

Study of the Thermal Behavior of Solar Cells Based on GaAs

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Abstract

The paper studies the thermal modeling and simulation of photovoltaic cells suitable for use in highly concentrated solar flux (> 1000 suns). The cells studied are those of GaAs and GaSb kind. These cells are a very good alternative to be studied instead of more complex multi junctions cells.

A large amount of absorbed solar radiation is not converted into electricity and increases their temperature, reducing their electrical efficiency. This temperature can be lowered with a good natural or forced circulation of a fluid.

The objective is to find a simple and inexpensive way to remove heat from PV modules and to keep the electrical performance to an acceptable level.

In order to quantify the heat loss in these cells, a numerical model was developed with COMSOL Multiphysics®. The results of the simulation are used to calculate the performance of these solar cells, and improve the heat transfer.

These results of simulation will be confronted with experiment.

A thermistor was disposed on the upper face of the sample to measure its temperature and validate the numerical model.