

# Influence of large periods of DC current injection in c-Si photovoltaic panels



A. Moretón-Fernández<sup>1\*</sup>, S. Gallardo-Saavedra<sup>2</sup>, M.M. Jiménez-Martín<sup>1</sup>, V. Alonso-Gómez<sup>2</sup>, L. Hernández-Callejo<sup>2</sup>, J.I. Morales-Aragón<sup>2</sup>, O. Martínez-Sacristán<sup>1</sup>, M. A. González-Rebollo<sup>1</sup>, J. Jiménez-López<sup>1</sup>.



<sup>1</sup>GdS-Optronlab group, Dept. Física de la Materia Condensada, University of Valladolid; \*angel.moreton@uva.es  
<sup>2</sup>Department of Agricultural and Forestry Engineering. University of Valladolid, Soria, Spain.

DC current injection is necessary to make ELi measurements in photovoltaic modules.

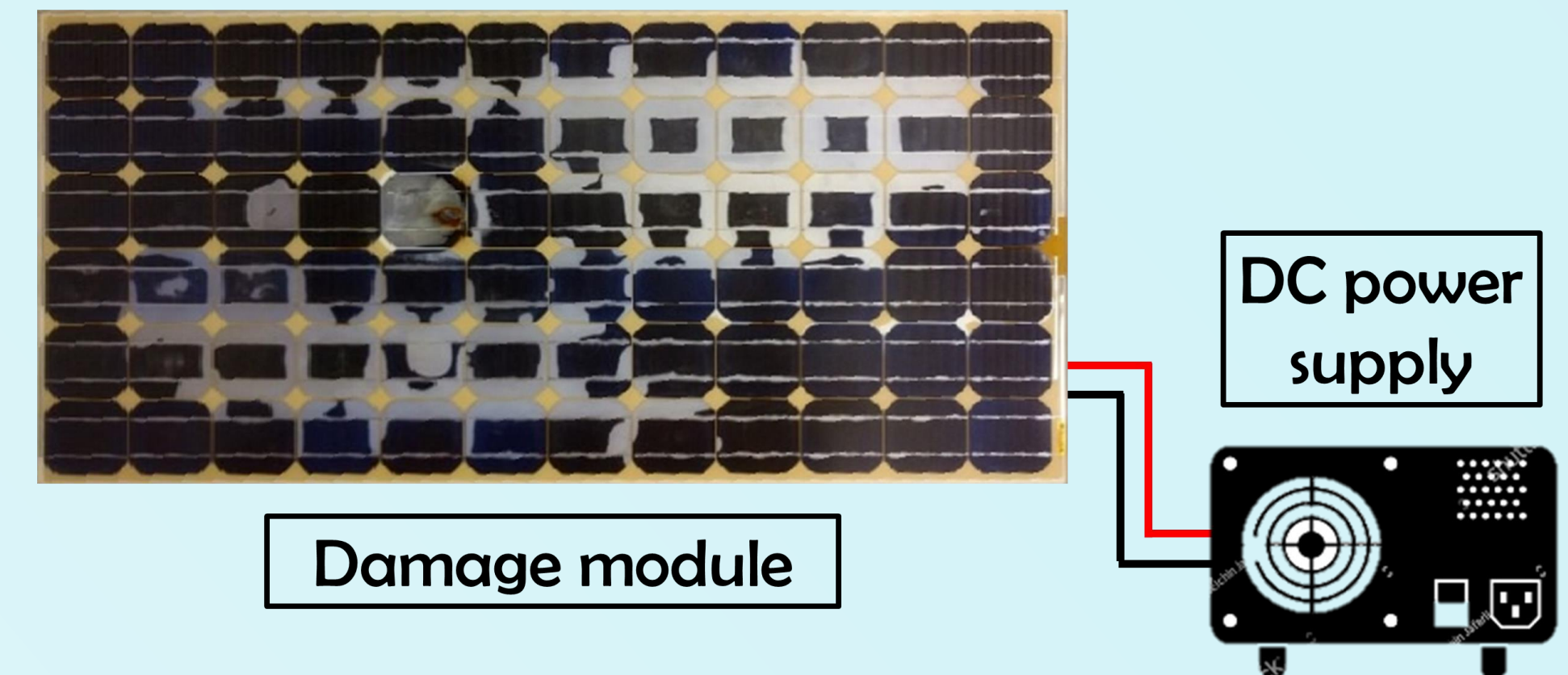
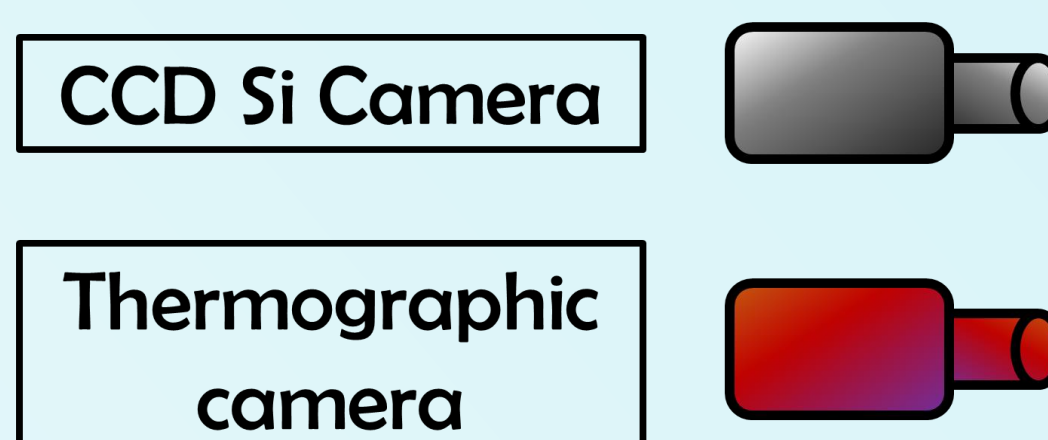


Can it affect to modules performance and lifetime?

## MATERIALS AND METHOD

- Large periods of DC current injection on several monocrystalline silicon modules have been carried out.
- The modules tested have already fulfilled their useful life and present multiple defects.
- In order to analyse how this affects to the state of the module, several thermography images (every minute) and electroluminescence (every half an hour) have been taken during the current injection.

### Experimental setup



### Experiment details

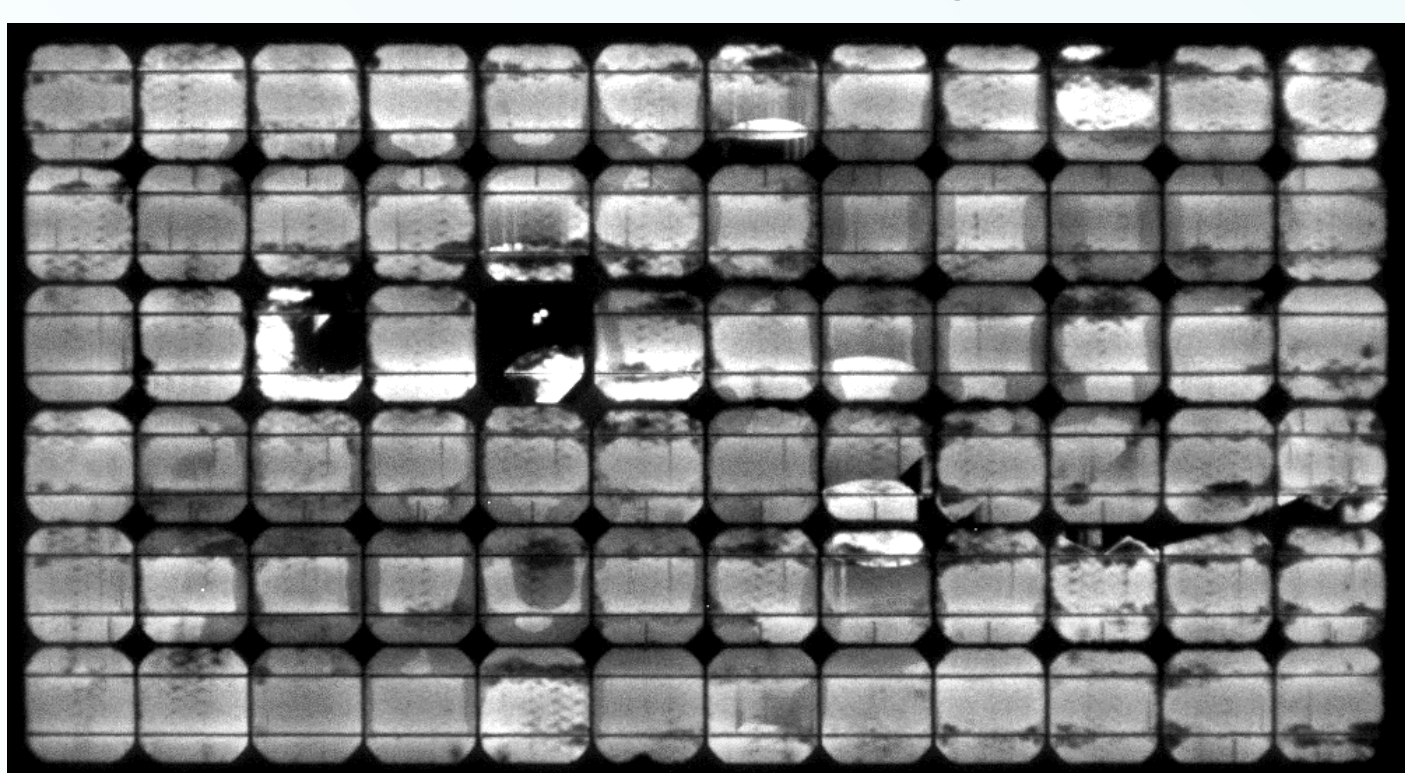
Model / Lab Name	Power (W)	Type	Cells	Voc (V)	Vmpp (V)	Isc (A)	Imp (A)	Toll
TYN SOLAR 175/T2	175	Mono	72	43,99	36,72	5,17	4,77	±2
EOPLLY 175 / E1, E2, E3, E4	175	Mono	72	44,35	36,26	5,45	4,83	±5

- Nominal  $I_{SC}$  was injected to the modules in forward direction.
- Two different types of modules were tested. Nominal data of the modules is given in the Table.
- All the measurements have been carried out in a dark chamber, with controlled temperature and humidity conditions.

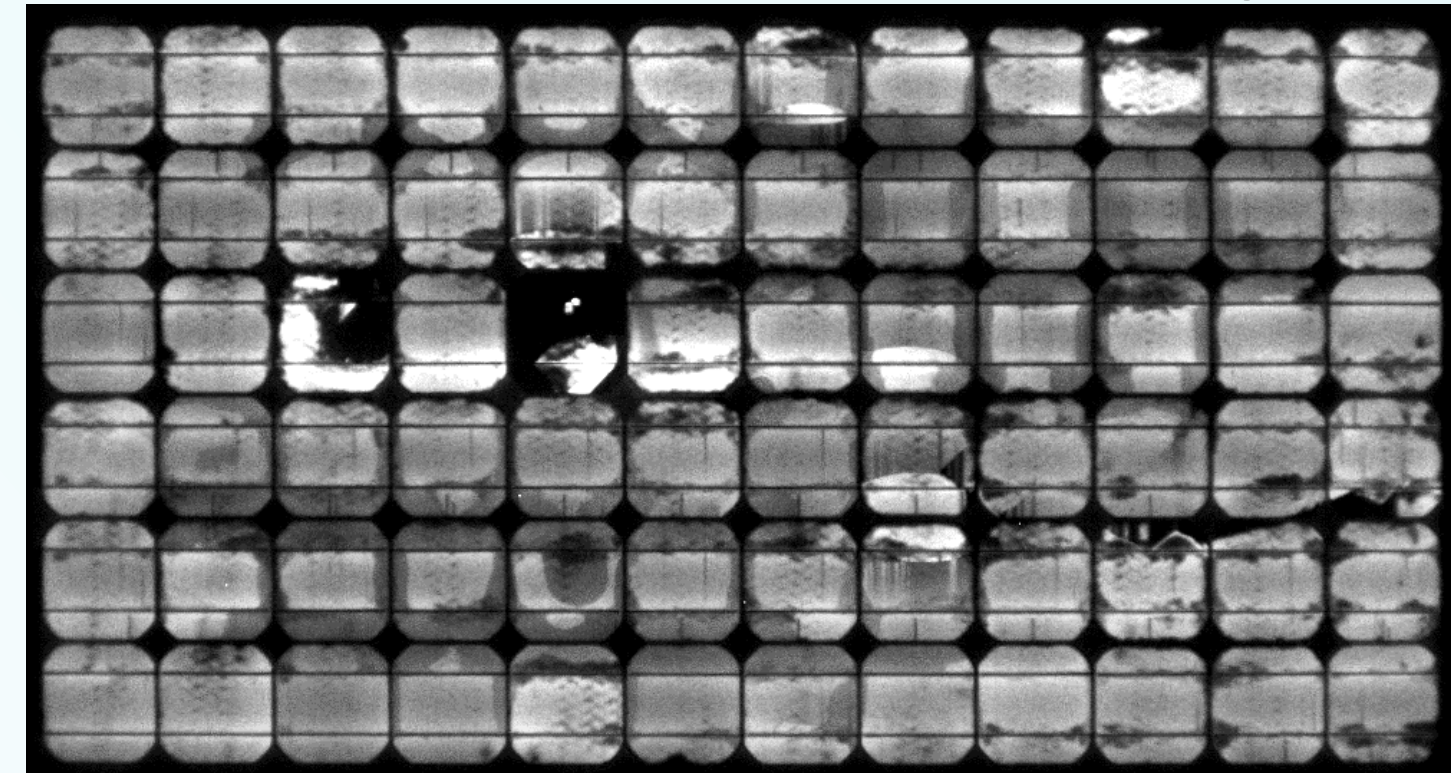
## RESULTS

### 1. ELi qualitative analysis

Before Isc current injection



After 96 hours of Isc current injection

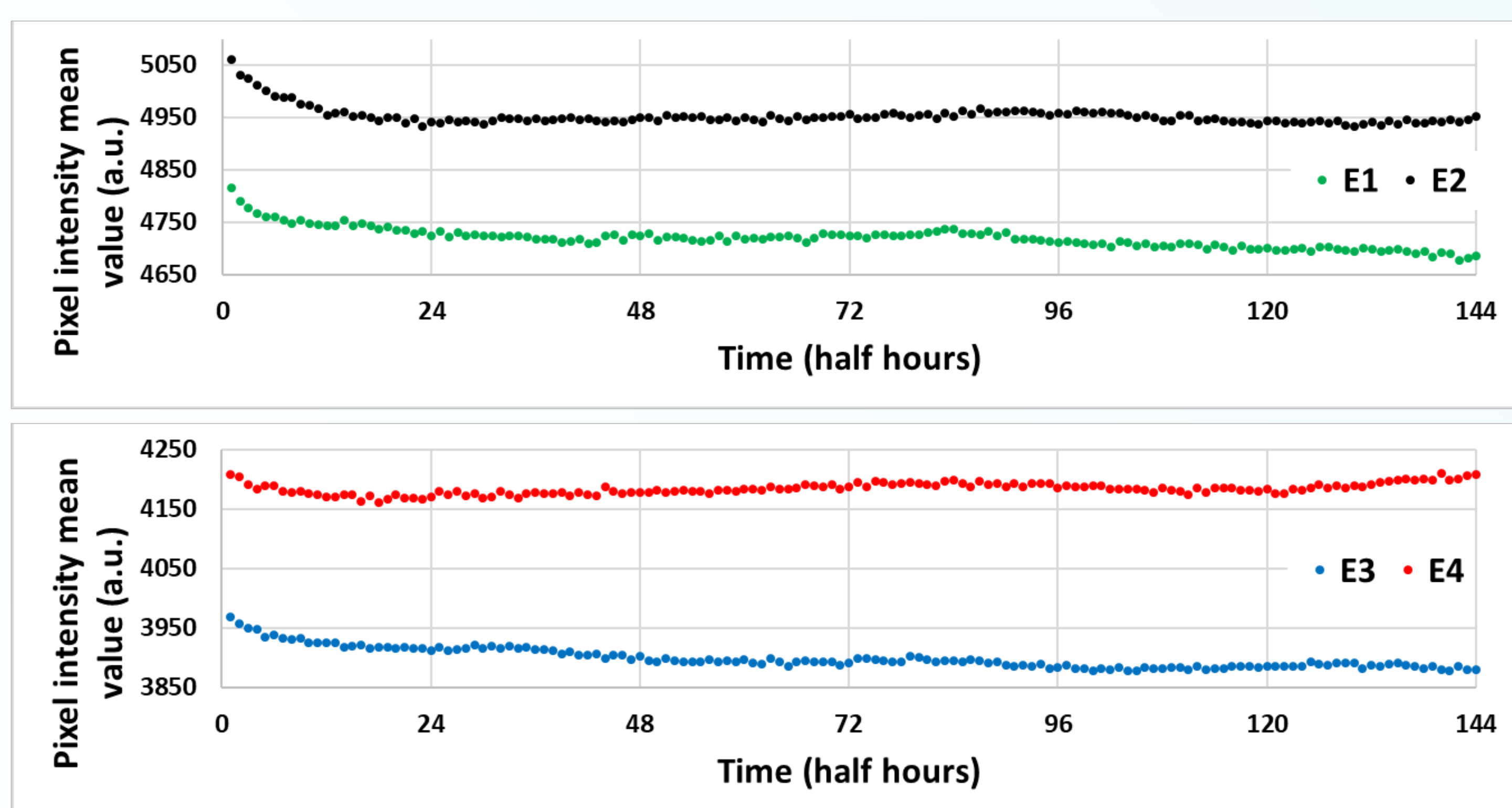


- As expected no differences were found in visual exam of EL images.

- A detailed analysis was performed in order to see the defects induced by current injection.

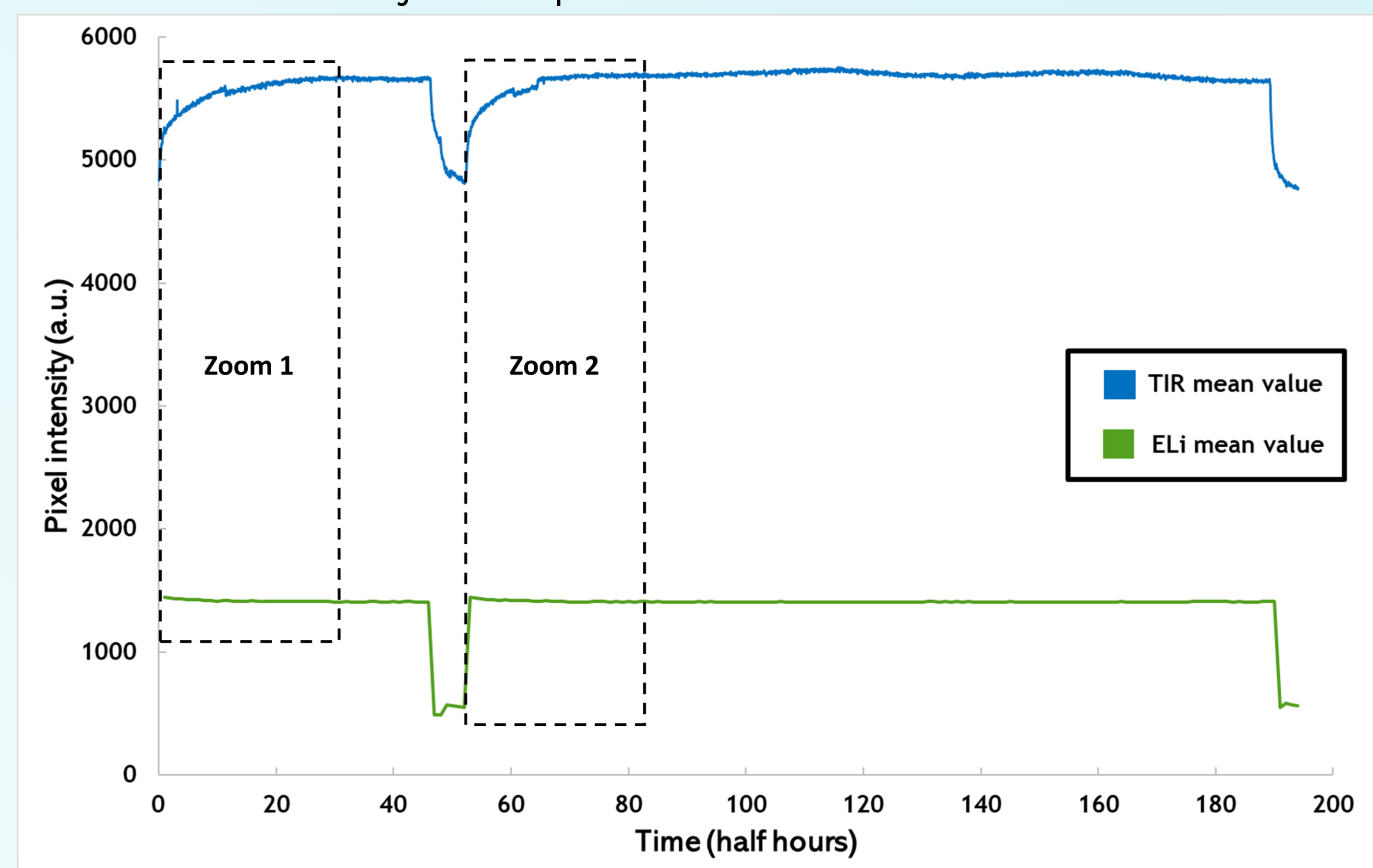
### 3. ELi quantitative analysis of several modules

Mean value of EL images was evaluated during the current injection period in several EOPLLY modules.

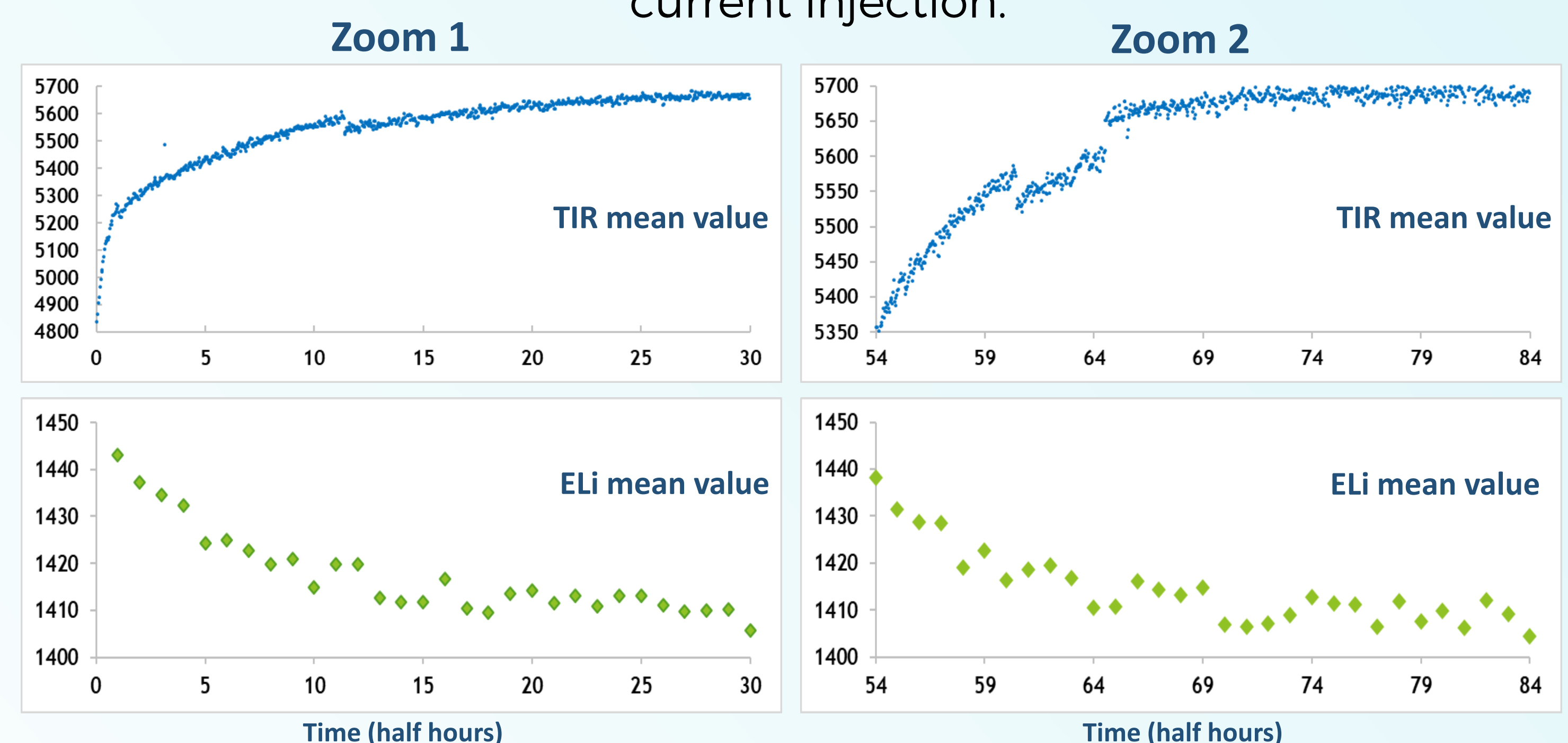


### 2. ELi + TIR quantitative analysis

Mean value of EL and TIR images were evaluated during the current injection period in TYN SOLAR module.



Zoom zones in upper graph, showing module heat ups due to the current injection.



## Conclusions

- The temperature rise due to the current injection into modules makes the EL signal to decrease.
- In the tests carried out it was not appreciated that current injection periods had affected the module performance.
- The ELi measurements carried out along the life service of the module do not affect its lifetime and performance.