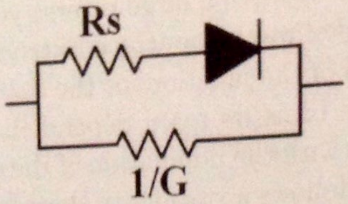

Figure 1. Electrical circuit corresponding to the four parameters model of the real diode.

Where I_J is the current flowing into the junction, and $I_p = GV$ is the current flowing into the parallel resistance; a similar modeling has been proposed in ref. [14]. Parallel and series resistances are normally introduced in the modelization of the photovoltaic cells and in the evaluation of its performance, so that the comparison of this model to the experimental data of a diode is also valuable as an introduction to the parametrization of the photovoltaic devices: a good discussion of the state of the art of the applied numerical methods is found in a recent paper[15].

3. Experimental

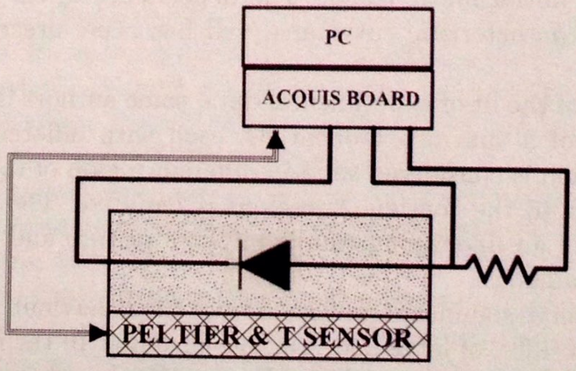

Figure 2. Schematic view of the experimental setup.

A small ($4 \times 4 \times 4$ cm^3) brass cube is placed between two 30 W thermoelectric power sources/sinks realized with commercial Peltier modules. It hosts both the device under test, a commercial 1N4148 silicon *p-n* diode, and a calibrated thermistor. The direction of the heat flux can be selected through the polarity of the electric power supply connected to the modules. The heat exchanged is regulated through the duration of the power pulse in proportion to the difference between the requested temperature and the temperature registered by the thermistor. The system stabilizes the temperature of the central volume of the cube in few tens of seconds to the value set by the operator in the range 10-100 °C with an accuracy better than 1 °C. The I–V characteristic is then measured with two differential channels of a National Instruments NI6221 data acquisition board equipped with multiplexed 16-bit ADC with selectable bipolar full scales. One of the ADC channels samples the voltage V across the electrodes of the diode with a resolution of 0.3 mV and the other channel senses the current I crossing the diode by measuring the potential drop on a calibrated resistor R in series with the diode, with a nominal resolution of 0.02 μA. V is varied