



DEPARTMENT OF PHYSICS
MAR THOMA COLLEGE FOR WOMEN, PERUMBAVOOR

CHARACTERISTICS OF SOLAR CELL / PHOTODIODE – V-I CHARACTERISTICS

A photodiode is a semiconductor device that converts light energy into an electrical current. It is designed to operate in reverse bias, meaning that a voltage is applied across the device in a way that allows it to detect and respond to light.

Aim

To draw the V - I characteristics of a solar cell.

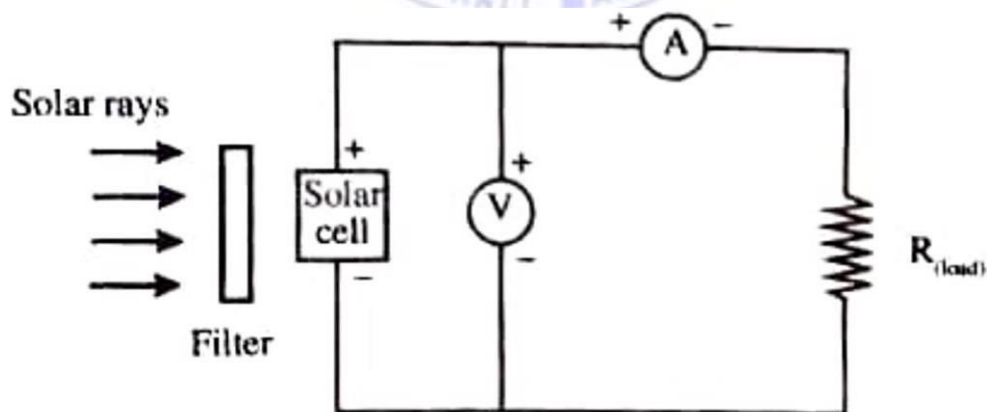
Apparatus

A solar cell, a voltmeter, an ammeter, a resistor and filter papers.

Theory

An unbiased p-n junction diode designed in such a way that it can convert sufficient percentage of light energy, falling on it, directly into electrical energy is known as photo voltaic cell and a special type of photovoltaic cell having large surface area and suitable to work with solar radiations is known as a solar cell.

A solar cell is basically being a p-n junction, is made of silicon or indium, phosphorus or gallium arsenide. It consists of a relatively thick p-type crystal with a thin n-type crystal covering with a higher rate of doping. The thickness of n-type crystal is so small that photons can penetrate the junction. When the photon reaches the junction, it knocks out electrons and transfers them to the conduction band. These electrons drift through the n-type material and then through the external circuit containing a load resistance R.



Connection diagram



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Procedure

To study the voltage - current characteristics, make the connections as shown in figure. All solar rays to fall on the solar cell, Note down voltmeter reading and ammeter reading. To repeat the experiment the intensity of the solar radiation incident on the solar cell may be controlled using suitable filters. The variations of incident intensity of solar radiation will make the output voltage and current vary. Each time note down voltmeter and ammeter readings. Finally a graph may be drawn with voltage along the horizontal axis and current along the vertical axis. This graph is known as the V-I characteristics of the solar cell.

Tabular column

Trial No	Filters	Voltmeter reading (V)	Ammeter reading (A)
1	Filter 1		
2	Filter 2		
3	Filter 3		
4	Filter 4		
5	Filter 5		

Result

The variation of current with voltage has been studied and V - I characteristics of the solar cell has been drawn.



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References

- Experimental Physics – II, For Fifth & Sixth Semester, BSc Degree Programme

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- <https://youtu.be/luqdjUSzf-Y?si=2ywlNErQYSUnTmlK>

