

# SOPHIA PV Module Reliability Workshop, 30<sup>th</sup> June-1<sup>st</sup> July 2022

## General

The SOPHIA PV module reliability workshop is a yearly forum to feature reliability aspects of innovative PV applications in service life prediction modeling, testing, and standardization as well as possibilities offered by data analytical methods to work on reliability topics.

This year EPFL's PV-Lab had the honor to host on its premises and co-organize -together with Fraunhofer-ISE – the **10<sup>th</sup> SOPHIA PV Module Reliability workshop (WS)**. In normal years, before the pandemic, the SOPHIA WS was gathering around 60 specialists – equally shared between research institutions and the industry -from all over Europe. Due to the covid pandemic, over the last two years, the event has been substituted by successful online webinars, jointly organized by EPFL and ISE. See e.g.:

[www.pv-reliability.com/workshop-2021](http://www.pv-reliability.com/workshop-2021)

This year we finally were able to host a **physical event**, with all the benefits and advantages connected to this: networking opportunities, scientific/technical and business discussions, contacts, etc.

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The main topics of the SOPHIA workshop were:

- **Integrated PV and special applications**

Novel applications requiring adapted quality and reliability assessment as floating-PV or PV in harsh environments

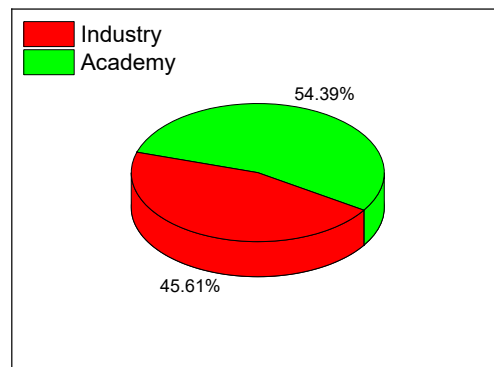
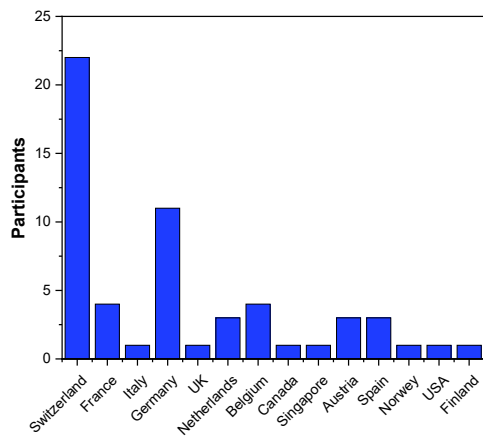
- **Novel cell types influencing reliability**

Developments in Si-cells (PERC, TopCon, Heterojunction...) as well as thin-film and organic technologies and their influence on reliability testing of modules

- **Alternative polymeric materials in PV modules and relation of reliability to sustainability**

Upcoming polymeric materials entering PV market. Sustainability assessments require reliability data as input.

The workshop was a great success with around 60 participants coming from countries over the world, from Europe to America and Asia, with a balanced relationship between participants from industry and academia, as shown in the Figures below.



*Geographical distribution (left) and Academia-Industry relation (right) of SOPHIA workshop's participants.*

The program offered 5 specialized oral sessions on the first day, and 3 sessions on the second day, with a tour of the main laboratories at PV-lab and at Innoparc (as reported in table 1 and possible to find [here](#)), 21 oral contributions, and a poster session.

We also had the opportunity to host another workshop at EPFL, the ReSi-Norm project - Standardisation of silicon solar module recycling processes, on 29 June, just before the start of the SOPHIA workshop, which offered the opportunity to discuss another important topic within the photovoltaic community.



*Audience during one of the workshop sessions*



*One of the lab tour groups.*

## Conference organization and scientific contribution

The PV-Lab team worked to establish the general and notably the scientific program. All matters of catering, printed material, and IT was organized by PV-Lab.

*Table 1: agenda of the SOPHIA Workshop*

<b>12th SOPHIA PV-Module Reliability Workshop, June 30th – July 1st, 2022</b>			
<b>Venue: EPFL Neuchâtel</b>			
<b>Thu, June 30<sup>th</sup></b>	<b>Topic</b>		<b>Speaker (Institution)</b>
<b>8:30 - 9:00</b>	<b>Registration + Coffee</b>		
<b>09:00 - 10:30</b>	<b>Welcome + Introduction: Reliability in HIGH-TECH industries</b>		
	a)	<b>Welcome</b>	<b>Virtuani, Alessandro (EPFL/CSEM)</b>
			<b>Weiß, Karl-Anders (ISE)</b>
	b)	<b>Recent progress in PV technologies, and future reliability challenges</b>	<b>Ballif, Christophe (EPFL/CSEM)</b>
	c)	<b>Design for Reliability in high-tech products</b>	<b>Annigoni, Eleonora (Holland Innovation)</b>
<b>10:30 - 11:00</b>	<b>Coffee Break</b>		
<b>11:00 - 12:30</b>	<b>Block I "Reliability of polymersic materials in PV-moduls"</b>		
	a)	<b>Reliability testing of new polyolefinic encapsulants and backsheets</b>	<b>Eder, Gabriele (OFI)</b>
	b)	<b>Latest generation of eco-designed PV module packaging materials and highly accelerated testing methods</b>	<b>Mofakhami, Eeva (INES/CEA)</b>
	c)	<b>Biopolymers for photovoltaics? General framework, suitability and challenges</b>	<b>Feldbacher, Sonja (PCCL)</b>
<b>12:30-13:30</b>	<b>Lunch Break + Poster Session</b>		
<b>13:30 - 15:00</b>	<b>Block II "Integrated-PV and special applications of PV"</b>		
	a)	<b>Enhanced stress tests for integrated and floating PV</b>	<b>Pravettoni, Mauro (SERIS)</b>
	b)	<b>The techno-economic potential of floating photovoltaics and the impact of its operating temperature</b>	<b>Micheli, Leo (Sapienza University of Rome)</b>
	c)	<b>Agrovoltaics: Understanding the impact of soiling based on filed data</b>	<b>Chudy, Dominika (CSEM)</b>
<b>15:00 - 15:30</b>	<b>Coffee Break</b>		

<b>15:30 - 16:30</b>	<b>Block II "Integrated-PV and special applications of PV"</b>		
	d)	<b>Evaluation of moisture ingress through edge sealants for floating PV applications</b>	<b>Roosloot, Nathan (IFE)</b>
	e)	<b>Reliability of BIPV modules/systems</b>	<b>Ozkalay, Ebrar (SUPSI)</b>
<b>16:30 - 17:00</b>	<b>Coffee Break</b>		
<b>17:00 - 18:30</b>	<b>Block III "Reliability and Sustainability"</b>		
	a)	<b>PV sustainability and circular model in the PV value chain</b>	<b>Agraffeil, Claire (CEA)</b>
	b)	<b>Recycling and Repair of PV modules – requirements and testing</b>	<b>Lenck, Norbert (VDE)</b>
	c)	<b>How to regulate the durability of PV modules and inverters with Ecodesign requirements</b>	<b>Polverini, Davide (EC - DG Growth)</b>
<b>18:30</b>	<b>End of Day 1</b>		
<b>19:30</b>	<b>Conference Dinner</b>		
<b>Fri, July 1st</b>	<b>Topic</b>		<b>Speaker (Company)</b>
<b>8:00 - 8:30</b>	<b>Registration</b>		
<b>8:30 - 10:00</b>	<b>Block IV "Reliability of PV-Materials and BOS Components"</b>		
	a)	<b>Electrically Conductive Adhesives in PV Module: A Perspective on Reliability and Sustainability</b>	<b>Miller, Peter (Henkel)</b>
	b)	<b>Power Converters for Renewables – Reliability Design for novel Applications</b>	<b>Clemens, Daniel (SMA)</b>
	c)	<b>Degradation Mechanisms of Fluorinated and Non-Fluorinated Anti-Soiling Coatings</b>	<b>Jones, Luke (CREST)</b>
<b>10:00 - 10:30</b>	<b>Coffee Break</b>		
<b>10:30 - 12:00</b>	<b>Block V "Reliability of new cell-technologies"</b>		
	a)	<b>Extended reliability of Si Heterojunction solar modules</b>	<b>Gnocchi, Luca; Arriaga-Arruti, Olatz (EPFL)</b>
	b)	<b>Measurement challenges of PSK devices and their mitigation</b>	<b>Mihailov, Blago (JRC)</b>
	c)	<b>Patterns of Degradation in Perovskite Solar Cells</b>	<b>Jacobs, Daniel (EPFL)</b>
<b>12:00 - 13:00</b>	<b>Block VI "Service-life prediction and standardization"</b>		

	<b>a)</b>	<b>Modelling the effects of polymer thermal and moisture diffusion properties on lifetime energy yield prediction</b>	<b>Kaaya, Ismail (IMEC)</b>
	<b>b)</b>	<b>IEC standards for PV modules, current status and ongoing developments</b>	<b>Sample, Tony (JRC)</b>
	<b>Open Discussion &amp; Sum up</b>		
<b>13:00 - 14:00</b>	<b>Lunch + Poster</b>		
<b>14:00 - 15:30</b>	<b>Optional: LAB tours (MC and Innoparc)</b>		
	<b>End of Workshop (or after lunch for people not taking the tour)</b>		