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## Diagnosis of an Unknown Solar Cell by Electrical Characterization

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### ABSTRACT

The diagnosis of a solar cell whose composition and electrical characteristics are unknown is carried out by an electrical characterization. The procedure used is based on the exploitation of the experimental results of the current-voltage variations for different light intensities. This study will then make it possible to define mathematical series of the behavior of the cell which will be used to optimize the choice of the cell for different percentage of lighting using CAD techniques.

### I-Measurement of the electrical characteristics of the solar cell in the dark

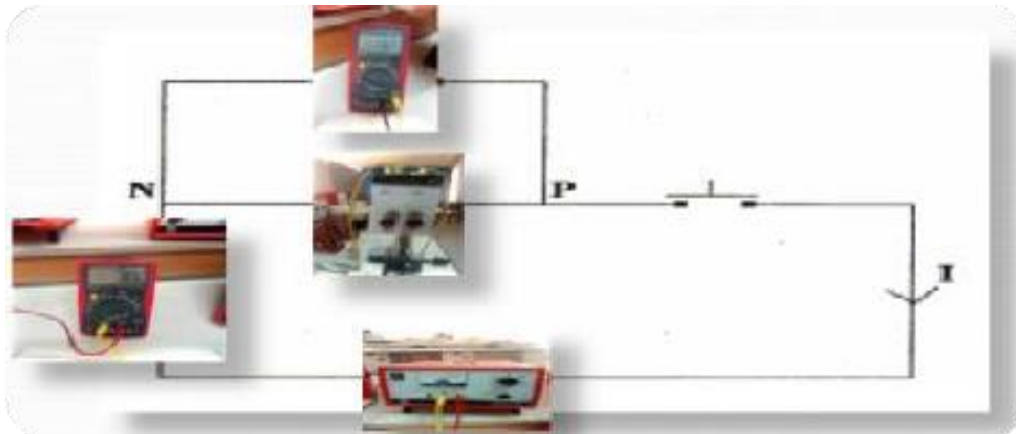


Figure 1: Measuring circuit

The current-voltage variation curve is determined experimentally using the circuit given in figure 1. The solar cell is in the dark and its connection in direct polarity, the generator voltage varies from a low voltage close to zero to an infinite limit value. Polarity reversal is done by reversing the polarity of the generator. The results obtained are given in figure 2.

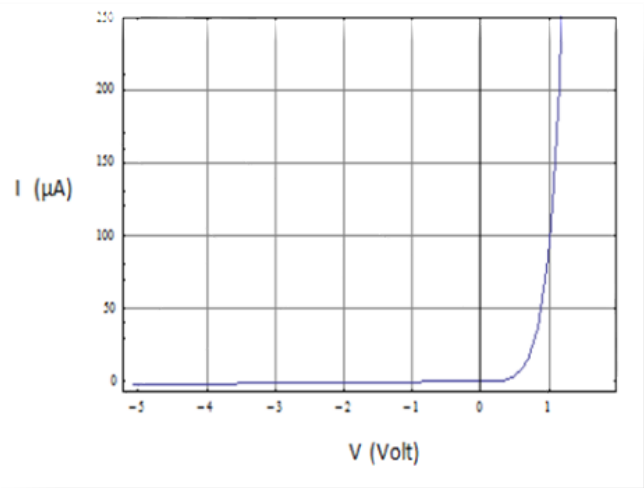


Figure 2: Dark current-voltage characteristics



The electrical behavior of the solar cell in the dark is similar to that of the conductivity of a diode, which allows us to justify the modeling methods used subsequently.

## II-Modeling methods

There are 3 models for modeling a solar cell in the dark: The one-diode model, The two-diode model, The similar model. The one-diode model: This is the most widely used analytical model to obtain the unmeasured quantities shown in the circuit in Figure 3.

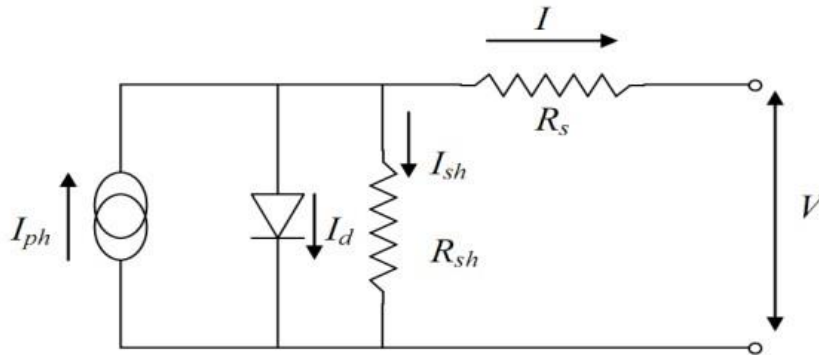


Figure 3: Equivalent diagram of a cell

## Conclusion

The setting up of the experimental procedure is simple and does not require heavy equipment and gives good quality results for the objective which has been set. In addition, the numerical simulation does not present any difficulties since the models based on the similarity with the diodes exist. It is the mastery of the physical phenomena that are linked to the design of the solar cell that eventually cause the latter to have a low efficiency.