

5. Experiment Contents

A. Measure the I-V characteristic of a photocell at positive bias without light illumination (e.g. cover the photocell with a black paper), Bias Switch turn to right, DC bias continuously adjustable from 0 to 3.0 V.

1) Referring to Figure 3, connect photocell to the electric box,

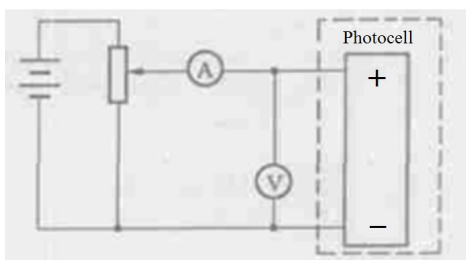


Figure 3.

2) Change the applied bias voltage from 0 to 3.0 V with step 0.3 V, record a set of I and V values,

3) Plot I-V curve, acquire constant $\beta = \frac{q}{nKT}$ and I_0 .

Write down data in the table:

$U (V)$	0	0.3	0.6							
$I (\mu A)$										

B. Without bias, illuminate the photocell with white light at a distance about 20 cm, remain illuminating light intensity unchanged during this experiment.

1) Referring to Figure 4, connect photocell to the electric box,

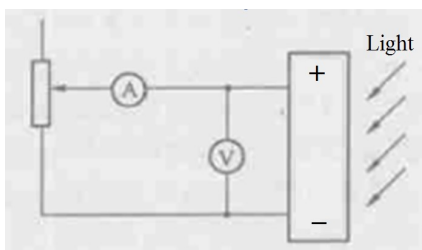


Figure 4.

2) Change load resistance, record a set of I and V values:

$R(k\Omega)$	0	1	2	3	4	5	6	7	8	9	10
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$U (V)$											
$I (\mu A)$											

- 3) Plot I-V curve,
- 4) Acquire short circuit current I_{SC} and open circuit voltage U_{OC} ,
- 5) Plot a curve of the output power P ($P=U \times I$) vs. the load resistance R ,



- 6) Find the maximum output power of the photocell and write down the load resistance at maximum power,
- 7) Calculate fill factor $FF = P_{\max} / I_{SC} U_{OC}$.

C. Study photoelectric effect and electro-optic effect of a photocell.

- 1) Referring to Fig. 4, connect wires,
- 2) Measure the light power at a distance 20 cm away from the white light source using the light meter, which is set as the standard light intensity, J_0 ;
- 3) Change distance of the photocell from the light source, measure the light power at this position, set the reading as J ;
- 4) Measure short circuit current I_{SC} and open circuit voltage U_{OC} ,
- 5) Repeat Steps 3) and 4) to acquire a series of J values and corresponding I_{SC} and U_{OC} ,
- 6) Plot the relationship curve between I_{SC} and J / J_0 , find the approximate function relationship between I_{SC} and J / J_0 ,

7) Plot the relationship curve between U_{OC} and J/J_0 , find the approximate function relationship between U_{OC} and J/J_0 .