Changping District
Beijing China
(86 10) 58828111

March 9,2014
Hongfu Compus,
Teaching Building 1

LABORATORY REPORT
THE PHOTO-ELECTRICS CHARACTERISTICS OF SILICON SOLAR CELL

INTRODUCTORY SUMMARY

Last Thursday, we build several circuits to test the light properties of silicon cell.A solar cell, or photovoltaic cell, is an electrical device that converts the energy of light directly intoelectricity by the photovoltaic effect, which is a phisical and chemical phenomenon.

Solar power is one of the clean and green energy. Utilizing the solar power has been getting more and more attention by the world. Si-Solar Cell is one of the typical solar cells; it is one of widely used optic-electro sensor thanks to its directly converting solar radiation into electricity.

As we know, in this lab, the main purposes are studying the principle of photovoltaic effect, drawingt he characteristic curve of the Si-cell and managing how to measure photocurrent and load-current by using current compensation method.

LAB MATERIALS

Our lab analysis relies on only one piece of specified equipment: Silicon solar cell. Besides it, we use a digital voltmeter, a resistance box, sliding resistors, an optical bench, and halogen tungsten lamp.

An operational amplifier CA3140 is welded on the back of the circuit pattern. At the same time , a lot of metal holes are with the template. These metal mold holes are to access other parts in this experiment.

LAB PROCEDURE

Before each test, we built a circuit as drawn in the text and changed the values of the corresponding parameters. Then, we recorded the data. Our specific procedure consisted of these two steps:

Step 1

Test the relation between open circuit voltage, short circuit current and intensity of incident light. On a regular illumination, the voltage betweenthe two poles of the solar cell with a infinity resistance (open circuit) is open circuit voltage $V_{oc.}$ We use a digital multimeter to measure voltage of silicon photocell. Let the light source emit at 1.6A current. Change the distance from the light source. Measure the open circuit voltage and short circuit current. List the data and draw the chart to record the message in the experiment to analyze.

Step 2

Use the current compensation method to measure the load current. In order to do it, we keep constant distance between light source and battery, change the load resistance and measure the corresponding current I. Make a list to record data. Finally, calculate each output power.

Intensity of illumination I is in inverse proportion to the distance between light source and the receive plane of the Si-cell r^2 as the point light source illuminates on the cell. The light is so small or the distance to the cell is so long as the light can be treated as point light source, hence, the intensity of illumination can be changed by changing the distance between the light and the cell.

When a resistance is connected on the two output terminals of the Si-cell, there is the corresponding terminal voltage, load current and output power. The output power is maximum when the load resistance is optimum matching resistance.

PROBLEMS ENCOUNTERED

The entire lab procedure went as planed. The problem we encountered is that no matter how we changed the resistance of R1 and R2, we can not make galvanometer deflection zero.

Fortunately, after checking the silicon photovoltaic cells and batteries polarity, we found they were not correctly connected. Furthermore, I examined each connection point of the circuit until good contact.

CONCLUSION

We benefit a lot in this experiment and learnt the photovoltaic effect. Ideal point source is impossible, however, in this lab, we try to make the light source far away enough to make the light approach the point source. We are glad to learn to use the equipment.

Sincerely,
FU Qiang