



## 1<sup>st</sup> Cypriot PV Workshop: DegradationLab and TESTARE Joint Event

<b>Date and Time:</b>	Tue, June 27 <sup>th</sup> 2023, 09:15 – 17:00 (EEST – CY Time)
<b>Workshop:</b>	09:15 – 14:00 (EEST – CY Time)
<b>Onsite Location:</b>	<b>Room LRC012</b> , Learning Resource Centre – Library “Stelios Ioannou”, New Campus, 1 University Avenue, 2109 Aglantzia, Nicosia, <a href="#">Map</a>
<b>Online Location:</b>	<b>Zoom</b> - After registration, interested participants will receive an email with instructions for participating in the webinar.
<b>Infrastructure Open Day:</b>	14:00 – 17:00 (EEST – CY Time)
<b>Onsite Locations:</b>	<b>Aglantzia New Campus</b> , DegradationLab - PV Technology Laboratory, 1 University Avenue, 2109 Aglantzia, Nicosia, <a href="#">Map</a> <b>Latsia Annex</b> , DegradationLab – Renewable Energy Laboratory, 40 Makedonias Avenue, 2238 Latsia, Nicosia, <a href="#">Map</a>
<b>Hosted by:</b>	University of Cyprus (UCY) – Dr. Maria Hadjipanayi

This 1<sup>st</sup> Cypriot PV Workshop is a joint force of the “DegradationLab” and “TESTARE” projects aiming to present the latest trends in Research and Development in Photovoltaics (PVs) in Cyprus and beyond. This workshop will provide the scientific background in the field of **new-generation PV and emerging technologies**, with an emphasis on their stability and reliability. The attendees will have the opportunity to **access the new facilities** developed under the “DegradationLab” infrastructure project during an **Open Day session**. The workshop is intended for the **local and international scientific community, industry, enterprises, young researchers and stakeholders in the PV energy sector**. The participants will get the required technical background and in-field knowledge of the work carried out in the “DegradationLab” project and be introduced to the activities of the recently started “TESTARE” project.

### Workshop Agenda

08:45	09:15	0:30	<i>Arrival and Registration</i>
09:15	09:30	0:15	<b>Welcome Remarks and Introduction to “DegradationLab” and “TESTARE”</b> <i>Dr. Maria Hadjipanayi, “DegradationLab” and “TESTARE” coordinator, UCY</i>
09:30	10:45	1:15	<b>International Research and Development in New-generation PV</b>
09:30	9:45	0:15	<b>Materials and processes for efficient and stable large-scale perovskite solar modules</b> <i>Dr. Anurag Krishna, imec Interuniversity Microelectronics Centre</i>
09:45	10:00	0:15	<b>Fully printable perovskite module architectures for industrial up-scaling</b> <i>Dr. Markus Kohlstädt, Fraunhofer Institute for Solar Energy Systems ISE</i>
10:00	10:15	0:15	<b>Stability of perovskite PV: indoor vs outdoor degradation studies</b> <i>Prof. Eugene Katz, Ben Gurion University of the Negev</i>
10:15	10:30	0:15	<b>VIPERLAB: Harmonization and standardization challenges for Perovskite PV</b> <i>Dr. Rita Ebner, AIT Austrian Institute of Technology</i>
10:30	10:45	0:15	<b>Correlative microscopy and spectroscopy for PV applications</b> <i>Dr. Sabrina Pechmann, Fraunhofer Institute for Ceramic Technologies and Systems IKTS</i>

The **DegradationLab** project is co-financed by the European Regional Development Fund and the Republic of Cyprus through the Research and Innovation Foundation (INFRASTRUCTURES/1216/0043).

The **TESTARE** project is funded by the European Union (101079488).

<b>10:45</b>	<b>11:15</b>	<b>0:30</b>	<i>Coffee Break</i>
<b>11:15</b>	<b>12:45</b>	<b>1:30</b>	<b>New-generation PV Research Developments in Cyprus</b>
<b>11:15</b>	<b>11:30</b>	<b>0:15</b>	<b>CIGS-based Thin Film Solar Cells Fabricated by Pulsed Laser Deposition</b> <i>Prof. Ioannis Giapintzakis, Mechanical and Manufacturing Engineering, UCY</i>
<b>11:30</b>	<b>11:45</b>	<b>0:15</b>	<b>Toward high-performance solution processed photovoltaics</b> <i>Prof. Stelios Choulis, Mechanical Engineering, Cyprus University of Technology</i>
<b>11:45</b>	<b>12:00</b>	<b>0:15</b>	<b>Colloidal perovskite nanomaterials -prospects for PV</b> <i>Dr. Grigorios Itskos, Physics, UCY</i>
<b>12:00</b>	<b>12:15</b>	<b>0:15</b>	<b>Perovskite modules: Long-term outdoor testing and seasonal effects</b> <i>Dr. Vasiliki Paraskeva, DegradationLab, Electrical and Computer Engineering, UCY</i>
<b>12:15</b>	<b>12:30</b>	<b>0:15</b>	<b>Using Raman microscopy for perovskite degradation studies</b> <i>Dr. Sophia Hayes, Chemistry, UCY</i>
<b>12:30</b>	<b>12:45</b>	<b>0:15</b>	<b>Experiences in developing measurement protocols for perovskite-based PV and inter-comparison efforts</b> <i>Dr. Matthew Norton, DegradationLab, Electrical and Computer Engineering, UCY</i>
<b>12:45</b>	<b>13:00</b>	<b>0:15</b>	<b>Closing Remarks</b> <i>Dr. Maria Hadjipanayi, "DegradationLab" and "TESTARE" coordinator, UCY</i>
<b>13:00</b>	<b>14:00</b>	<b>1:00</b>	<i>Networking Light Lunch</i>
<b>14:00</b>	<b>17:00</b>	<b>3:00</b>	<b>Open Day DegradationLab Facilities (Aglantzia Campus and Latsia Annex)</b>

## Background Information

### DegradationLab – “Advanced centre for testing degradation and failures in new and emerging solar cells”



Since solar cells tend to degrade after a specific time of operation, characterisation methods are more than necessary for the failure analysis of PV cells. New and emerging technologies such as perovskites and perovskite on silicon tandems, demand more advanced characterisation methods for understanding degradation mechanisms occurring therein and subsequently contributing to the improvement of their properties which can lead to their commercialisation. DegradationLab project aimed at characterising such cells indoors with several optoelectronic techniques as well as outdoors in real operating conditions for the detailed analysis of degradation mechanisms. Through this project a dedicated laboratory has been established and key collaborations for addressing complex and multiple failures in perovskites-based cells in a full top-down, holistic approach, have been developed. Methods of Light Beam Induced Current (LBIC), Dark Lock-In Thermography (DLIT), Lock-in Thermography (LIT), spatially-resolved Electroluminescence (EL) and Photoluminescence (PL) have been set up for a complete optical and electrical characterisation of cells. These methods in combination with ultrafast spectroscopy and Raman measurements and other microscopic-spectroscopic techniques such as Transmission



Electron Microscopy (TEM), Scanning Electron Microscopy (SEM), X-ray Photoelectron Microscopy (XPS) and Energy-dispersive X-ray spectroscopy (EDX) have provided a detailed failure analysis in the perovskite-based cells. The overall project pursued the improvement of the stability and efficiency of perovskite and perovskite on silicon tandem cells and also the creation of a new infrastructure unit for tests of emerging technology cells with significant capabilities that was absent in Cyprus and in Europe generally.

**Coordinator:** University of Cyprus (UCY) – DegradationLab of PV Technology Laboratory, Laboratory for Ultrafast Science and Molecular Spectroscopy Laboratory.

**Partners (Foreign Research Organisations):** Interuniversity Microelectronics Centre (IMEC) - Belgium, AIT Austrian Institute of Technology GmbH (AIT) - Austria and Max-Planck Institute for the Science of Light (MPL) – Germany.

**Start and end date:** 31/12/2018 – 30/06/2023

**Total project funding:** €999,460.00

The DegradationLab project is co-financed by the European Regional Development Fund and the Republic of Cyprus through the Research and Innovation Foundation (INFRASTRUCTURES/1216/0043).



### **TESTARE – “Twinning for excellence in TEsting new generation PV: Long-term STAbility and field Reliability”**



**TESTARE**

In this “Twinning” Horizon Europe project, the University of Cyprus (UCY) will link effectively with leading research institutions, namely Interuniversity Microelectronics Centre (IMEC), Fraunhofer Institute for Solar Energy Systems (Fraunhofer ISE), and Ben-Gurion University of the Negev (BGU), aiming to stimulate excellence and innovation capacity at the DegradationLab of the PV Technology Laboratory in the field of long-term stability and field reliability testing of new and emerging photovoltaic technologies. Key activities will include knowledge transfer, exchange of best practices between UCY and the leading partners, industrial networking and infrastructure sharing. An exploratory research project will also take place within “TESTARE” assessing the performance and lifetime of perovskite on silicon tandem modules, which are considered extremely promising for low-cost and highly flexible photovoltaics suitable for integration into the urban environment.

**Coordinator:** University of Cyprus (UCY)

**Partners:** Interuniversity Microelectronics Centre (IMEC) - Belgium, Fraunhofer Institute for Solar Energy Systems (Fraunhofer ISE) - Germany and Ben-Gurion University of the Negev (BGU) - Israel.

**Start and end date:** 01/01/2023 – 31/12/2025

**Total project funding:** €1,499,996.25

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