ESR7 - Potential, temperature and humidity induced degradation of PV module energy yield

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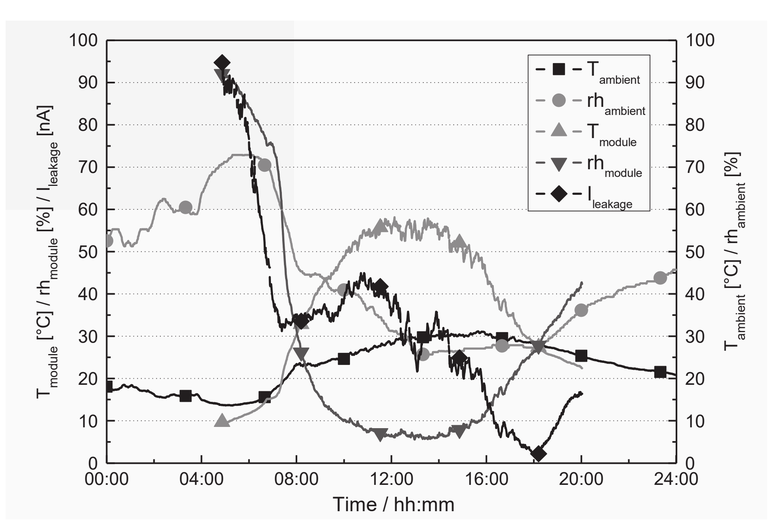
Objectives

- To extract climatic parameter zones across Europe that affect the degradation process of PV modules, with emphasis on temperature, humidity and electrical potential
- To improve the state of the art fixed in the relevant IEC standards and specifications, for example IEC TS 62804
- To establish a link between accelerated laboratory experiments and outdoor climatic conditions

Data analysis

Climatic parameters and real field data will be reviewed and correlated to potential induced degradation effects. The focus will be on electrical potential, temperature and humidity. One source of data will be the PV monitoring test site of the LPVO.

Strong variations of the environmental conditions, especially humidity, within short time periods can be observed outdoors, emphasizing the need for short intervals between data points.

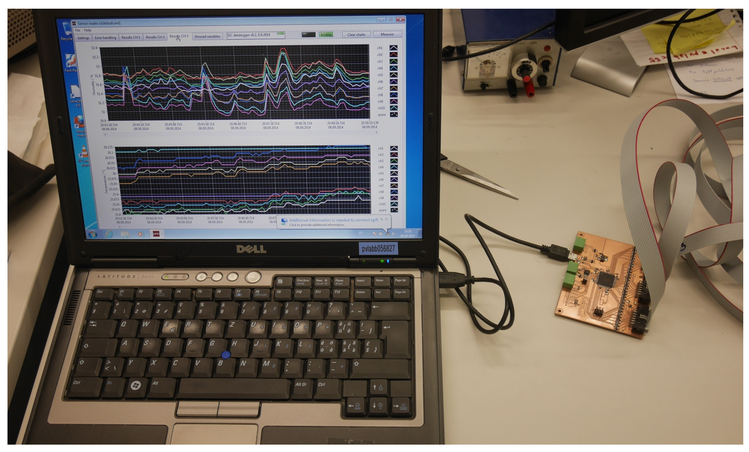


S. Hoffmann, M. Koehl. "Effects of humidity and temperature on the potential-induced degradatioin". Progress in Photovoltaics, 22(2), 2014, p. 173 - 179

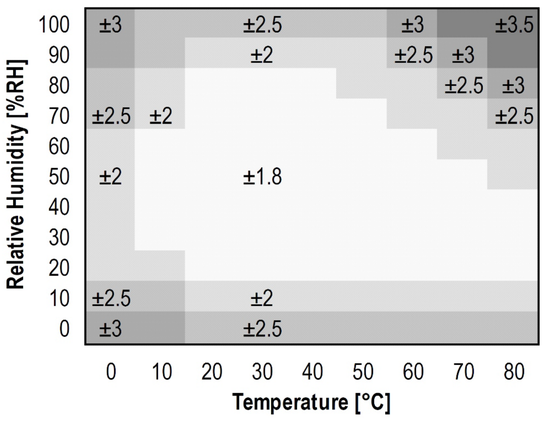
Experimental setup

Climatic chamber

A measurement setup for potential induced degradation of PV modules will be built inside a climatic chamber. Extracted data will include dark IV curves, leakage current from the cells to the module frame and temperature and humidity at the backsheet.

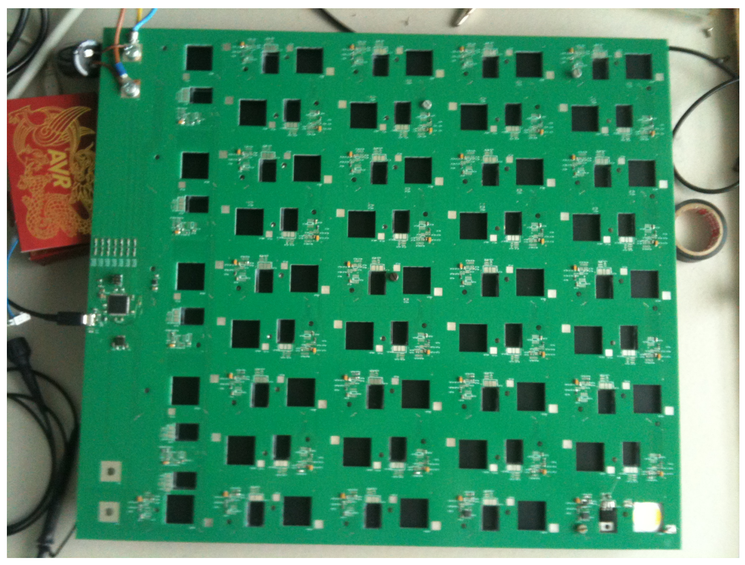


Multiple temperature and humidity sensors spread at key positions within the chamber will be monitoring the effects of the added modules and light source on the temperature and humidity control of the chamber.



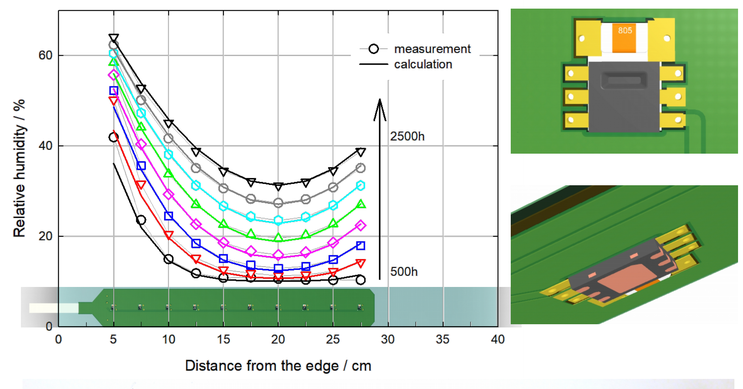
Light source

The setup will include a light source to simulate the degradation caused by UV light. Different sources are under consideration, for example fluorescence tubes and LED arrays.



Mini-modules

Mini-modules of different materials will be produced to be used in accelerated degradation tests. Miniature sensors encapsulated within the modules will monitor humidity ingress.



M. Jankovec et al. "Moisture ingress in PV modules: innovative and versatile in-situ monitoring technique". Presented at the 31st EUPVSEC, 2015, Hamburg, Germany

Acknowledgement

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