Photoconductivity

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In this experiment, we study the current-voltage characteristics and current-intensity characteristics of a Cadmium Sulphide Photoresistor

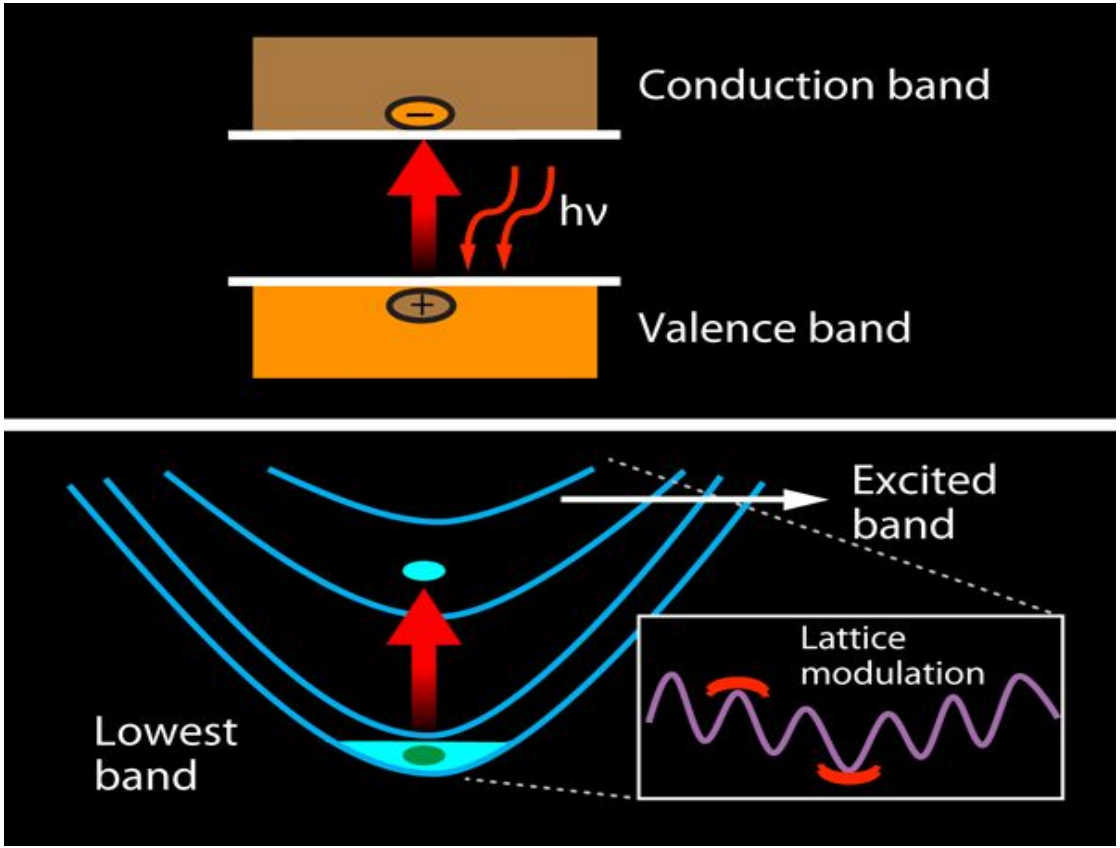
What is a photoresistor?

It is a resistor whose resistivity varies based on the principle of photoconductivity.

What is photoconductivity?

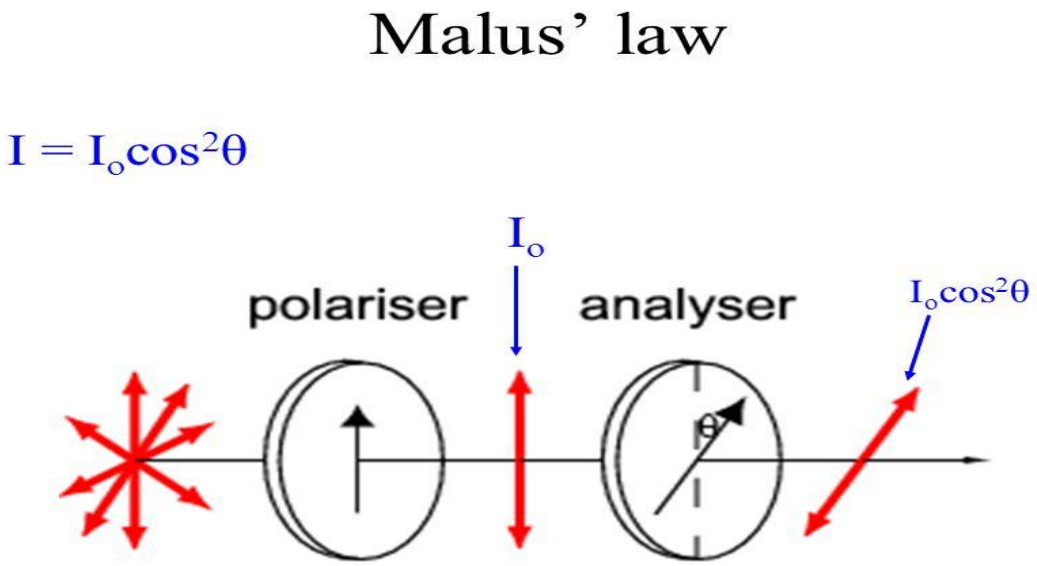
Photoconductivity is a phenomenon where the absorption of light results in the transition of electrons from the valence band to the conduction band.

Thus the intensity of a suitable light source can be used to control the population of free electrons, and hence the conductivity of the material

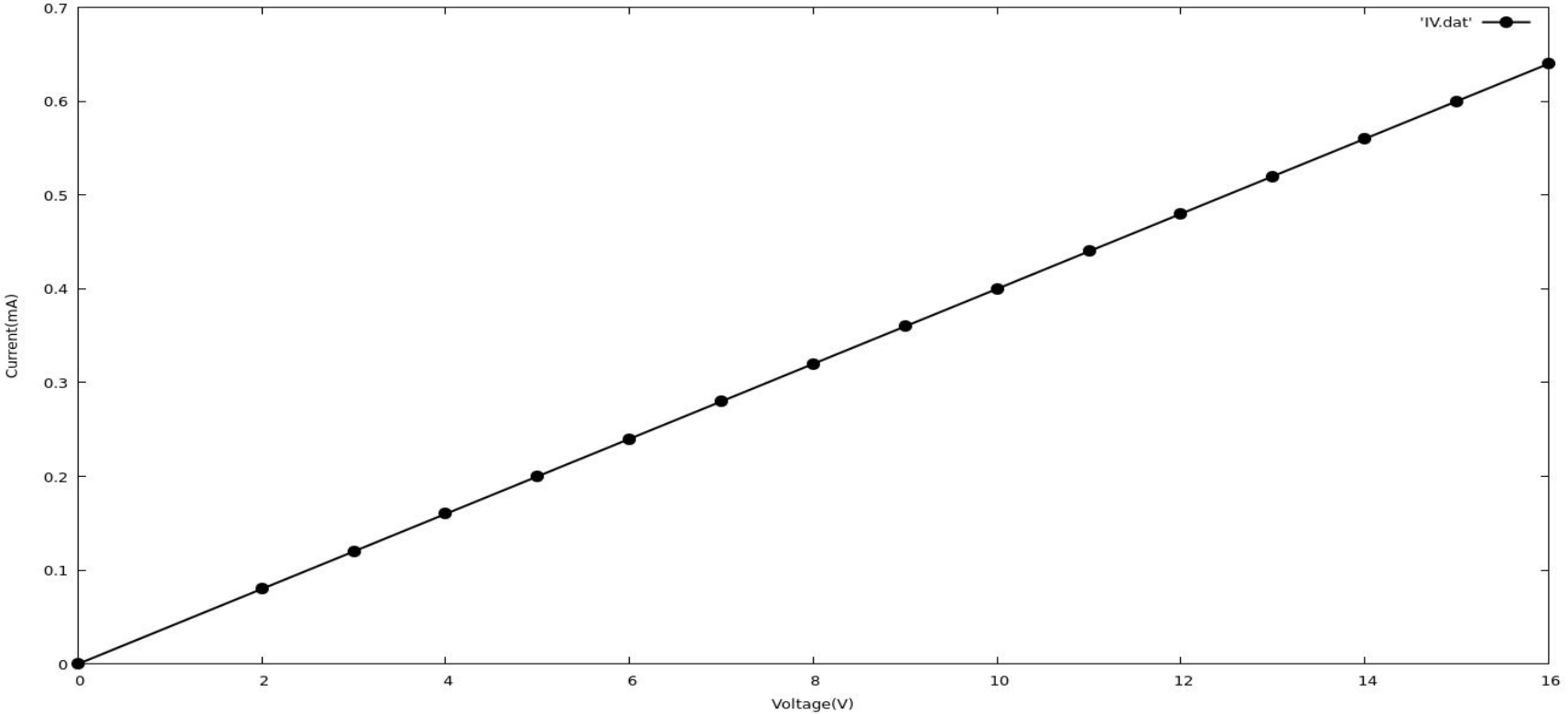

Conduction band
hν
Valence band
Excited band
Lattice modulation
Lowest band

Experimental Setup

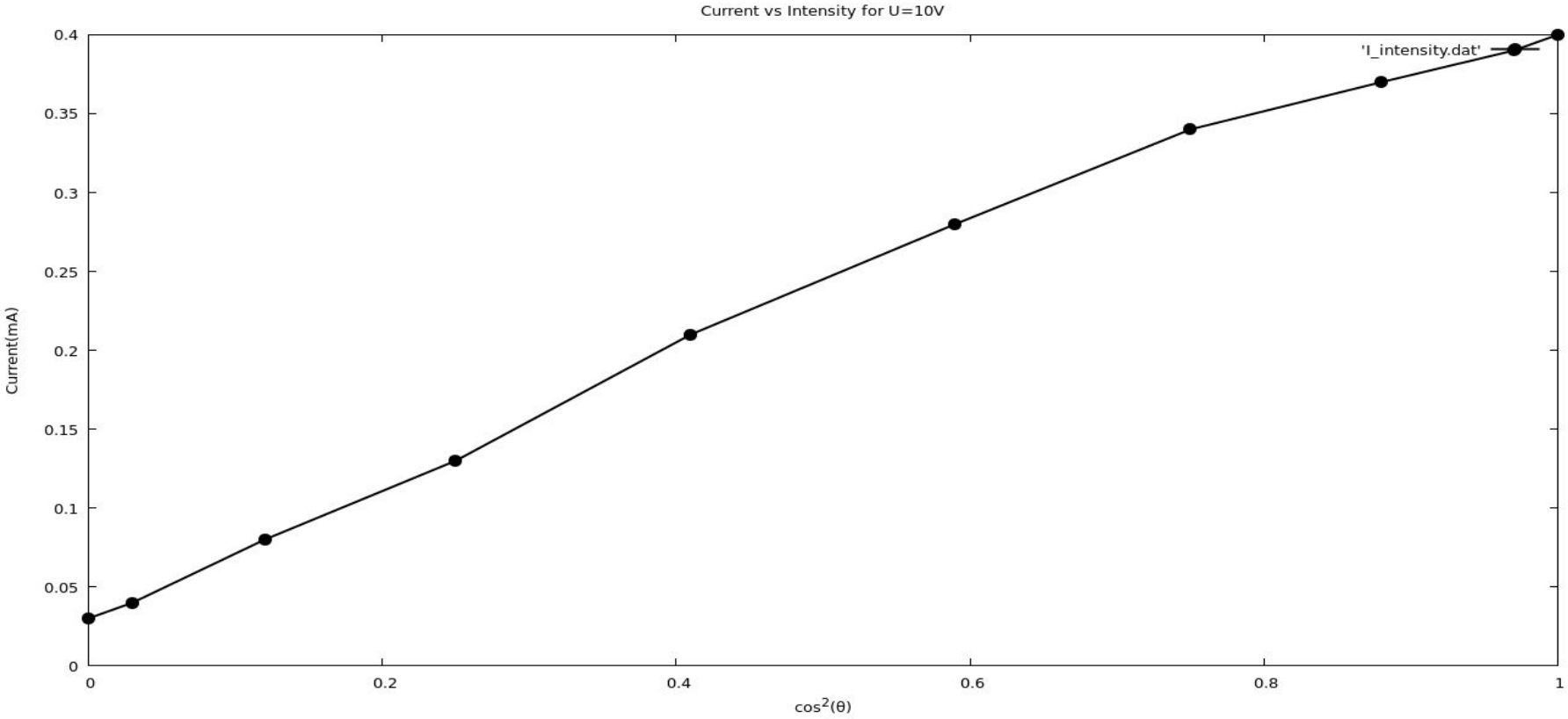
Intensity is varied based on Malus Law!



Current-Voltage Characteristics at max intensity



Current-Intensity characteristics at U = 10.0V



Results

The I - V characteristics are linear, so the CdS photoresistor behaves as an ohmic resistor for constant intensity of light.

The Current - Intensity characteristics are approximately linear, and Photocurrent increases as Intensity is increased.

Applications of Photoconductivity

Because the current ceases when the light is removed, photoconductive materials form the basis of light-controlled electrical switches.

These materials are also used to detect infrared radiation in military applications such as guiding missiles to heat-producing targets.

Photoconductivity has broad commercial application in the process of photocopying, or xerography, which originally used selenium but now relies on photoconductive polymers.