

Solar-dark characteristic curve

Task and equipment

Information for teachers

Notes on the setup and procedure

As the current will be more than 200 mA in this experiment, make sure that the students use the 20 A measurement range and also the 20 A measuring socket.

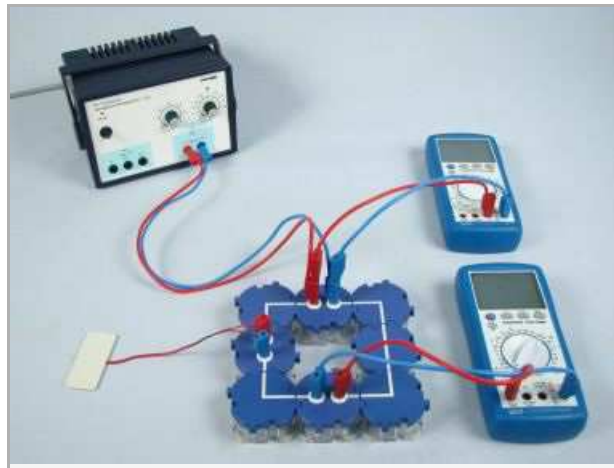
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Task and equipment

Task

How does a solar cell behave when it is dark?

The current dependence on voltage of a darkened solar cell is to be measured.



Equipment



Position No.	Material	Order No.	Quantity
1	Solar cell 2.5 x5 cm, with plugs	06752-11	1
2	Interrupted connector module, SB	05601-04	3
3	Straight connector module, SB	05601-01	1
4	Angled connector module, SB	05601-02	4
5	Connecting cord, 32 A, 250 mm, blue	07360-04	2
6	Connecting cord, 32 A, 250 mm, red	07360-01	2
7	Connecting cord, 32 A, 500 mm, blue	07361-04	1
8	Connecting cord, 32 A, 500 mm, red	07361-01	1
9	PHYWE power supply DC: 0...12 V, 2 A / AC: 6 V, 12 V, 5 A	13506-93	1
10	DMM with NiCr-Ni thermo couple	07122-00	2

Set-up and procedure

Set-up

Experiment 1

Set up the electric circuit shown in Fig. 1 and lay the solar cell on the table with the white side (base plate) facing up. Take care that you make the correct cable connections when you now connect the power supply to the circuit.

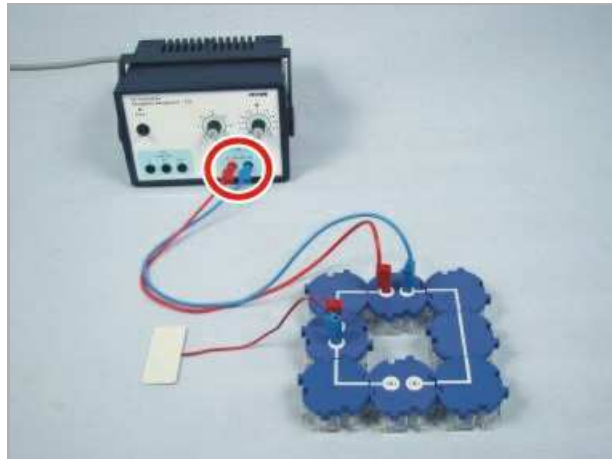


Fig. 1

Connect the multimeter to the voltage measuring instrument (voltmeter) in parallel with the power supply (Fig. 2).



Fig. 2

We now connect the multimeter for current measurement (ammeter) in series with the solar cell (Fig. 3).

Student's Sheet

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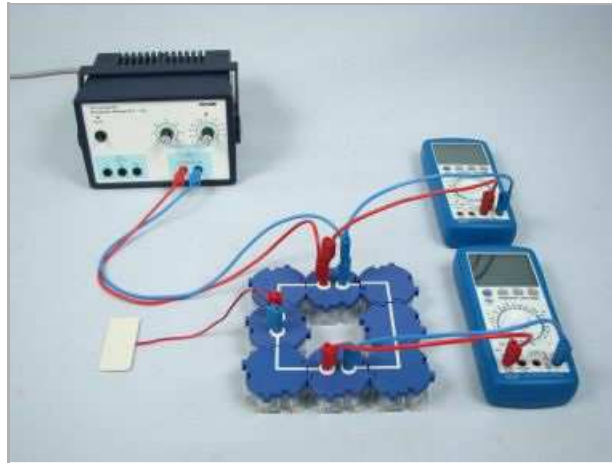


Fig. 3

Set the ammeter to the 20 A- measurement range (Fig. 4) and the voltmeter to the 2 V- (Fig. 5) measurement range. Make sure that you use 20 A- socket when you connect the cable to the ammeter.



Fig. 4



Fig. 5

Turn the current regulator to the far right (clockwise) and set the voltage to 0 V (Fig. 6). The power supply is still switched off.



Fig. 6

Experiment 2

Set up the circuit shown in Fig. 3. Compared to experiment 1, the leads to the power supply are connected the other way round here (Fig. 7). The white side of the solar cell again faces up and the power supply settings are as in experiment 1.

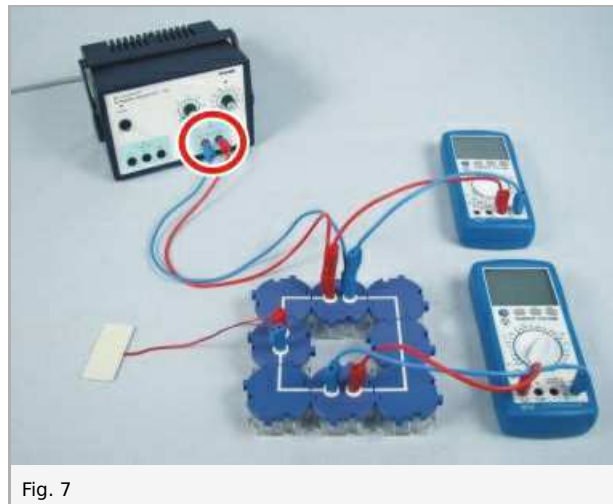


Fig. 7

Procedure

Experiment 1

Switch the power supply on. Increase the voltage U in 100 mV steps from 0 V to 0.50 V and then in 50 mV steps from 0.50 V to 1.00 V (Fig. 8).



After each step, measure the current I and note the value in Table 1.

Note:

It is not easy to exactly set the value for the voltage. Deviations of 10 mV are no problem.

Experiment 2

Proceed exactly as before but, in contrast to experiment 1, increase the voltage in 200 mV steps from 0 V to -2.00 V and note the current measured in Table 1.

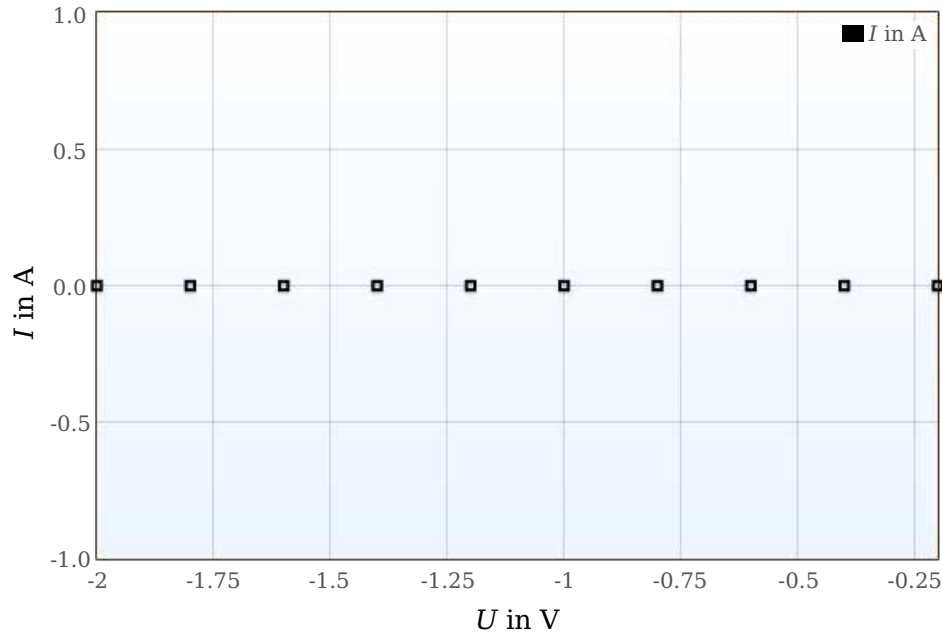
Report: Solar-dark characteristic curve

Result - Table 1

Note your measured values in the table.

U in V	I in A	
-2,00	0,00	0
-1,80	0,00	0
-1,60	0,00	0
-1,40	0,00	0
-1,20	0,00	0
-1,00	0,00	0
-0,80	0,00	0
-0,60	0,00	0
-0,40	0,00	0
-0,20	0,00	0
0,10		0
0,20		0
0,30		0
0,40		0
0,50		0
0,55		0
0,60		0
0,65		0
0,70		0
0,75		0
0,80		0
0,85		0
0,90		0
0,95		0
1,00		0

Number1



Evaluation - Question 1

Which other electrical component behaves in the same way as the solar cell behaved in the two experiments?

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Evaluation - Question 2

Describe the characteristic curve $I(U)$ that has resulted from experiments 1 and 2.

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Evaluation - Question 3

Read how high the threshold voltage of the solar cell is from the characteristic curve.

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