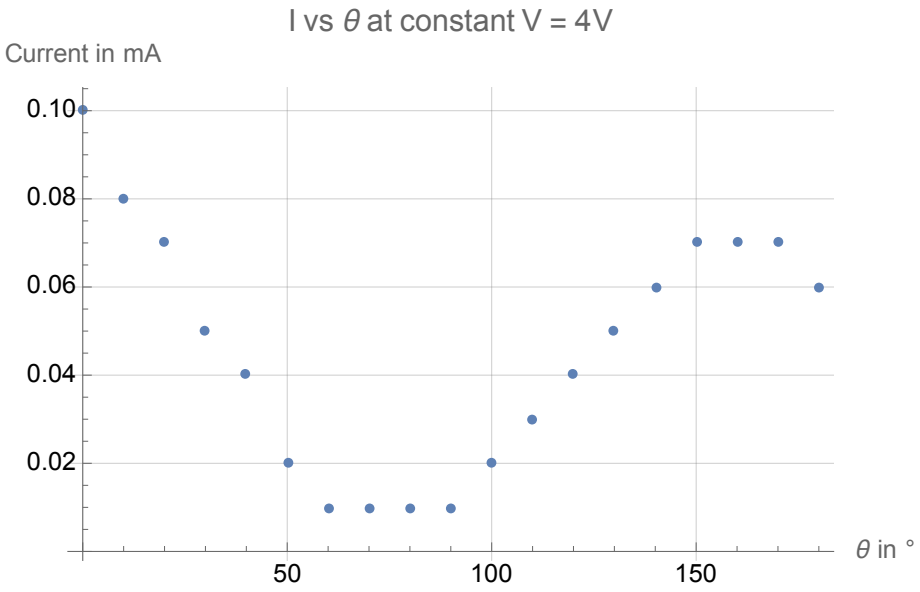

Figure 4:

Minimum :- 90°

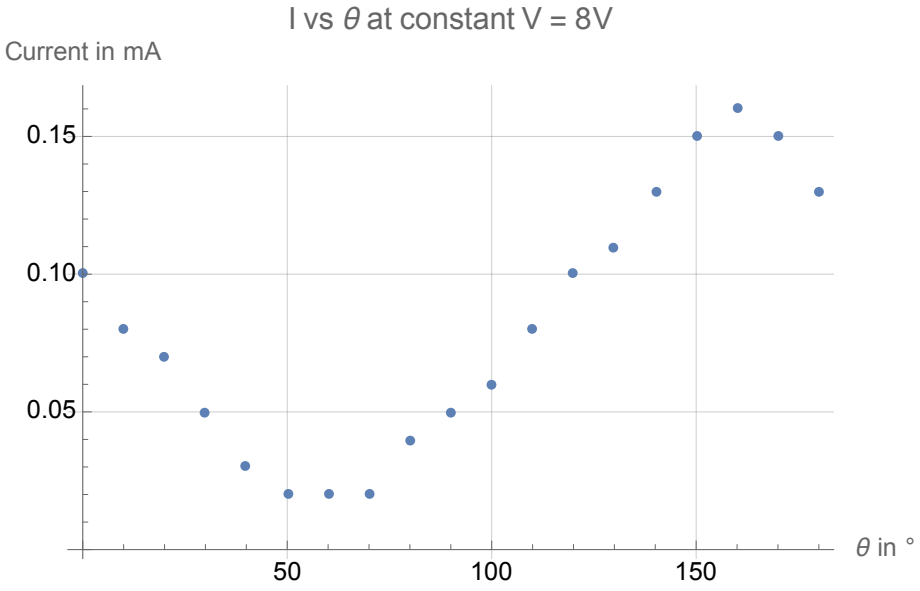

Figure 5:

Minimum:- 80°

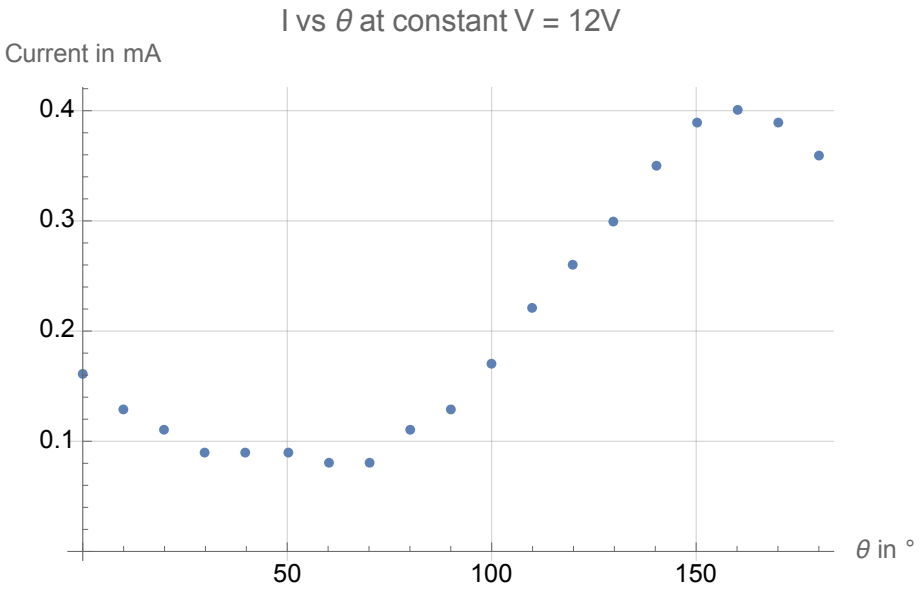

Figure 6:

Minimum:- 70°

5 Conclusion

Average of Slopes of I vs V graph = 0.0183712. This is the conductivity of the photo-resistor.