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CABLE SOLAR Project : CAptive Balloons for aLtitudE SOLAR farms

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► **To cite this version:**

Yoan Bourlier, Géraud Delpont, Tiphaine Mathieu-Pennober, Jean-François Guillemoles, Johan Parra, et al.. CABLE SOLAR Project : CAptive Balloons for aLtitudE SOLAR farms. 13ème Journées Nationales du Photovoltaïque (JNPV 2023), Dec 2023, Dourdan, France. . hal-04730943

HAL Id: hal-04730943

<https://hal.science/hal-04730943v1>

Submitted on 11 Oct 2024

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CABLE SOLAR Project : Captive Balloons for altitude SOLAR farms

Main goal

Development of a long-duration flying platform using photovoltaic energy and thin film solar cells architecture to produce electricity

Main Objectives

- Durable Captive balloon autonomous in energy
- Developing an airborne platform for solar cells characterizations

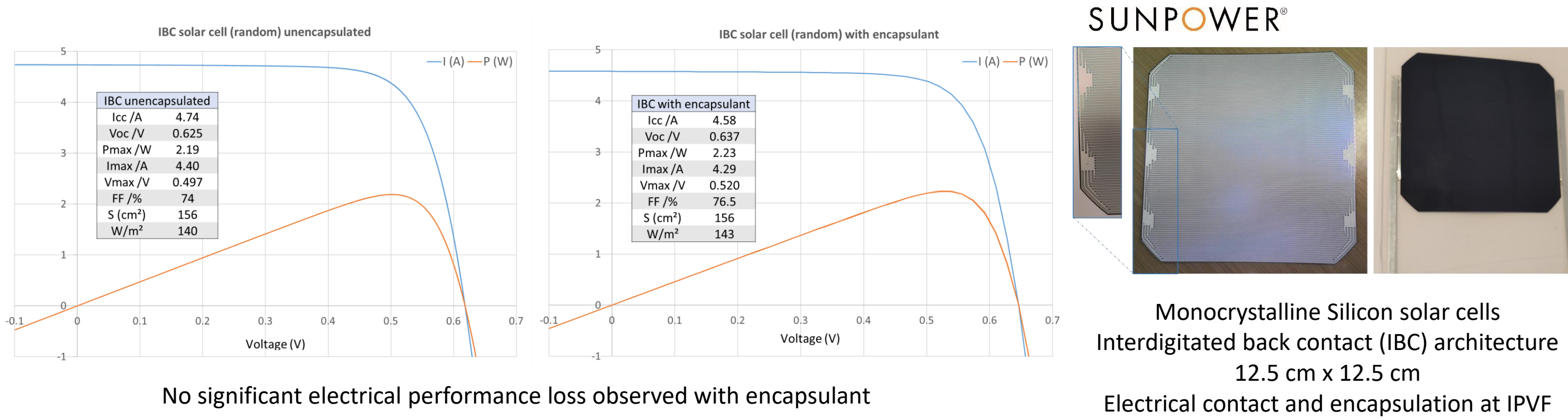
Main achievements

- Electrical contacts, Encapsulation and I/V characterization were performed on isolated solar cells
- The first two "on scale PV-ring" using Si and CIGS solar cell technologies have been designed and realized
- Installation of the winching station and first flights realized with Tankers SAS

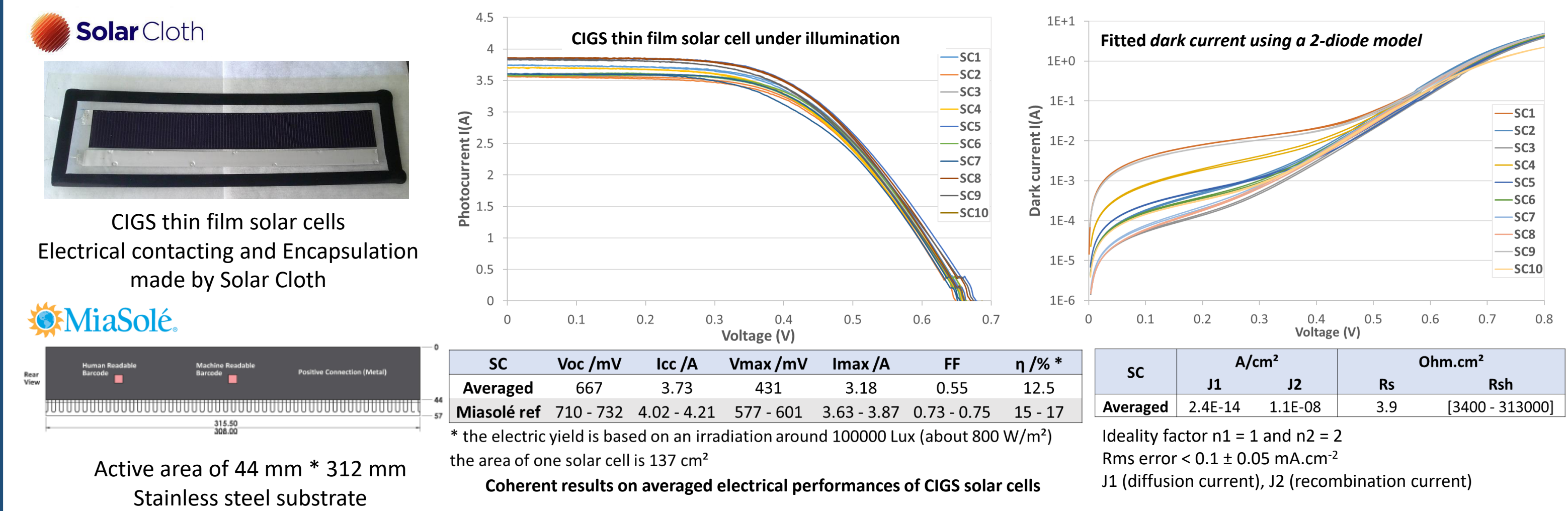


Solar cells electrical characterization & On-scale module design

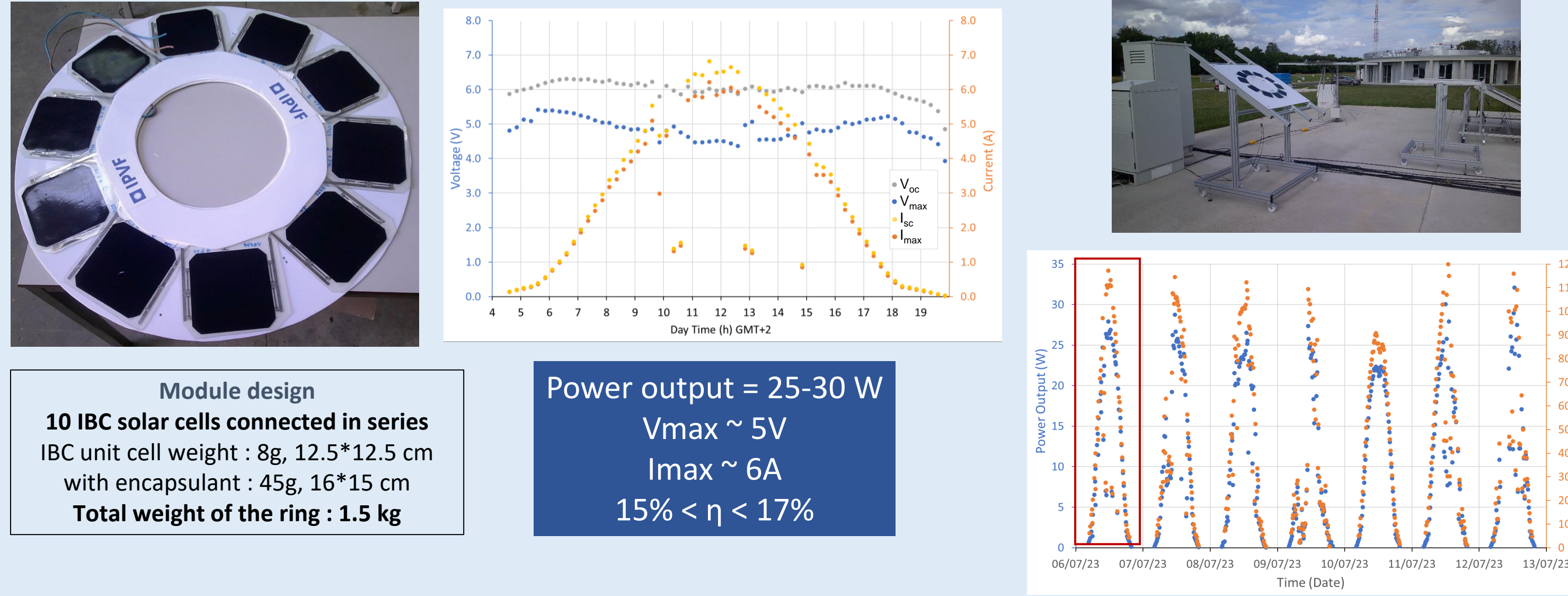
Si solar cells encapsulated at IPVF with indoor I/V characterization



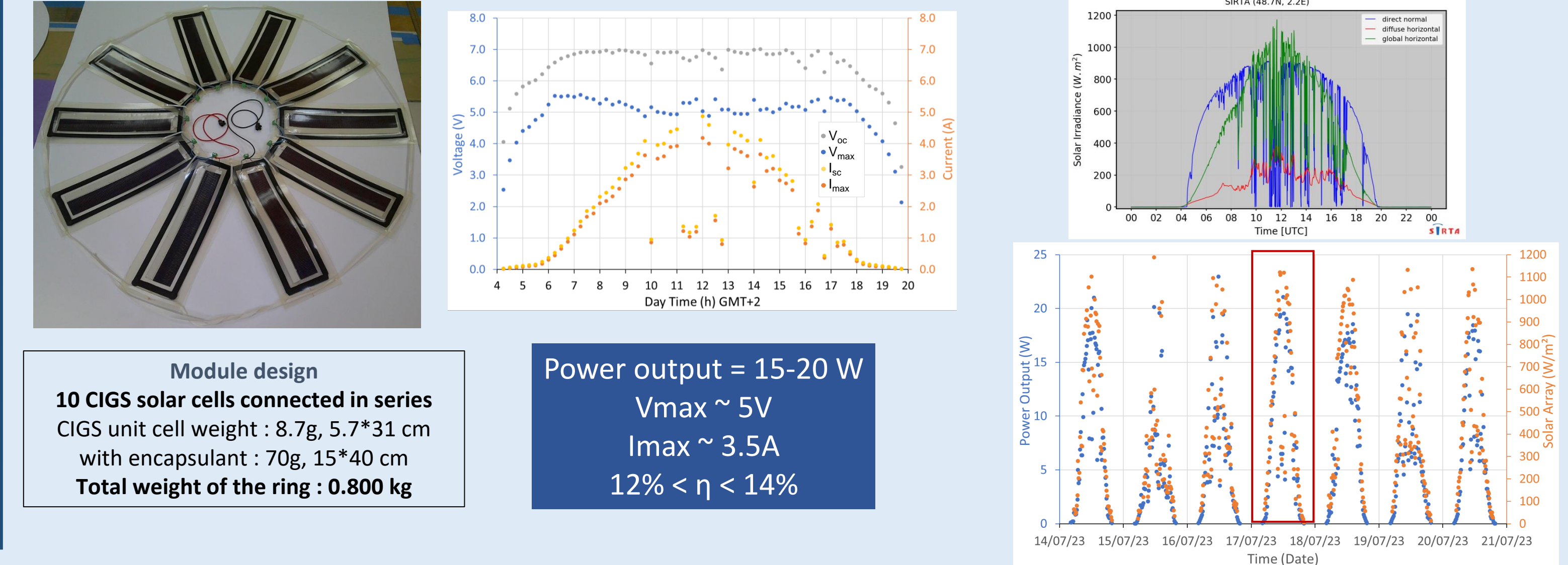
CIGS thin film technology with outdoor I/V characterization at SOYPV



Outdoor electrical measurements at SIRTa



Outdoor electrical measurements at SIRTa



PV integration and first flight



Indoor tests at Tankers building

Platform of flight and PV installation

First flights in June 2023

Description of the platform

- Captive balloon**
 - 4 m diameter Sphere
 - 30 m³ of Helium
 - 4G communication
 - Environmental sensors
 - 50 meters of altitude
 - PV ring for battery loading
- Stabilization**
 - 1 overall net
 - 3 deported cable pulley sealed on ground
- Ground station**
 - 1 electric winch sealed on ground
 - Connected anemometer
 - Wind alert communication
 - Manual and remote control
 - 12V battery monitoring with a 120W PV panel

Under progress... and Forecast

- Embedded system for airborne measurement of the PV production
- Sensor network under development → distribution of the solar array on the balloon vs daytime
- Array simulation in LAAS laboratory → optimization of the PV architecture
- Next flight campaign at SIRTa-IPSL meteorological measurements platform in preparation
- Bibliographic study and technico-economic assessment in progress



Acknowledgment

- We want to thank **M. Alain Janet (Solar Cloth)** for the supply of the CIGS thin film solar cells
- We are very grateful to **Mrs. Christine Dillmann (INRAE)** for giving us the opportunity to fly on their land
- We specially thank **M. Rolland Sarda (LSCE)** for providing us the Helium

Funding

- This work is supported by the EDF Chair of "Energies durables" of the Polytechnic Institute of Paris

