



EUPVSEC

14 — 18
September

WTC —
World Trade Center

Rotterdam —
The Netherlands

EU PVSEC

43rd European
Photovoltaic Solar Energy
Conference and Exhibition

2026

**Conference
Programme**

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43rd European Photovoltaic Solar Energy Conference and Exhibition

Conference Program

Monday, 14. September 2026

MONDAY MORNING

CONFERENCE OPENING

PLENARY PRESENTATIONS AP.1

08:30 - 09:30 PV in the Energy System

Chairpersons: Eszter Voroshazi
CEA, Le Bourget-du-Lac, France
Grazia Barchi
Eurac Research, Bolzano, Italy

AP.1.1 Limitless PV in Grids: Opportunities, Challenges and Stragies

Pierre-Jean Alet¹, Giovanna Adinolfi², Grazia Barchi³, Venizelos Efthymiou⁴, Marion Perrin⁵, Maximilian Schönau⁶, Elham Shirazi⁷

¹ CSEM, Neuchâtel, Switzerland; ² ENEA, Portici, Italy; ³ EURAC Research, Bolzano, Italy; ⁴ EPL Technology Frontiers, Nicosia, Cyprus; ⁵ Energy Pool, Le Bourget du Lac, France; ⁶ smartblue, Munich, Germany; ⁷ University of Twente, Enschede, The Netherlands

AP.1.2 AI for PV and PV for AI: Linking Nanoscale to TeraWatt(h)

Jozef (Jef) Poortmans¹, Ivan Gordon¹, Arnaud Morlier¹, Olivier Dupon¹, Bart Onsia¹, Dounia Saadallah¹, Louis De Taeye¹, Ya-Mi Chuang¹, Matthias Strobbe¹, Chris Develder², Timon Evenblij¹, Marie Garcia-Bardon¹, Santiago Gaitan¹, Michael Daenen³, Patrizio Manganiello³

¹ imec vzw, Leuven, Belgium; ² University Ghent, Gent, Belgium; ³ University Hasselt, Hasselt, Belgium

AP.1.3 From Solar Abundance to System Intelligence: Managing Congestion, Market Dynamics, and Flexibility in High-PV Power Systems

Koen Kok¹

¹ Eindhoven University of Technology, Eindhoven, The Netherlands

09:30 - 10:00 Becquerel Prize Ceremony

Chairpersons: Stefan W. Glunz
Fraunhofer ISE, Freiburg, Germany

Becquerel Prize Winner 2026

The Laudatio

European Commission
Representative

10:30 - 11:30 Welcome Message | Opening Addresses | Keynote Speech

Welcome Message - General Chair EU PVSEC 2026

Wilfried G.J.H.M. van Sark¹

¹ Utrecht University, The Netherlands

Welcome Message - WIP Renewables Energies

Jon de Gregorio¹

¹ WIP Renewable Energies, München, Germany

Key Note Speech - Congestion and other Limits in the Electricity System

Peter Palensky¹

¹ Delft University of Technology, The Netherlands

PANEL DISCUSSION PRESENTATIONS

11:30 - 12:15 Moderated Panel Discussion - Grid Congestion management and the perspective of The Netherlands

Chairpersons: Edwin van Gastel
Solar & Storage Magazine, Uden, The Netherlands

Panelist 1 - Peter Palensky, Delft University of Technology, The Netherlands

Panelist 2 - Otto Bernsen, RVO, The Netherlands

Panelist 3 - Margriet Rouhof, TenneT, The Netherlands

Panelist 4 - Arjan van Voorden, Stedin, The Netherlands

Panelist 5 - Nold Jaeger, Holland Solar, The Netherlands



ORAL PRESENTATIONS 2AO.1

13:30 - 15:00 New Concepts in CIGS and CdTe Solar Cells

Chairpersons: Mirjam Theelen
TNO/Solliance, Eindhoven, The Netherlands
Thomas Dalibor
Avancis, Torgau, Germany

2AO.1.1 Study of Eco-friendly Processed Widegap Cu(In,Ga)S₂ Solar Cells

Takahito Nishimura¹, Yota Suzuki¹, Yuta Yoshino¹, Akira Yamada¹

¹ Institute of Science Tokyo, Meguro-ku, Japan

2AO.1.2 Back-Contact Passivation as the Next Efficiency Leap for Ultrathin and Bifacial CIGS Solar Cells

Negar Naghavi¹, Stephane Collin¹, Loukiana Kozlov¹, Javid Hajhemati¹, Nathanaelle Schneider¹, D. Coutancier², J. F. Guillemoles², Romain Carron³, Matteo De Marzi³, Susanne Siebentritt⁴, Saeed Bayat⁴, Marika Edoff⁵, Jan Keller⁵, Elizaveta Yakovleva⁵, Pedro Salome⁶, Sascha Sadewasser⁶, Antonio J. N. Oliveira⁶, Andre F. Violas⁶, Jennifer P. Teixeira⁶, J. Fonseca⁶, Heiko Kempa⁷, Roland Scheer⁷, Merve Demir⁷, Matthias Maiberg⁷, Dimitrios Hariskos⁸, Wolfram Witte⁸, Rico Gutzler⁸, Capucine Tong⁹

¹ CNRS, Palaiseau, France; ² IPVF, Palaiseau, France; ³ EMPA, Zurich, Switzerland; ⁴

University of Luxembourg, Luxembourg; ⁵ Uppsala University, Uppsala,

Sweden; ⁶ INL, Braga, Portugal; ⁷ Martin-Luther-Universität Halle-Wittenberg, Halle,

Germany; ⁸ ZSW, Stuttgart, Germany; ⁹ Saint-Gobain Research, Aubervilliers, France

2AO.1.3 Buffer and Interface Engineering in 'Standard' and Low-gap Cu(In,Ga)Se₂

Rico Gutzler¹, Ana Kanevce¹, Wolfram Witte¹, Dimitrios Hariskos¹

¹ ZSW, Stuttgart, Germany

2AO.1.4 Bandgap Engineering of Ag-Alloyed Cu(In,Ga)Se₂ for High-Performance Perovskite/ACIGS Tandem Cells

Emilee Fortier¹, Thomas Tom¹, Jackson Lontchi¹, Vincent Dufoulon¹, Javid Hajhemati¹, Amelle Rebai¹, Peggy Marie¹, Philip Schulz¹, Negar Naghavi¹

¹ IPVF, Palaiseau, France

2AO.1.5 Buried Junction and Efficient Carrier Separation in CdSexTe1-x/CdTe Thin Film Solar Cell

Deliang Wang¹, Hongxu Jiang¹, Yanbo Cai¹

¹ University of Science and Technology of China, Hefei, China

2AO.1.6 CdTe Solar Cells for Tandem Application with Silicon Devices

Mariyam Mukhtar¹, Elisa Artegiani¹, Alessandro Romeo¹

¹ University of Verona, Verona, Italy

ORAL PRESENTATIONS 1-3AO.4

13:30 - 15:00 UV-Induced Degradation: From Cell Level Mechanisms to Module Reliability

Chairpersons: Alison Ciesla
UNSW, Sydney, Australia
Dominika Chudy
SUPSI, Mendrisio, Switzerland

1AO.4.1 Revealing the Physical Mechanisms of Ultraviolet-induced Degradation in Silicon Solar Cells through Experiments and Theoretical Modelling

Jiaxin Yang¹, Muhammad Umair Khan¹, Xinyuan Wu¹, Chandany Sen¹, Jessica Yajie Jiang¹, Bram Hoex¹, Fiacre Rougieux¹

¹ UNSW, Sydney, Australia

1AO.4.2 UV-Induced Degradation of TOPCon and Heterojunction Solar Cells: Impact of Spectrum, Temperature, Intensity and Post-UV Treatments

Pascal Messmer¹, Benjamin Hamann¹, Salar Sedani², Tim Niewelt¹, Wolfram Kwapi¹, Ilker Yildiz³, Paul Gebhardt¹, Martin C. Schubert¹, Florian Schindler¹

¹ Fraunhofer ISE, Freiburg, Germany; ² ODTÜ-GÜNAM, Ankara, Türkiye; ³ METU, Ankara, Türkiye

1AO.4.3 UV-Induced Degradation in TOPCon: Self-Healing Effects and Consequences for Field Performance

Muhammed Umair Khan¹, Shukla Poddar¹, Ho Yuet Rachel Yeung¹, Aeron Johns¹, Ting Huang², Liang Wu², Hao Song², Ruirui Lv², Yuanjie Yu², Phillip Hamer¹, Bram Hoex¹

¹ UNSW, Sydney, Australia; ² CSI Solar, Jiangsu, China

3AO.4.4 Inter-Laboratory Comparative Study of UV-Induced Degradation (UVID) on N-Type PV Modules

Ting Huang¹, Ruirui Lv¹, Liang Wu¹, Yuanjie Yu¹, Alan Xu¹, Bram Hoex²

¹ Canadian Solar, Suzhou, China; ² UNSW, Sydney, Australia

3AO.4.5 UV-Induced Degradation in TOPCon Modules: Linking Accelerated and Outdoor Testing

Todd Karin¹, Archana Sinha¹, Jean-Nicolas Jaubert¹

¹ Kiwa PVEL, Napa, United States of America

3AO.4.6 Using EI, Dlit and IR Imaging and Contactless EI Imaging for Defect Detection in Thin-Film Solar Modules

Peer Sluijs¹, Sreejith Koorthedath Pullayikody¹, Ravi Vasudevan², Arno H. M. Smets¹

¹ Delft University of Technology, Delft, The Netherlands; ² Lift PV, Arnhem, The Netherlands



ORAL PRESENTATIONS 4AO.7

13:30 - 15:00 Accuracy of Solar Resource Measurement

Chairpersons: Olympia Gounari
European Commission JRC, Ispra, Italy
Jan Remund
Meteotest, Bern, Switzerland

4AO.7.1 Comparison of Pyranometers for Measuring Global Horizontal Irradiance

Adam R. Jensen¹, Ioannis Sifnaios¹, Nicholas C. Riedel-Lyngskær²

¹ DTU, Kgs. Lyngby, Denmark; ² European Energy, Søborg, Denmark

4AO.7.2 Standardization of PV Reference Cells for Field Performance and Yield Assessment

Anton Driesse¹, James Blakesley²

¹ PV Performance Labs, Freiburg, Germany; ² National Physical Laboratory, London, United Kingdom

4AO.7.3 Evaluation of Data Quality and Measurement Uncertainty in Solar Data: Findings from NLR's SUNI Application Across 89 Stations

Aron Habte¹, Manajit Sengupta¹, Sora Ryu¹, Stephen Wilcox², Thomas Stoffel²

¹ NLR, Golden, United States of America; ² Solar Resource Solutions, Louisville, United States of America

4AO.7.4 Uncertainty Propagation from Irradiance Measurements to Simulated Rear Side Irradiance and Bifacial Gain

Elin Dypvik Sødahl¹, Heine Nygard Riise¹, Marie Syre Wiig¹, Magnus Moe Nygård¹

¹ IFE, Kjeller, Norway

4AO.7.5 Field Evaluation of Irradiance Sensing and Transposition Approaches for Single-Axis Tracker Optimization Under Diffuse Sky Conditions

Maddalena Bruno¹, Anton Driesse², Lena Ackermann³, Matthew Berwind¹

¹ Fraunhofer ISE, Freiburg, Germany; ² PV Performance Labs, Freiburg, Germany; ³ ZIMMERMANN PV-Steel Group, Eberhardzell, Germany

4AO.7.6 Assessing Ground Albedo in PV-Plants via Fisheycamera and Satellite Images

Niklas Blum¹, Bijan Nouri¹, Stefan Wilbert¹, Johannes Roeder², Luis F. Zarzalejo³

¹ DLR, Almería, Spain; ² DLR, Oberpfaffenhofen, Germany; ³ CIEMAT, Madrid, Spain

VISUAL PRESENTATIONS 3AV.1

13:30 - 15:00 PV Module Design and Manufacturing

Chairpersons: Sonja Feldbacher
PCCL, Leoben, Austria
Veronica Bermudez Benito
BERBETIN, Antibes, France
Ralf Preu (i)
Fraunhofer ISE, Freiburg, Germany

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 2AO.2

15:15 - 16:45 III-V and Organic Solar Cells | Contactless Measurement Techniques

Chairpersons: Alessandro Romeo
University of Verona, Italy
Nasim Rezaei-Hartmann
LayTec, Berlin, Germany

2AO.2.1 Effect of Incident Angle on the Device Performance of InGaAsP LPCs

Sho Aonuki¹, Takaya Oshimo², Kotona Tabata², Takeru Yamada², Masato Suzuki¹, Natsuha Ochiai¹, Yukiko Suzuki¹, Kazuto Kashiwakura¹, Yuka Oshima¹, Masakazu Arai², Yohei Toriumi¹, Madoka Takahashi¹

¹ NTT, Musashino, Japan; ² University of Miyazaki, Miyazaki, Japan

2AO.2.2 Student Awards Finalist Presentation: Low Temperature GaAs Solar Cells Produced by RP-VPE and PE-CVD: A New Approach Towards Low Cost GaAs/c-Si Tandem Solar Cells

Alba Eurosí¹, Maxime Levillayer², Karim Ouaras², Lise Watrin², Ivan Garcia Vara³, Ignacio Rey-Stolle³, Alexandre Jaffre⁴, Martin Ledinisky⁵, Jakub Holovsky⁶, Vesselin Donchev⁷, Zdravko Slavov⁷, Jose Alvarez⁴, Jean-Paul Kleider⁴, Pere Roca i Cabarrocas²

¹ IPVF, Palaiseau, France; ² LPICM, Palaiseau, France; ³ IES, Madrid, Spain; ⁴ CNRS, Gif-sur-Yvette, France; ⁵ Institute of Physics, Academy of Sciences of the Czech Republic, Prague, Czech Republic; ⁶ Academy of Sciences of the Czech Republic, Prague, Czech Republic; ⁷ Sofia University, Sofia, Bulgaria

2AO.2.3 Development of High-Efficiency Non-Fullerene Acceptor Organic Solar Cells using Novel Qx-Based Small Molecules

Meriç Caliskan Arslan¹, Duygu Yalvaç¹, Gönül Hızalan Özsoy², Ali Çırpan¹

¹ METU, Ankara, Türkiye; ² ODTÜ-GÜNAM, Ankara, Türkiye

2AO.2.4 Contactless Subcell-Resolved I-V Characterisation of Tandem Solar Cells

Shuai Nie¹, Felix Gayot¹, Yan Zhu¹, Ziv Hameiri¹

¹ UNSW, Sydney, Australia



2AO.2.5 Rapid, High-Throughput, Multimodal Characterization of Emergent PV Materials and Device Insights
 Ethan G. Schwartz¹, Amy E. Louks², Anthony T. Troupe³, Brandon T. Motes³, Axel F. Palmstrom⁴, Zhaoyang Han⁵, Qi Jiang⁵, Joseph J. Berry⁴, J. Devin MacKenzie¹, Minhal Hasham³

¹ University of Washington, Seattle, United States of America; ² Colorado School of Mines, Golden, United States of America; ³ Optigon, Somerville, United States of America; ⁴ NLR, Golden, United States of America; ⁵ CAS, Beijing, China

2AO.2.6 Contactless Determination of the Series Resistance of Tandem Solar Cells - Possibilities and Limitations

Johannes M. Greulich¹, Andreas Fell¹, Oliver Fischer¹, Cyril Leon², Joël Wytenbach², Martin C. Schubert¹, Stefan Rein¹

¹ Fraunhofer ISE, Freiburg, Germany; ² CEA, Le Bourget-du-Lac, France

ORAL PRESENTATIONS 1AO.5

15:15 - 16:45 Silicon Solar Cells; Hydrogen and Stability & Reduction of Silver Consumption

Chairpersons: Florian Schindler
 Fraunhofer ISE, Freiburg, Germany
 Dheeraj Sah
 Aarhus University, Denmark

1AO.5.1 Student Awards Finalist Presentation: New Insights into Hydrogen Behaviour in PECVD SiNx: H Films

Lahiruni Ranasinghe¹, Muhammad Umair Khan¹, Shona McNab¹, Alvin Mo¹, Aeron Johns¹, Phillip Hamer¹, Saul Winderbaum¹, Alison Ciesla¹

¹ UNSW, Sydney, Australia

1AO.5.2 UV Impact on Commercial nc-Si SHJ Structure

Maysa Sarsour¹, Alison Ciesla¹, John O'Sullivan², Shona McNab¹, Brendan Wright¹, Chukwuka Madumelu¹, Martin Green¹, Ned J. Ekins-Daukes¹, Ruy S. Bonilla², Jessica Yajie Jiang¹

¹ UNSW, Sydney, Australia; ² Oxford University, Oxford, United Kingdom

1AO.5.3 Research on Ag-Coated Ni Paste Screen Printing for TOPCon Solar Cells

Fujian An¹, Ning Chen², Minghao Zheng³, Zilu Shi¹, Qinghui Yin², Yong Du¹, Kai Li¹

¹ Central South University, Changsha, China; ² Wuxi Autowell Technology, Wuxi, China; ³ Changzhou Fusion New Material, Shanghai, China

1AO.5.4 Student Awards Finalist Presentation: Silver-Reduced PV Pastes via Composite and Hollow Particles

Wen Yu¹, Yiyu Zeng¹, Martin Green¹, Yajie Jiang¹

¹ UNSW, Sydney, Australia

1AO.5.5 Towards Silver-free High-efficiency Solar Cells: Copper-plating of Advanced TOPCon Solar Cells with Local Passivated Front Contacts

Jan Hoß¹, Sven Kluska², Saman Sharbaf Kalaghichi¹, Pirmin Preis¹, Dominik Rudolf¹, Haifeng Chu¹, Mertcan Comak¹, Jan Lossen¹, Lejo J. Koduvelikulathu¹

¹ ISC Konstanz, Konstanz, Germany; ² Fraunhofer ISE, Freiburg, Germany

1AO.5.6 Ag-Lean Metallization Strategy for Poly-Si Layers in TOPCon Devices

Audrey Morisset¹, Agata Lachowicz¹, Nicolas Badel¹, Niels Holm¹, Jun Zhao¹, Reyu Sakakibara², Bertrand Paviet-Salomon¹, Christophe Ballif², Tonio Buonassisi¹

¹ CSEM, Neuchâtel, Switzerland; ² EPFL, Neuchâtel, Switzerland

ORAL PRESENTATIONS 4AO.8

15:15 - 16:45 Solar PV Forecasting

Chairpersons: Manajit Sengupta
 National Laboratory of the Rockies, Golden, United States of America
 Shukla Poddar
 UNSW, Sydney, Australia

4AO.8.1 Task-aware Latent-Space Coupling for Generative Solar Forecasting

Yann Fabel¹, Bijan Nouri¹, Milon Miah¹, Niklas Blum¹, Luis F. Zarzalejo², Julia Kowalski³, Robert Pitz-Paal⁴

¹ DLR, Almería, Spain; ² CIEMAT, Madrid, Spain; ³ RWTH Aachen University, Aachen, Germany; ⁴ DLR, Cologne, Germany

4AO.8.2 Sky Camera Forecasting of Solar Power Plant Ramp Rates

Jacob K. Thorning¹, Sergiu V. Spataru¹, Adam R. Jensen², Peter B Poulsen¹

¹ DTU, Roskilde, Denmark; ² DTU, Lyngby, Denmark

4AO.8.3 3-Month Nordic Benchmark of ASI-based Solar Nowcasting: Commercial Solutions and DL Literature Models

Erling Ween Eriksen¹, Magnus Moe Nygård¹, Yann Fabel², Bijan Nouri², Heine N. Riise¹

¹ IFE, Kjeller, Norway; ² DLR, Almería, Spain

4AO.8.4 Optimizing Semantic Cloud Segmentation via Video Object Segmentation for Solar Forecasting

Eduardo Saez Martinez¹, Bijan Nouri¹, Raphael Gut¹, David Magiera¹, Yann Fabel¹, Niklas Blum¹, Luis F. Zarzalejo²

¹ DLR, Almería, Spain; ² CIEMAT, Madrid, Spain

4AO.8.5 Benchmarking Accuracy and Variability in Intra-Hour Solar Irradiance Forecasts from Satellite and Ground Observations

Thomas Schmidt¹, Bijan Nouri², Keisuke Tanaka³, Jorge Lezaca¹, Yann Fabel², Annette Hammer¹, Niklas Blum¹, Marion Schroedter-Homscheidt¹, Frank Dressel¹, Stefan Wilbert¹

¹ DLR, Oldenburg, Germany; ² DLR, Almería, Spain; ³ DLR, Dresden, Germany

4AO.8.6 Intraday Solar Energy Forecasting at National Scale using Satellite-based Solar Forecast Models

Luca Lanzilao¹, Angela Meyer¹

¹ Bern University of Applied Sciences, Biel, Switzerland



VISUAL PRESENTATIONS 3AV.2

15:15 - 16:45 PV Module Durability and Reliability

Chairpersons: Paul Gebhardt
Fraunhofer ISE, Freiburg, Germany
Olatz Arriaga Arruti
CSEM, Neuchâtel, Switzerland
Ralph Gottschalg (i)
Fraunhofer CSP, Halle (Saale), Germany

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 2AO.3

17:00 - 18:30 Advanced Characterisation and Simulation of Perovskite and Tandem Cells

Chairpersons: Theresa Magorian Friedlmeier
ZSW, Stuttgart, Germany
Iñigo Ramiro
UPC, Barcelona, Spain

2AO.3.1 Measurement of Surface Recombination Velocities on Perovskite Layers Using Wavelength-dependent Time-resolved Photoluminescence (λ -TRPL)

Benjamin Grimm¹, Johannes Löhr¹, Chencheng Xu¹, Jan Schmidt¹
¹ ISFH, Emmerthal, Germany

2AO.3.2 Transport Efficiency Mapping in Tandem Photovoltaic Cells Using Luminescence and Electrical Measurements

Ahmed Aissaoui¹, Hassanet Sodabanlu², Kentaroh Watanabe², Masakazu Sugiyama², Stéphane Collin¹, Amaury Delamarre¹
¹ CNRS, Palaiseau, France; ² RCAST, Tokyo, Japan

2AO.3.3 Understanding and Mitigating Non-Ohmic Transport Losses in High-Efficiency Perovskite-Silicon Tandem Solar Cells by Experiment and Simulation

Christoph Messmer¹, Oussama Er-Raji¹, Oliver Fischer², Andreas Fell², Patricia S.C. Schulze², Martin Bivour², Martin Hermle², Jonas Schön¹, Martin C. Schubert², Stefan W. Glunz¹
¹ University of Freiburg, Freiburg, Germany; ² Fraunhofer ISE, Freiburg, Germany

2AO.3.4 Student Awards Finalist Presentation: Metastability through Ion Migration – Impact of Scan Speed and Temperature on Current-Voltage Curve Measurements

Thomas Schleyerbach¹, Christoph Messmer², Alexander J. Bett¹, Johanna Modes¹, Jonas Schön², Benedikt Bläsi¹, Martin C. Schubert¹
¹ Fraunhofer ISE, Freiburg, Germany; ² INATECH, Freiburg, Germany

2AO.3.5 Uncovering hidden Phases in Evaporated Perovskite Thin Films by Combining In-Situ Reflectance and Photoluminescence

Adrian Adrian¹, Matthew Leyden², Nasim Rezaei-Hartmann¹, Claudine Groß¹, Enno Malguth¹, Christian Kaspari¹, Marcel Roß², Lars Korte², Jinyoung Noh³, Jeffrey Lee³, Steve Albrecht², Christian Camus¹, Viktor Škorjanc²
¹ LayTec, Berlin, Germany; ² HZB, Berlin, Germany; ³ Korea Kiyon, Seoul, South Korea

2AO.3.6 Physics-aware Solar Production Forecasting using SOLEY

Zacharie Jehl Li-Kao¹, Sergio Giraldo¹, Marcel Placidi¹, Alex Jimenez Arguijo¹, Edgardo Saucedo¹
¹ UPC, Barcelona, Spain

ORAL PRESENTATIONS 1AO.6

17:00 - 18:30 Innovations in Passivating Contact Solar Cells

Chairpersons: Audrey Morisset
CSEM, Neuchâtel, Switzerland
Pere Roca i Cabarrocas
LPICM-CNRS, Palaiseau, France

1AO.6.1 Decoration of POLO2 IBC Cells with Modulated Surface Texturing Methods Yielding in Power Conversion Efficiency above 26%

Engin Özkol¹, Katarina Kovačević¹, Udo Römer², Yifeng Zhao¹, Robby Peibst³, Olindo Isabella¹
¹ TU Delft, Delft, The Netherlands; ² ISFH, Emmerthal, Germany; ³ LUH, Hannover, Germany

1AO.6.2 Direct Atomic Layer Processing Enabled Localized Edge Passivation of Laser Scribed TOPCon Cells

Dheeraj Sah¹, Karolis Parfeniukas², Roberto Boccardi³, Narendra Bandaru¹, Agata Lachowicz⁴, Bertrand Paviet-Salomon⁴, Benjamin Borie², Mira Baraket², Maksym Plakhotnyuk², Gisele A. Dos Reis Benatto³, Sune Thorsteinsson³, Peter B. Poulsen³, Rasmus Schmidt Davidsen¹
¹ Aarhus University, Aarhus, Denmark; ² ATLANT 3D, Taastrup, Denmark; ³ DTU, Roskilde, Denmark; ⁴ CSEM, Neuchâtel, Switzerland

1AO.6.3 Highly Effective Boron Doped ZnO Passivating Contacts for Crystalline Silicon Solar Cells

Piyumi Kodithuwakku¹, Christian Samundsett¹, Stephane Armand¹, Daniel H. Macdonald¹, Lachlan E. Black¹
¹ ANU, Canberra, Australia

1AO.6.4 p-i-n Junctions in Polycrystalline Silicon on Oxide Passivating Contacts for Local Device-Integrated Bypass Diodes in IBC Solar Cells

Jan Krügener¹, Udo Römer², Leon Salomon¹, Robby Peibst²
¹ Leibniz University Hannover, Hannover, Germany; ² ISFH, Emmerthal, Germany

1AO.6.5 Bulk Degradation during LeTID Conditions in P-, Sb- and As-Doped Cz-Si Wafers and TOPCon Solar Cells

Joshua Kamphues¹, Chirag Mule², Thien Truong³, Juri Miech¹, Sumit Agarwal², Pauls Stradins³, Giso Hahn¹
¹ University of Konstanz, Konstanz, Germany; ² Colorado School of Mines, Golden, United States of America; ³ NLR, Golden, United States of America



1AO.6.6 Study on Weak Light Response of Back-contact Crystalline Silicon Photovoltaic Cells and Modules

Jikai Kang¹, Xian Jiang¹, Bo Zhang¹, Hansong Guo¹, Jiaqi Song¹, Zongyou Shen¹, Zhenguo Li¹

¹ Longi Green Energy Technology, Xi'an, China

ORAL PRESENTATIONS 4AO.9

17:00 - 18:30 Long-term Solar Resource Datasets

Chairpersons: Ana Maria Gracia Amillo
CENER, Sarriguren, Spain
Adam R. Jensen
Technical University of Denmark, Kgs. Lyngby, Denmark

4AO.9.1 Extending the Capabilities of JRC-PVGIS for Energy Yield Estimation in Urban and Mountainous Environments

Olympia Gounari¹, Alexandros Falangas², Ana Martinez¹, Luis Mercado¹, Nigel Taylor¹

¹ European Commission JRC, Ispra, Italy; ² TRASYS International, Herstal, Belgium

4AO.9.2 Bias-Aware Dynamical Downscaling of Earth System Model Projections for Energy Applications

Manajit Sengupta¹, Jaemo Yang¹, Yu Xie¹

¹ NLR, Golden, United States of America

4AO.9.3 Improving the National Solar Radiation Data Base using PSM V4

Manajit Sengupta¹, Yu-Konsta Xie¹, Aron Habte¹, Brandon Benton¹, Paul Edwards¹, Jaemo Yang¹, Michael Foster², Andy Heidinger³

¹ NLR, Golden, United States of America; ² University of Wisconsin, Madison, United States of America; ³ NOAA, Madison, United States of America

4AO.9.4 Integration of GOES Data for Solar Resource Assessment of the Contiguous United States

Yu Xie¹, Manajit Sengupta¹, Brandon Benton¹, Aron Habte¹, Jaemo Yang¹, Michael Foster²

¹ NLR, Golden, United States of America; ² University of Wisconsin, Madison, United States of America

4AO.9.5 Data-Driven P50–P90 PV Yield Estimation using Long-Term Historical Irradiance across Norwegian Sites

Alexander Severinsen¹, Heine Nygard Riise²

¹ Cofactor, Sætre, Norway; ² IFE, Kjeller, Norway

4AO.9.6 Non-Autoregressive Transformer for High-Resolution Time Series Downscaling of Solar Irradiance

Cristian Javier Maza Merchan¹, Jose Alberto Cumbicos Romero¹, Gustavo Fraidenraich¹, Arttu Tuomiranta², Tarcio Andre dos Santos Barros¹

¹ UNICAMP, Campinas, Brazil; ² TotalEnergies, Palaiseau, France

VISUAL PRESENTATIONS 3AV.3

17:00 - 18:30 PV Module Performance – Modelling, Testing, Standards

Chairpersons: Marco Ernst
ANU, Canberra, Australia
Giorgio Bardizza (i)
TÜV Rheinland Solar, Milan, Italy

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.



Tuesday, 15. September 2026

ORAL PRESENTATIONS 3BO.11

08:30 - 10:00 Polymers and Encapsulation

Chairpersons: Chiara Barretta
PCCL, Leoben, Austria
Remi Aninat (*i*)
TNO/Solliance, Eindhoven, The Netherlands

3BO.11.1 Introductory Presentation: Reliability Puzzle: Insight into the Role of Additives in EVA and POE Encapsulants in Damp Heat-Induced Failures

Chandany Sen¹, Haoran Wang¹, Muhammad Umair Khan¹, Muhie Vasuthevan², Ziyi Zhao², Robert Sporne², Ting Huang³, Hao Song³, Ruirui Lv³, Yuanjie Yu³, Bram Hoex¹

¹ UNSW, Sydney, Australia; ² Tindo Solar, Sydney, Australia; ³ CSI Solar, Jiangsu, China

3BO.11.2 Environmental Debonding of EVA and POE from Tinned Copper Interconnectors

Gernot M. Wallner¹, Florian Fenyvesi¹, Gabriel Riedl¹

¹ Johannes Kepler University Linz, Linz, Austria

3BO.11.3 Student Awards Finalist Presentation: Can there be too Much Adhesion Promoter in POE Encapsulation? Molecular Insights from Damp-heat Weathering

Jishnu Ramachandran Nair¹, Nishant Pradhan¹, Paul Schenk¹, Matthias Pander¹, Steffen Bornemann², Ralph Gottschalg¹, Anton Mordvinkin¹

¹ Fraunhofer CSP, Halle (Saale), Germany; ² Folienwerk Wolfen, Bitterfeld Wolfen, Germany

3BO.11.4 New Insights into UV-Induced Degradation of EVA/POE Encapsulants and its Impact on SHJ Modules

Hugo Lajoie¹, Maxime Babics¹, Frédéric Jay¹, Romain Couderc¹, Sandrine Therias²

¹ CEA, Le Bourget-du-Lac, France; ² CNRS, Aubièrre, France

3BO.11.5 Water Vapour Barrier Performance of Advanced Polymer Encapsulants for PV Modules: Effects of Structure, Colorants and Additives

Gabriele C. Eder¹, Yuliya Voronko¹, Rayna Mutewsky¹, Markus Babin², Andreas Brandstätter³, Markus Feichtner⁴

¹ OFI, Vienna, Austria; ² DTU, Roskilde, Denmark; ³ Lenzing Plastics, Seewalchen, Austria;

⁴ Sonnenkraft, St.Veit/Glan, Austria

ORAL PRESENTATIONS 4BO.16

08:30 - 10:00 BIPV Module and System Design

Chairpersons: Simona Villa
TNO, Eindhoven, The Netherlands
Shantanu Roy
CSTEP, Bengaluru, India

4BO.16.1 PV Modules based on U-profiled Glass for Building Integration

Kevin Meyer¹, Wael Mandow¹, Susanne Blankemeyer¹, Jonas Bollermann¹, Thomas Daschinger¹, Iris Kunze¹, Markus Buning², Thomas Schmidt², Federico Giovanetti¹, Henning Schulte-Huxel¹

¹ ISFH, Emmerthal, Germany; ² Flachglas Sülzfeld, Meiningen, Germany

4BO.16.2 Free-space Luminescent Solar Concentrators for Improved Winter Performance of Building-integrated Photovoltaics

Lisanne Einhaus¹, Rebecca Saive¹

¹ University of Twente, Enschede, The Netherlands

4BO.16.3 Fire Behavior Assessment of Polymer-based PV Encapsulants at Material and Module Level

Gabriele C. Eder¹, Michael Bichler¹, Anna Stanzel², Dieter Moor³

¹ OFI, Vienna, Austria; ² BVS, Linz, Austria; ³ Arconsol, Linz, Austria

4BO.16.4 Student Awards Finalist Presentation: Silicon Photovoltaics on Metal Substrates: Investigating Cell Gap Changes in Modules with Aluminum Rear Cover

Wiebke Wirtz¹, Kevin Meyer¹, Ulli Zeller², Matthias Pander², Ringo Koepge², Bengt Jaeckel², Rolf Brendel¹, Henning Schulte-Huxel¹

¹ ISFH, Emmerthal, Germany; ² Fraunhofer CSP, Halle (Saale), Germany

4BO.16.5 Numerical Sensitive Analysis of the Thermal Behaviour of a Building-Integrated Photovoltaic Ventilated Facade

Zeinab Aldroubi¹, Ya Brigitte Assoa¹, Christophe Menezo², Mohamed Amara³

¹ CEA, Le Bourget-du-Lac, France; ² CNRS, Le Bourget-du-Lac, France; ³ INSA, Lyon, France

4BO.16.6 Towards a New Approach for Certification of IPV Product Families Based on Semi-Fabricates

Nikoleta Kyranaki¹, Alvaro De Gruijter Eguiluz², Dominika Chudy³, Aldo Kingma⁴, Remi Aninat⁴, Andreas Haller⁵, Ruben Roldan⁶, Marcello La Rosa⁷, Jasper Klomps⁸, Arnaud Morlier⁹, Roland Valckenborg⁴, Michael Daenen¹

¹ Hasselt University, Genk, Belgium; ² Eurac Research, Bolzano, Italy; ³ SUPSI, Mendrisio, Switzerland; ⁴ TNO, Eindhoven, The Netherlands; ⁵ Ernst Schweizer, Metallbau, Switzerland;

⁶ iWin, Manno, Switzerland; ⁷ Glass to Power, Rovereto, Italy; ⁸ Wienerberger, Zaltbommel, The Netherlands; ⁹ imec, Genk, Belgium



ORAL PRESENTATIONS 2BO.1

08:30 - 10:00 Novel Materials and Processes for Perovskite Devices

Chairpersons: Rutger Schlatmann
HZB, Berlin, Germany
Invited

2BO.1.1 CsPbCl₃: Yb³⁺ Perovskite Nanocrystal-based Luminescent Down-Shifting Layers for Perovskite Solar Cells

Zeynep Durmaz¹, Mathis Van de Voorde¹, Tim Bekius², Rebecca Saive¹
¹ University of Twente, Enschede, The Netherlands; ² Univeristy of Twente, Enschede, The Netherlands

2BO.1.2 Full Process Development of Large-Scale Rigid and Flexible Perovskite Modules Using In-House Slot-Die Coating and Vacuum Quenching Technologies

Katsumi Araki¹
¹ Alpha Precision Systems, Mckinney, United States of America

2BO.1.3 Understanding the Principles of Co-deposition of Mixed-SAMs in MAPbI₃-based p-i-n Structure Perovskite Solar Cells

Haoxu Wang¹, Jin Yan¹, Mare Dijkstra¹, Engin Torun¹, Moumita Rana¹, Paul Procel Moya¹, Rudi Santbergen¹, Miro Zeman¹, Olindo Isabella¹, Luana Mazzarella¹
¹ TU Delft, Delft, The Netherlands

2BO.1.4 Operation Window Engineering of Hybrid Evaporation–Solution Processed Perovskites for Building-Integrated Photovoltaics

Elshan Asadi¹, Cem Maden¹, Mustafa Yasa¹, Gorkem Gunbas¹, Selcuk Yerci¹
¹ ODTÜ - GÜNAM, Ankara, Türkiye

2BO.1.6 Conjugated Diammonium A⁺-Cations for Enhanced Performance and Stability in Quasi-2D Lead and Lead-Tin Perovskite Solar Cells

Dzaky Ruhimat¹, Susana Ramos-Terron², Daniel Rammer¹, Alexander Holzer¹, Luis Camacho², Suman Mallick¹, Lakshmi Rajan³, Egon Pavlica³, Gustavo de Miguel², Gregor Trimmel¹, Thomas Rath¹
¹ Graz University of Technology, Graz, Austria; ² University of Cordoba, Cordoba, Spain; ³ University of Nova Gorica, Nova Gorica, Slovenia

ORAL PRESENTATIONS 4BO.6

08:30 - 10:00 Operational Levers for PV Asset Management: From Layouts to Repowering

Chairpersons: Marie Syre Wiig
Institute for Energy Technology, Kjeller, Norway
Anton Driesse
PV Performance Labs, Freiburg, Germany

4BO.6.1 Impact of Incidence Angle in Photovoltaic Soiling Ratio Measurements

Alexander Eeles¹, João Marques¹, Pedro Salomé¹
¹ INL, Braga, Portugal

4BO.6.2 Model and Field Validation of Partial-Shade Backtracking for Tracking PV Arrays with Half-Cut Cells

Kevin Anderson¹, Nicholas Riedel-Lyngskær², Adam Jensen³
¹ Unaffiliated, -, United States of America; ² European Energy, Kongens Lyngby, Denmark; ³ DTU, Søborg, Denmark

4BO.6.3 Universal Analytical Model for Inter-Row Shading Loss Estimation in PV Plants

Maitheli Nikam¹, Karel De Brabandere¹, Julien Deckx¹, Gofran Chowdhury¹
¹ 3E, Brussels, Belgium

4BO.6.4 Performance Analysis of Bifacial PV Arrays: Tilted and Vertical Configuration

Teodora Stoyanova Lyubenova¹, Stefano Alessandrini¹, Ewan D. Dunlop¹
¹ European Commission JRC, Ispra, Italy

4BO.6.5 Student Awards Finalist Presentation: Quantifying Data Requirements for Transfer Learning in PV Defect Detection

Shayan Umar¹, Tarek EL-Fouly¹, Ahmed Al Durra¹
¹ KAUST, Abu Dhabi, United Arab Emirates

4BO.6.6 Revamping and Repowering of Aging Solar Assets: Performance Drivers, Energy Gains, and Economics from a 14-Year-Old PV System in Tropical Singapore

Xiaoqi Xu¹, André M. Nobre², Qiying Ng², Ian Marius Peters³, Thomas Reindl¹
¹ SERIS, Singapore, Singapore; ² PV Doctor, Singapore, Singapore; ³ FZJ, Erlangen, Germany



VISUAL PRESENTATIONS 1BV.1

08:30 - 10:00 Single Junction Silicon Cells | Silicon Bottom Cells for Tandem Photovoltaics | Characterisation & Modelling of Silicon Cells

Chairpersons: Delfina Muñoz (i)
CEA, Le Bourget-du-Lac, France
Hisham Nasser
ODTÜ-GÜNAM, Ankara, Türkiye
Aloña Otaegi
UPV/EHU, Bilbao, Spain

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 4BO.7

10:30 - 12:00 Smarter O&M: AI-Driven Inspections and Diagnostics for PV Systems

Chairpersons: Marios Theristis
Sandia National Laboratories, Albuquerque, United States of America
Roland Einhaus
ZSW, Stuttgart, Germany

4BO.7.1 Augmentation of Computer Vision-Analysis using Tandem Visual and Thermal Field-Imaging of Photovoltaic Modules

Thøger Kari¹, Sergiu V. Spataru¹, Rodrigo del Prado Santamaría¹, Mahmoud Dhimish¹, Gisele A. dos Reis Benatto¹, Peter Behrendorf Poulsen¹
¹ DTU, Roskilde, Denmark

4BO.7.2 Choosing the Right AI Approach for PV Inspections: A Practical Comparison of Machine Learning and Deep Learning on Drone IR Imagery

Philippe Marechal¹, Ioannis (John) Tsanakas¹
¹ CEA / INES, Le Bourget-du-Lac, France

4BO.7.3 Attention-Based Hybrid Deep Learning for Interpretable PV Fault Detection with Temporal Analysis

Yegane Bagheri¹, Sandra Gallmetzer¹, Lukas Koester¹, Luis Fialho¹
¹ Eurac Research, Bolzano, Italy

4BO.7.4 Design and Application of a Generalizable Time-Aware Intelligent Fault Detector for Commercial Photovoltaics: DEFNE v2

Mücahid Candan¹, David Melgar¹
¹ Fraunhofer ISE, Freiburg, Germany

4BO.7.5 Integrated Probabilistic and Logic-Based Machine Learning Approach for Photovoltaic Fault Diagnosis

Peyman Ghaedi¹, Aref Eskandari², Mohammadreza Aghaei³
¹ Amirkabir University of Technology, Tehran, Iran; ² Iran University of Science and Technology, Tehran, Iran; ³ Norwegian University of Science and Technology, Ålesund, Norway

4BO.7.6 A Search-Based Tracking Schedule for Row-to-Row Shading Mitigation in Irregular Terrain

Robinson Cavieres¹, Felipe Valencia¹, Carlos Cardenas-Bravo²
¹ ATAMOSTEC, Antofagasta, Chile; ² USM, Santiago, Chile

ORAL PRESENTATIONS 3BO.12

10:30 - 12:00 Indoor/Outdoor Correlations and Degradation

Chairpersons: Timea Bejat
CEA, Le Bourget-du-Lac, France
Ralph Gottschalg
Fraunhofer CSP, Halle (Saale), Germany

3BO.12.1 Defining the 50-year Module: Luck, Design, or Both?

Silvana Ovaitt¹, Dirk Jordan¹, Heather Mirlitz¹, Brian Mirlitz¹, Teresa Barnes¹
¹ NLR, Golden, United States of America

3BO.12.2 A Correlative Indoor-Outdoor Study of Degradation Mechanisms in Silicon Heterojunction and TOPCon Modules: Benchmarking against PERC and Evaluating Bill-of-Materials Dependence

Amir A. Abdallah¹, Mohamed Abdelrahim¹, Mohamed Elgaili¹, Maulid Kivambe¹, Oleksandr Mashkov², Claudia Buerhop-Lutz²
¹ QEERI, Doha, Qatar; ² HI ERN, Erlangen, Germany

3BO.12.3 What Solar Module Test Failures Reveal in 2026: Key Takeaways from Kiwa PVEL's PV Module Reliability Scorecard

Todd Karin¹, Jean-Nicolas Jaubert¹, Archana Sinha¹, Tristan Erion-Lorico¹
¹ Kiwa PVEL, Napa, United States of America

3BO.12.4 Challenges in Predicting PV Module Degradation from Accelerated Aging Tests

Paul Gebhardt¹, Suraj Ravindrababu¹, Ingrid Hädrich¹, Daniel Philipp¹
¹ Fraunhofer ISE, Freiburg, Germany

3BO.12.5 Outdoor Evidence of UV-Induced Degradation in Silicon PV Modules Supported by Advanced Materials Analysis

Dominik Bagrowski¹, Jonathan Kriening¹, Philipp von Bismarck¹, Maximilian Engel¹, Dirk Stellbogen¹, Wolfram Hempel¹, Theresa Magorian Friedlmeier¹, Roland Einhaus¹
¹ ZSW, Stuttgart, Germany

3BO.12.6 A Methodology for Climate-driven Global Mapping of Photovoltaic Degradation Risk using Laboratory Ageing Data

Ismail Kaaya¹, Patrizio Manganiello², Lara Vissers³, Gauvain Jago³, Stijn Scheerlinck³, Arnaud Morlier¹
¹ imo-imomec, Genk, Belgium; ² UHasselt, Hasselt, Belgium; ³ Engie Laborelec, Linkebeek, Belgium



ORAL PRESENTATIONS 4BO.17

10:30 - 12:00 Colour and BIPV

Chairpersons: Simon Boddaert
CSTB, Sophia Antipolis, France
Lenneke H. Slooff
TNO Energy Transition, Petten, The Netherlands

4BO.17.1 21%-Efficient Colour-tuneable Silicon Solar Cells Enabled by Ultra-Stable Perovskite Quantum Dots/EVA Composite Films

Minya Zhou¹, Hanchen Li¹, Shujuan Huang², Martin Green¹, Yajie Jiang¹
¹ UNSW, Sydney, Australia; ² Macquarie University, Sydney, Australia

4BO.17.2 Flexible MorphoColor® Technology Integrated for Coloured Perovskite Solar Cells

Sophie Gledhill¹, Stefanie Ritter¹, Martin Mattenheimer¹, Andreas Wessels¹, Marjan Akbari Famileh¹, Markus Kohlstädt¹, Thomas Kroyer¹, Hubert Hauser²
¹ Fraunhofer ISE, Freiburg, Germany; ² temicon, Freiburg, Germany

4BO.17.3 Modelling of Coloured BIPV Façade Systems – Results and Learnings from the 1st IEA PVPS Task 15 Blind Modelling Intercomparison

Markus Babin¹, Sune Thorsteinsson¹, Maximilian Riedel², Björn Rau², Hua Ge³, Konstantinos Kapsis⁴, Gabriele C. Eder⁵
¹ DTU, Roskilde, Denmark; ² HZB, Berlin, Germany; ³ Concordia University, Montréal, Canada; ⁴ University of Waterloo, Waterloo, Canada; ⁵ OFI, Vienna, Austria

4BO.17.4 Third Edition of the Dutch BIPV Award

Ruud Derks¹, Kevin Verpaalen², Wilfried G.J.H.M. van Sark³
¹ IM efficiency, Helmond, The Netherlands; ² Kameleon Solar, Roosendaal, The Netherlands; ³ Utrecht University, Utrecht, The Netherlands

4BO.17.5 Optical Design Strategies for Scalable Luminescent Solar Concentrators beyond PLQY Optimization

Yuan-Chih (Atom) Chang¹, Guozheng Shi¹, Sandhuli Hettiarachchi¹, David Payne¹, Binesh Puthen Veettil¹, Shujuan Huang¹
¹ Macquarie University, Sydney, Australia

4BO.17.6 Balancing Aesthetics, Efficiency and Durability in Colored Building-Integrated Photovoltaic Modules: A Systematic Comparison

Eleonora Tomasino¹, Gabriella Gonnella¹, Jordi Veirman¹, Martina Pelle¹, Tom Melkert², Bjorn Petter Jelle³, Gabriele Lobaccaro³, Andrea Spedicato⁴, Luis Fialho¹, Laura Maturi¹
¹ Eurac Research, Bolzano, Italy; ² Soluxa, Nijmegen, The Netherlands; ³ NTNU, Trondheim, Norway; ⁴ GruppoSTG, Bergamo, Italy

ORAL PRESENTATIONS 1BO.2

10:30 - 12:00 Silicon Heterojunction Solar Cells

Chairpersons: Paola Delli Veneri
ENEA, Portici, Italy
Kaining Ding
Forschungszentrum Jülich, Germany

1BO.2.1 Silicon Heterojunction Solar Cells Featuring TCO-free Localized Front Contacts

Sebastian Smits¹, Brian Istvan Giam¹, Maryam Manesh¹, Paul Procel-Moya¹, Yifeng Zhao¹, Luana Mazzarella¹, Olindo Isabella¹
¹ TU Delft, Delft, The Netherlands

1BO.2.2 Inhomogeneity and Shunt Analysis in PECVD p-type nc-Si:H for Silicon Heterojunction Solar Cells

Amanda Merino Leiva¹, Jean Patrice Rakotoniaina¹, Tristan Gageot¹, José Alvarez², Jean-Paul Kleider², Delfina Muñoz¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² CNRS, Gif-sur-Yvette, France

1BO.2.3 Evaporated C60 as Electron-Selective Contact in Dopant-Free Silicon Heterojunction Solar Cells

Riccardo Brondolin¹, Yifeng Zhao¹, Yi Zheng¹, Paul Procel Moya¹, Luana Mazzarella¹, Olindo Isabella¹
¹ TU Delft, Delft, The Netherlands

1BO.2.4 Room Temperature Sputtered SnOx Contact Layers for Silicon Heterojunction Solar Cells

Hassan Mohamed Osman¹, Alexandr Zamchiy¹, Alexander Eberst¹, Benjamin Klingebiel¹, Karsten Bittkau¹, Henrike Gattermann¹, Andreas Lambert¹, Kaining Ding¹
¹ FZJ, Jülich, Germany

1BO.2.5 Student Awards Finalist Presentation: From Proof-of-concept towards 24 % Efficiency: Advancing IBC-SHJ Solar Cells Featuring MoOx Blanket Layer

Katarina Kovačević¹, Yifeng Zhao¹, Paul Procel¹, Liqi Cao¹, Engin Özkol¹, Luana Mazzarella¹, Olindo Isabella¹
¹ TU Delft, Delft, The Netherlands

1BO.2.6 Reinforcement of FlexTrail Seeds by Electrodeposited Copper for Sustainable Metallization of Heterojunction Cells

Agata Lachowicz¹, Jörg Schube², Roman Keding², Sven Kluska², Jun Zhao¹, Bertrand Paviet-Salomon¹, Christophe Ballif³, Tonio Buonassisi¹
¹ CSEM, Neuchâtel, Switzerland; ² Fraunhofer ISE, Freiburg, Germany; ³ EPFL, Neuchâtel, Switzerland



VISUAL PRESENTATIONS 2BV.2

10:30 - 12:00 Compound (Chalcogenide, Kesterite, III-V) and Organic Devices

Chairpersons: Alessandro Romeo
University of Verona, Italy
Mirjam Theelen
TNO/Solliance, Eindhoven, The Netherlands

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 2BO.8

13:30 - 15:00 Novel Architectures and Advanced Materials for Enhanced Efficiency and Versatility

Chairpersons: Rebecca Saive
University of Twente, Enschede, The Netherlands
Jozef (Jef) Poortmans
imec, Leuven, Belgium

2BO.8.1 Student Awards Finalist Presentation: First Demonstration of Photoresponsivity in Polycrystalline GeSn Thin Films toward Versatile Infrared Photovoltaic Application

Shintaro Maeda¹, Takamitsu Ishiyama¹, Takashi Suemasu¹, Kaoru Toko¹
¹ University of Tsukuba, Tsukuba, Japan

2BO.8.2 Optoelectronic Properties of Low-temperature-processed Chalcogenide Perovskite Thin Films

Elvira Cánovas-Corbalán¹, Inés Durán¹, Kiruba Catherine Vincent², Shubhanshu Agarwal², Jorge Rodríguez-Muro¹, Antonio Martí¹, Rakesh Agrawal², Simon Svatek¹, Elisa Antolin¹
¹ UPM, Madrid, Spain; ² Purdue University, West Lafayette, United States of America

2BO.8.3 Hot Carrier-Induced Photocurrent as an Extra Loss Mechanism in Solar Cell Operation

Jonas Gradauskas¹, Oleksandr Masalskyi¹, Ihor Zharchenko², Steponas Ašmontas², Algirdas Sužiedėlis², Aurimas Čerškus¹
¹ VGTU, Vilnius, Lithuania; ² CPST, Vilnius, Lithuania

2BO.8.4 Enhancing Outdoor Durability of Cu₂O Top Cell by Passivation Treatment for High Efficiency Cu₂O/Si Tandem Solar Cells

Atsushi Wada¹, Sara Yoshio¹, Soichiro Shibasaki¹, Naoyuki Nakagawa¹, Yuya Honishi¹, Yukitami Mizuno¹, Takashi Yamamoto¹, Motohiro Toyota¹, Mutsuki Yamazaki¹, Yasutaka Nishida¹, Kanta Sugimoto¹, Junji Sano¹, Kazushige Yamamoto¹, Eduardo Román², Asier Sanz²
¹ Toshiba, Kawasaki, Japan; ² Tecnalia, Derio, Spain

2BO.8.5 Towards Scalable Free-space Luminescent Solar Concentrators for Year-round Photovoltaic Yield Enhancement

Mathis Van de Voorde¹, Twan Kalthof¹, Jelle Westerhof¹, Lisanne Einhaus¹, Rebecca Saive¹
¹ University of Twente, Enschede, The Netherlands

2BO.8.6 Revisited CIGS Solar Cells for Standalone Solar-to-X

Léo Choubrac¹, Hichem Ichou², Garen Suna², Vincent Marignoni³, Afridi Zamader³, Fabrice Odobel², Julien Bonin³, Marc Robert³, Nicolas Barreau²
¹ SATT Ouest Valorisation, Nantes, France; ² Nantes University, Nantes, France; ³ Sorbonne University, Paris, France

ORAL PRESENTATIONS 2-3BO.3

13:30 - 15:00 Performance Characterisation of Perovskite-based Cells and Modules

Chairpersons: Lili Wang
Technology Innovation Institute, Abu Dhabi, United Arab Emirates
Gabi Friesen
SUPSI, Mendrisio, Switzerland

2BO.3.1 Industrial Full-Size Perovskite-Silicon Bifacial Tandem Modules under Real-World Conditions

Natalia Schiwon¹, Grecia Montserrat Mendoza Alcazar², Bashini Mahaarachchi¹, Freya Leyland¹, Marko Remec¹, Daniel Kirk³, Ulrich Kentsch⁴, Simon Kirner⁴, Rutger Schlatmann¹, Mark Khenkin¹, Carolin Ulbrich¹
¹ PVcomB, Berlin, Germany; ² HZB, Berlin, Germany; ³ Oxford PV, Oxford, United Kingdom; ⁴ Oxford PV Germany, Brandenburg an der Havel, Germany

2BO.3.2 Comparison of Cross-Location Outdoor Testing of Perovskite-based Solar Cells

Kristijan Brecl¹, Marko Jošt¹, Mark Khenkin², Carolin Ulbrich², Quentin Jeangros³, Marko Topič¹
¹ University of Ljubljana, Ljubljana, Slovenia; ² HZB, Berlin, Germany; ³ CSEM, Neuchatel, Switzerland

2BO.3.3 Bifacial 2T Large Area Perovskite-Silicon Devices: from Processing to Modules and Outdoor Measurements

Sinclair R. Ratnasingham¹, Marcel Simor¹, Radha Kothandaraman¹, Yu Wu², Melvin ten Kate², Hande Ciftinar², Victor Rosca², Petra Manshanden², Corné Frijters¹, Johannes Lambooij¹, Bart J. Geerligts², Sjoerd Veenstra¹, Valerio Zardetto¹
¹ TNO, Eindhoven, The Netherlands; ² TNO, Petten, The Netherlands

3BO.3.4 Pre-Conditioning and Reliable Measurement Procedures on Large Size Perovskite PV Modules

Hanna Ellis¹, Harald Mülleians¹, Ewan Dunlop¹
¹ European Commission JRC, Ispra, Italy

3BO.3.5 Rapid Determination of Stabilized Power Output for Perovskite PV Modules via Kinetic Modeling

Yating Zhang¹, Christos Monokroussos¹, Frank Xu¹, Mengdi Liu¹, Giorgio Bardizza², Max Koentopp³
¹ TUV Rheinland, Shanghai, China; ² TUV Rheinland, Pogliano Milanese, Italy; ³ TUV Rheinland, Cologne, Germany



3BO.3.6 Study on I-V Testing and Stability of Large-Area Perovskite and Perovskite/Silicon Tandem Solar Cell Modules

Hexian Zhang¹, Shuiwei Wang¹, Jia Lü¹, Jian Li¹

¹ Shaanxi Zhongsen Electric Power Technology, Xi'an, China

VISUAL PRESENTATIONS 4BV.3

13:30 - 15:00 Solar Resource and Forecasting

Chairpersons:

Jan Remund

Meteotest, Bern, Switzerland

Dunia Bachour (i)

HBKU/ Qatar Foundation, Doha, Qatar

Khadija Barhmi

Utrecht University, The Netherlands

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

PANEL DISCUSSION PRESENTATIONS

13:30 - 15:00 BO.13 Geographical Diversification of PV Manufacturing

Chairpersons:

Lyu Fang

CAS, Beijing, China

Peter Fath

RCT-Solutions, Konstanz, Germany

This panel of experts from industry and research will explore the evolving landscape of global diversification in PV manufacturing. Bringing together perspectives from different regions, the discussion will highlight successful manufacturing examples and examine the strategies, policies, and innovations that have enabled their growth. The panel will also address the technological developments, scaling challenges, and supply chain complexities that Europe faces in building a competitive PV industry. By comparing these approaches, the panel aims to identify key success factors and lessons learned. An expected outcome is to assess how these insights can help to define the most effective pathways for a resilient, competitive, and sustainable PV manufacturing ecosystem not only in Europe but globally.

ORAL PRESENTATIONS 2BO.9

15:15 - 16:45 Advanced Characterisation and Stability in Perovskite Devices

Chairpersons: Sjoerd Veenstra

TNO Energy Transition, Eindhoven, The Netherlands

Shuzi Hayase

The University of Electro-Communications, Chofu, Japan

2BO.9.1 Analysis of Field Performance Data for Perovskite Solar Cells with Fixed Load Resistors

Takeshi Tayagaki¹, Kohei Yamamoto¹, Takuro Murakami¹, Masahiro Yoshita¹

¹ AIST, Tsukuba, Japan

2BO.9.2 Photocurrent Imaging of Perovskite PV Devices using Structured Illumination

George Koutsourakis¹, James C. Blakesley¹, Andrew Thompson¹, Nathan Hill², Sophia Baker², David Beynon³, Ershad Parvazian³, Trystan Watson³

¹ NPL, Teddington, United Kingdom; ² Power Roll, Seaham, United Kingdom; ³ Swansea University, Swansea, United Kingdom

2BO.9.3 Perovskite Stability and Degradation – Materials Analyses after Long-Term Outdoor Testing

Cordula Wessendorf¹, Theresa Magorian Friedlmeier¹, Wolfram Hempel¹, Jonas Hanisch¹, Stefanie Spiering¹, Ana Kanevce¹, Erik Ahlswede¹, Mark Khenkin², Steven Melendez², Carolin Ulbrich², Eva-Maria Hammer¹

¹ ZSW, Stuttgart, Germany; ² HZB, Berlin, Germany

2BO.9.4 Unravelling Performance Metastability in Perovskite Solar Cells

Aimad-Eddine Admane¹, Anne Migan Dubois², Anyssa Derj¹, Johan Parra³, Marion Provost¹, Armelle Yaiche⁴, Jordi Badosa⁵, Jorge Posada⁴, Jean Rousset⁴, Philip Schulz⁶, Karim Medjoubi¹

¹ IPVF, Palaiseau, France; ² GeePs, Gif-sur-Yvette, France; ³ Sorbonne University, Palaiseau, France; ⁴ EDF R&D, Palaiseau, France; ⁵ LMD, Palaiseau, France; ⁶ CNRS, Palaiseau, France

2BO.9.5 Student Awards Finalist Presentation: Outdoor Stress Tests of Perovskite Photovoltaic Modules over three Seasons: S-shape and Hysteresis

Ceri Sophia Hommerich¹, Sara Golroodbari¹, Aranzazu Aguirre², Yinghuan Kuang², Tamara Merckx², Anurag Krishna², Tom Aernouts², Wilfried G.J.H.M. van Sark¹

¹ UU, Utrecht, The Netherlands; ² imec, Genk, Belgium

2BO.9.6 Accurate Performance and Stability Characterization of Commercial Perovskite PV Devices

Peter Pasmans¹, Stefan Roest¹, Lukas Ziegler², Bernhard Mitchell²

¹ Eternal Sun | WAVELABS, The Hague, The Netherlands; ² Eternal Sun | WAVELABS, Leipzig, Germany



ORAL PRESENTATIONS 3BO.14

15:15 - 16:45 Environmental and Mechanical Stresses on PV Modules

Chairpersons: Ulrike Jahn
Fraunhofer CSP, Halle (Saale), Germany
Olatz Arriaga Arruti
CSEM, Neuchâtel, Switzerland

3BO.14.1 Durability Assessment of Anti-Soiling Coating Under Accelerated Multi-Environmental Stress

Pavan Fuke¹, Sandeep Kumar¹, Ganesh C¹, Praneeth Reddy¹, Narendra Shiradkar¹, Gopalan Anil Kottantharayil²
¹ IIT, Mumbai, India; ² IIT Bombay, Mumbai, India

3BO.14.2 Accelerated Product Development for Alpine PV Modules

Anika Gassner¹, Ebrar Özkalay², Gabriele C. Eder¹, Gabi Friesen², Markus Feichtner³
¹ OFI, Vienna, Austria; ² SUPSI, Mendrisio, Switzerland; ³ Sonnenkraft, St. Veit a. d. Glan, Austria

3BO.14.3 Standardization of Photovoltaic Modules Equipped with Snow Melting Heater (Snow-PV)

Akio Sato¹, Michio Kondo², Mauro Cacciavio³, Giovanni Bellenda³, Ze Guo⁴, Simon Boddart⁵, Jan Mastny⁶
¹ VDE Global Services Japan, Osaka, Japan; ² Waseda University, Tokyo, Japan; ³ SUPSI, Mendrisio, Switzerland; ⁴ CSA Group, Shanghai, China; ⁵ CSTB, Sophia Antipolis, France; ⁶ Ernst Schweizer, Hedingen, Switzerland

3BO.14.4 Evaluating Mechanical Strength of PV Modules under Non-standard Mechanical Load Test Conditions

Jan M. Kroon¹, Eelko Hoek¹, Paul Sommeling¹, Thomas Kaltenbach², Jochen Markert², Enzo Job², Halvard Fjaer³, Nathan Roosloot³
¹ TNO, Petten, The Netherlands; ² Fraunhofer ISE, Freiburg, Germany; ³ IFE, Kjeller, Norway

3BO.14.5 Evaluation of the Reliability of Hailstorm-damaged PV Modules using a Post-impact Stress Methodology

Dominika Chudy¹, Evelyn Bamberger², Andreas Bohren², Mauro Cacciavio¹
¹ SUPSI, Mendrisio, Switzerland; ² OST, Rapperswil, Switzerland

3BO.14.6 Determination of the Compressive Surface Pre-Stress on PV-Module Glass with a Scattered Light Polariscope

Jochen Markert¹, Frank Schneider², Ruth Kasper³, Ingrid Hädrich¹, Daniel Philipp¹
¹ Fraunhofer ISE, Freiburg, Germany; ² Technical University Darmstadt, Darmstadt, Germany; ³ Cologne University of Applied Sciences, Cologne, Germany

ORAL PRESENTATIONS 1BO.4

15:15 - 16:45 Manufacturing of Silicon Solar Cells and Technologies to Reduce Ag Consumption

Chairpersons: Peter Fath
RCT-Solutions, Konstanz, Germany
Yifeng Chen
Trina Solar Energy, Changzhou, China

1BO.4.1 Invited - Lessons Learned Implementing Solar Cell Mass Production in India, Focus on Topcon, Maybe Equipment Comparison European/Chinese

1BO.4.2 Industry-relevant Plasma Oxidation Technologies for TOPCon-based Solar Cells

Jana-Isabelle Polzin¹, Silvére Dufour-Robbe¹, Ivonne Vera Pauta¹, Jeffrey Dobkowski¹, Philipp Ehnes¹, Mathias Bories¹, Thomas Pernau², Amandine Guissart³, Thomas Schütte⁴, Jan-Peter Urbach⁴, Marc Hofmann¹
¹ Fraunhofer ISE, Freiburg, Germany; ² centrotherm international, Blaubeuren, Germany; ³ MUEGGE, Reichelsheim, Germany; ⁴ PLASUS, Mering, Germany

1BO.4.4 Comparative Study of 100% Copper-Based Metallization via Printing and Plating Strategies for Silicon Heterojunction Solar Cells

Gustavo Rodrigues Lopes¹, Felix Wiedenmann², Stéphane Bastide³, Johann Jourdan¹, Thibaud Hatt², Wilfried Favre¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² PV2+, Freiburg, Germany; ³ CNRD, Thiais, France

1BO.4.5 High-Efficiency Silver-Free Silicon Heterojunction (SHJ) Solar Cells: towards Deeper Insights and Perspectives for Sustainable Metallization

Mohamed Issifi Yacouba¹, Andreas Lambert¹, Henrike Gattermann¹, Karsten Bittkau¹, Uwe Rau¹, Ruth Schwaiger¹, Nicolas J. Peter¹, Kaining Ding¹
¹ FZJ, Jülich, Germany

1BO.4.6 Enabling 45 µm Wide Screen-Printed Aluminum Front Fingers Using Knot-Less Screens and Advanced Paste Engineering

Sebastian Junge¹, Byungsul Min¹, Verena Mertens¹, Till Brendemühl¹, Kosuke Tsuji², Marwan Dhamrin², Rolf Brendel¹
¹ ISFH, Emmerthal, Germany; ² Toyo Aluminium, Higashiyama, Japan

VISUAL PRESENTATIONS 4BV.4

15:15 - 16:45 PV and Buildings

Chairpersons: Eduardo Román Medina
Tecnalia, Derio, Spain
Simona Villa
TNO, Eindhoven, The Netherlands

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.



ORAL PRESENTATIONS 2BO.10

17:00 - 18:30 Towards Industrial Processing of Perovskite Devices

Chairpersons: Tom Aernouts
imec, Genk, Belgium
Nikoleta Kyranaki
Hasselt University, Genk, Belgium

2BO.10.1 Up-Scaling of Perovskite Solar Cells via Slot-DDie Coating with Green Solvents: Towards Semi-Transparent n-i-p Modules

Giulia Lucarelli¹, Felipe Vinocour Pacheco¹, Drishya Rajan Pillai¹, Corné Frijters¹, Klaas Bakker¹, Flavio Linardi², Gorkem Gunbas³, Anne Biezemans¹, Johan Bosman¹, Ilker Dogan¹, Sjoerd Veenstra¹
¹ TNO, Eindhoven, The Netherlands; ² Avantama, Stafa, Switzerland; ³ ODTÜ-GÜNAM, Ankara, Türkiye

2BO.10.2 Processing and Scaling of Fully Evaporated Perovskite Solar Devices: Influence of Air Exposure between Layer Depositions

Pablo Reyes Figueroa¹, Arindam Mallick¹, Muhammad Faraz Ud Din¹, Joao Silvano¹, Bastian Jarmer¹, Janina Moereke¹, Christian Schubbert¹, Stefan Grünsteidl¹, Marko Stölzel¹, Peter Borowski¹, Patrick Eraerds¹, Thomas Dalibor¹
¹ Avancis, Munich, Germany

2BO.10.3 High Thermal Budget Processing Route for Flexible Thin-Film Perovskite Solar Cells and Modules: The Temporary 'Superstrate' Based on Al-Foil and Transparent Etch-Stop Barrier Layers

Paula Perez Rodriguez¹, Govind Padmakumar¹, Federica Saitta¹, Peer Sluijs¹, Reinder Boekhof¹, Lara van der Poll¹, Niels van Silfhout¹, K.P. Sreejith¹, Luana Mazzarella¹, Tom Savenije¹, Malte Vogt¹, Rudi Santbergen¹, Arno Smets¹
¹ TU Delft, Delft, The Netherlands

2BO.10.4 From Lab Scale to High Throughput: Optimization of Spray Coating Processes for Silicon-Perovskite Tandem Solar Cell Manufacturing

Martin Zimmer¹, Lena Emmer¹, Ulrike Hatt¹, Melanie Frettlöeh¹, Prabhithkumar Parapurath Subashkumar¹
¹ Fraunhofer ISE, Freiburg, Germany

2BO.10.5 Sequentially Processed High-Quality Perovskite Films for High-Performance, Large-Area Perovskite Solar Modules

Young Yun Kim¹
¹ KRICT, Daejeon, South Korea

2BO.10.6 R2R Scalable Perovskite Solar Cells with High Efficiency and Long Term Stability via Scalable Encapsulation Methods

Georgia Gkouzia¹, Anuja Vijayan¹, Manvika Singh¹, Chandu Mohan¹, Dorrit Roosen-Melsen¹, Casper van Kessel¹, Harrie Gorter¹, Thomas Exlager¹, Sjoerd Veenstra¹, Ilker Dogan¹
¹ TNO, Eindhoven, The Netherlands

ORAL PRESENTATIONS 3BO.15

17:00 - 18:30 UV-ID; PID and Metallization Reliability

Chairpersons: Teresa Barnes (*i*)
National Laboratory of the Rockies, Golden, United States of America
Bram Hoex
UNSW, Sydney, Australia

3BO.15.1 Introductory Presentation: Comparative Study of Four Recovery Methods and Subsequent Dark Storage Metastability in UV-induced Degradation (UVID) Affected TOPCon PV Modules

Aziz Nairi¹, Johnson Wong², John Derek Arcebal¹, Srinath Nalluri¹, Thomas Reindl¹
¹ SERIS, Singapore; ² Quantified Energy, Singapore

3BO.15.2 Balancing Degradation and Recovery: Temperature Effects on UVID in TOPCon PV Modules

Paul Gebhardt¹, Angelika M. Beinert¹, Esther Fokuhl¹, Florian Schindler¹, Ingrid Hädrich¹, Daniel Philipp¹
¹ Fraunhofer ISE, Freiburg, Germany

3BO.15.3 Sequential UV/DH Aging Tests to Validate Silver-coated Copper Particles Paste on SHJ Solar Cells

Timea Bejat¹, Hugo Lajoie¹, Rémi Monna¹, Adeline Lanterne¹
¹ CEA-INES, Le Bourget du Lac, France

3BO.15.4 From Silver to Copper: Reliability of Copper-based Metallization with Multi-wire Twill Interconnection in SHJ Modules

Hamed Javanbakht Lomeri¹, Valerie Depauw¹, Jonathan Govaerts¹, Bart Reekmans¹, Mihir Mahajan¹, Mohamed Issifi Yacouba², Andreas Lambertz², Henrike Gattermann², Karsten Bittkau², Kaining Ding², Yi Zheng³, Engin Özkol³, Olindo Isabella³, Hariharsudan Sivaramakrishnan Radhakrishnan¹
¹ imec, Genk, Belgium; ² FZJ, Jülich, Germany; ³ TU Delft, Delft, The Netherlands

3BO.15.5 Testing System Voltage Potential-Induced Degradation with the Factor of Light

Peter Hacke¹, Kent Terwilliger¹, Sven Rissland²
¹ NLR, Golden, United States of America; ² Hanwha Q Cells, Bitterfeld-Wolfen, Germany



ORAL PRESENTATIONS 4BO.5

17:00 - 18:30 BIPV Performance Modelling and Reliability

Chairpersons: Kevin Meyer
ISFH, Emmerthal, Germany
Eduardo Román Medina
Tecnalia, Derio, Spain

4BO.5.1 City-Scale Evaluation of the Energy Yield of Perovskite Solar Cells Installed on Urban Building Surfaces

Tomoya Kawashima-Hirano¹, Akito Ozawa¹, Kazuki Yamaguchi², Yuya Takane³, Tomohiko Ihara⁴

¹ Global Zero Emission Research Center, Tsukuba, Japan; ² TEPCO Research Institute, Yokohama, Japan; ³ Center for Climate Change Adaptation, Tsukuba, Japan; ⁴ The University of Tokyo, Kashiwa, Japan

4BO.5.2 Lightweight Curved PV Modules for Structurally Constrained Rooftops: Performance Assessment and Modelling

Simona Villa¹, Mirza Khalid Baig¹, Harm Visscher², Ruud van de Voort³, Corry de Keizer¹

¹ TNO, Eindhoven, The Netherlands; ² Solarge, Weert, The Netherlands; ³ Soltronergy, Roermond, The Netherlands

4BO.5.3 Integrating Balcony Photovoltaics into Urban Energy Systems: A Scalable Framework for Assessing Solar Potential in High-rise Residential Buildings in India

Shantanu Roy¹, Mahesh Kalshetty², Saptak Ghosh², Madhusree Bhattacharjee¹, Sheikh Madiha Syed²

¹ CSTEP, Noida, India; ² CSTEP, Bengaluru, India

4BO.5.4 Outdoor Performance and Degradation of Photovoltaic Roof Tiles under Realistic BIPV Operating Conditions

Florian Ollagnon¹, Paul Rémondeau¹, Gaétan Carrier², Alba Finelli³, Xavier Bulliard³, Torsten Rößler⁴, Kléber Nicolet¹, John Morello², Antonin Faes¹, Christophe Ballif¹

¹ EPFL, Neuchâtel, Switzerland; ² FREESUNS, Colombier, Switzerland; ³ CSEM, Neuchâtel, Switzerland; ⁴ Fraunhofer ISE, Freiburg, Switzerland

4BO.5.5 Horizontal Spread of Fire under Photovoltaic Systems on Flat Roofs

Christine Hani¹

¹ Technical University of Munich, Munich, Germany

4BO.5.6 Synergies between Vertical Bifacial PV and Green Roofs: Microclimate and Energy Balance Analysis

Ammar Tummali¹, Bruno Bueno¹, Fatima Abdelrhman¹, Andreas Beinert¹

¹ Fraunhofer ISE, Freiburg im Breisgau, Germany

VISUAL PRESENTATIONS 1BV.5

17:00 - 18:30 Silicon Material Science and Technology | Manufacturing of Silicon Cells

Chairpersons: Martin P. Bellmann (i)
SINTEF, Trondheim, Norway
Damian Brunner (i)
RENA Technologies, Gütenbach, Germany
Pierre Verlinden (i)
AMROCK, McLaren Vale, Australia

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.



PLENARY PRESENTATIONS CP.1

08:30 - 10:00 Thin-Film PV Technologies Towards Impact

Chairpersons: Nicola Beaumont
Oxford PV, United Kingdom
Michael Saliba (i)
University of Stuttgart, Germany

2CP.1.1 Defects Activity in Metal Halide Perovskites

Annamaria Petrozza¹
¹ IIT POLIMI, Milan, Italy

2CP.1.2 Thin-Film PV Production in Europe – Opportunities and Research Perspective

Eva-Maria Hammer¹, Jonas Hanisch¹, Theresa Magorian Friedlmeier¹, Erik Ahlswede¹, Michael Powalla¹
¹ ZSW, Stuttgart, Germany

2CP.1.3 Perovskite/Silicon Triple Junction Devices: Achievements and Learnings from the TRIUMPH Project Funded under Horizon Europe

Hariharsudan Sivaramakrishnan Radhakrishnan¹, Kerem Artuk², Luis Restat³, Oliver Fischer³, Lian Duan⁴, Alejandra Galarza⁴, Estelle Gervais⁵, Felipe Saenz⁶, Maryamsadat Heydarian⁵, Paul Sommeling⁷, Cristian Villalobos Meza¹, Jonathan Parion¹, Yinghuan Kuang¹, Selin Seyrek¹, Valerie Depauw¹, Ismail Kaaya¹, Minasadat Heydarian⁵, Aïcha Hessler-Wyser², Christoph Messmer³, Mathias Kamp⁸, Martin Fischer⁹, René Köhler⁹, Jons Bolding¹⁰, Petra Manshanden⁷, Henrik Pettersson¹¹, Martin Karlsson¹¹, Jose Alvarez¹², Henry Weber¹³, Ralf G. Niemann¹³, Fabian Fertig¹³, Mustafa Yasa¹⁴, Jean-Baptiste Puel¹⁵, Juliane Borchert⁵, Selcuk Yerci¹⁴, Martin Späth⁷, Martin C. Schubert⁵, Pilar Lopez-Varo⁴, Jonas Schön³, Martin Bivour⁵, Sebastian Nold⁵, Christophe Ballif², Quentin Jeangros⁶, Christian Wolff²

¹ imec, Genk, Belgium; ² EPFL, Neuchâtel, Switzerland; ³ University of Freiburg, Freiburg, Germany; ⁴ IPVF, Palaiseau, France; ⁵ Fraunhofer ISE, Freiburg, Germany; ⁶ CSEM, Neuchâtel, Switzerland; ⁷ TNO, Petten, The Netherlands; ⁸ RENA, Freiburg, Germany; ⁹ Von Ardenne, Dresden, Germany; ¹⁰ SALD, Eindhoven, The Netherlands; ¹¹ Dyenamo, Stockholm, Sweden; ¹² CNRS, Palaiseau, France; ¹³ Qcells, Thalheim, Germany; ¹⁴ ODTU-GUNAM, Ankara, Türkiye; ¹⁵ EDF, Palaiseau, France

2CP.1.4 Designing and Manufacturing of a 34.21 % World-record Efficiency Non-Concentrating Terrestrial PV Module with Optimized Optics and Shingle Interconnection of III-V Solar Cells

Laura Stevens¹, Leonhard Böck¹, Li Carlos Rendler¹, Tim Kubera², Hubert Hauser³, Oliver Goehrmann⁴, Marc André Schüller¹, Najwa Abdel Latif¹, Christian Reichel¹, Martin Heinrich¹

¹ Fraunhofer ISE, Freiburg, Germany; ² Azur Space Solar Power, Heilbronn, Germany; ³ temicon holotools, Freiburg, Germany; ⁴ Goehrmann Solar Technology, Wedel, Germany

PLENARY PRESENTATIONS CP.2

10:30 - 12:30 Silicon PV Design, Manufacturing and Circularity

Chairpersons: Veronica Bermudez Benito
BERBETIN, Antibes, France
Wilfried G.J.H.M. van Sark
Utrecht University, The Netherlands

CP.2.1 Towards 28% Efficient Silicon Solar Cells in Mass Production

Daniel Macdonald¹, Rabin Basnet¹, Zhongshu Yang¹, Kean Fong¹, Gabriel Bartholazzi¹, AnYao Liu¹, Lachlan Black¹, Di Yan², James Bullock², Peiting Zheng³, Menglei Xu³, Jie Yang³, Xinyu Zhang³, Hao Jin³

¹ ANU, Canberra, Australia; ² University of Melbourne, Melbourne, Australia; ³ Jinko Solar, Haining, China

CP.2.2 Latest Development of TOPCon and Back Contact Solar Cells in China

Menglei Xu¹

¹ Jinko Solar, Haining, China

CP.2.3 Module Technology Innovations – An Important Driver for Performance and Cost Improvements as well as New Applications in Photovoltaics

Dirk-Holger Neuhaus¹

¹ Fraunhofer ISE, Freiburg, Germany

CP.2.4 Student Awards Finalist Presentation: The PVMD Toolbox v2: A Modular Framework for Modeling Advanced Photovoltaic Systems

Youri Blom¹, Malte Ruben Vogt¹, Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands

CP.2.5 Towards Circular PV Modules

Jaione Bengoechea¹

¹ CENER, Sarriena, Spain

CP.2.6 Time-Resolved Circular Energy Flows in TOPCon Solar Cell Production

Peter Brailovsky¹, Dilara Subasi¹, Tobias Dannenberg², Lisbeth Rochlitz³, Leonard Rohde⁴, Jascha Reich⁵, Wolfgang Kramer¹, Sebastian Mack¹, Baljeet Singh Goraya¹, Thomas Fluri¹, Nico Wöhrle¹, Martin Weber², Sebastian Nold¹

¹ Fraunhofer ISE, Freiburg, Germany; ² RENA Technologies, Gütenbach, Germany; ³ Pfeiffer Fab Solutions, Blaubeuren, Germany; ⁴ VON ARDENNE, Dresden, Germany; ⁵ TU Berlin, Berlin, Germany



ORAL PRESENTATIONS 1CO.1

13:30 - 15:00 Optimization of Manufacturing of Silicon Solar Cells

Chairpersons: Karsten Bothe
ISFH, Emmerthal, Germany
Pierre Verlinden (i)
AMROCK, McLaren Vale, Australia

1CO.1.1 Optimization of Metallization in TOPCon and SHJ Silicon Solar Cells for Shingle and TWILL Interconnection

Špela Tomšič¹, Sven Kluska², Marco Galiazzi³, Jonathan Govaerts⁴, Marko Topič¹, Matevž Bokalič¹

¹ University of Ljubljana, Ljubljana, Slovenia; ² Fraunhofer ISE, Freiburg, Germany; ³ Applied Materials Italia, Olmi, Italy; ⁴ imec, Genk, Belgium

1CO.1.2 Baseline for Edge Passivated TOPCon Shingle Solar Cells and (Matrix) Shingle Solar Modules

Elmar Lohmüller¹, Daniel von Kutzleben¹, Sabrina Lohmüller¹, Norbert Kohn¹, Alexander Göbel¹, Alexander Krieg¹, Sebastian Mack¹, Andreas Wolf¹, Marc Hofmann¹, Jale Schneider¹, Jörg Schube¹, Johannes M. Greulich¹, Jonas De Rose¹, Torsten Rößler¹, Achim Kraft¹, Holger Neuhaus¹, Florian Clement¹, Ralf Preu¹

¹ Fraunhofer ISE, Freiburg, Germany

1CO.1.3 Physics-informed Machine Learning for Solar Cell Diagnosis and Measurement Data Compression

Alexandra Wörnhör¹, Wilkin Wöhler¹, Andreas Fell¹, Ralf Preu¹, Stefan Rein¹, Matthias Demant¹

¹ Fraunhofer ISE, Freiburg, Germany

1CO.1.4 Bayesian Optimization for Fabricating TOPCon Solar Cells

Byungsul Min¹, Sebastian Junge¹, Verena Mertens¹, Rolf Brendel¹

¹ ISFH, Emmerthal, Germany

1CO.1.5 High Intensity Line Laser Light Soaking of Silicon Heterojunction Solar Cells

Benedikt Fischer¹, Hitoshi Sai², Zhihao Xu², Maurice Nuys¹, Andreas Lambert¹, Volker Lauterbach¹, Kaining Ding¹, Uwe Rau¹, Takuya Matsui², Karsten Bittkau³

¹ FZJ, Jülich, Germany; ² AIST, Tsukuba, Japan; ³ Forschungszentrum Jülich, Jülich, Germany

1CO.1.6 From Bimodal to Trimodal AgCu/Ag Microstructures: Tuning Percolation and Sintering for Low Temperature Solar Cell Metallization

Oumaima Mhirs¹, M. Noah Wengenmeyr¹, Jonas Bartsch¹

¹ Fraunhofer ISE, Freiburg, Germany

ORAL PRESENTATIONS 5CO.4

13:30 - 15:00 Combining PV and Energy Storage

Chairpersons: Marion Perrin
Energy Pool, Le Bourget-du-Lac, France
Pierre-Jean Alet
CSEM, Neuchâtel, Switzerland

5CO.4.1 System Economics of Flexibility, Storage, and Curtailment in Renewable Grids

Jan Remund¹, Richard Perez², Marc Perez³, Marco Pierro⁴

¹ Meteotest, Bern, Switzerland; ² SUNY, Albany, United States of America; ³ Clean Power Research, Napa, United States of America; ⁴ EURAC, Bolzano, Italy

5CO.4.2 Research on the System Electricity Supply Cost of Replacing Fossil-Fuel Generation with Photovoltaics

Dong Zhang¹, Yunzhou Zhang²

¹ State Grid Energy Research Institute, Beijing, China; ² China Renewable Energy Society, Beijing, China

5CO.4.3 Validating Robust MPC and Reinforcement Learning for Utility-Scale PV+BESS Dispatch using High-Fidelity Multi-Physics Simulation

Cristóbal Parrado Riquelme¹

¹ Andrés Bello University, Santiago, Chile

5CO.4.4 Assessing the Reliability of Battery Systems in Solar Power Plants in Operation

Erik Stensrud Marstein¹, Christian Messner², Patrik Ollas³, Jonathan Fagerström¹, Mengjie Li⁴, Dan-Eric Archer⁵, Roger H. French⁶

¹ IFE, Kjeller, Norway; ² AIT, Vienna, Austria; ³ RISE, Gothenburg, Sweden; ⁴ UCF, Orlando, United States of America; ⁵ Checkwatt, Gothenburg, Sweden; ⁶ CWRU, Cleveland, United States of America

5CO.4.5 High-Temperature Heat Pumps as Demand-Side Integration Assets for Renewable Curtailment Mitigation: A Case Study in Chilean Copper Mining

Maylin Moraga¹, Carlos Jose Felbol¹, Francisco Moraga¹

¹ Fraunhofer Chile Research, Santiago de Chile, Chile

5CO.4.6 Potential of PV+BESS as a Fast-deployment Option for Data Center Energy

Harry Apostoleris¹, Matteo Chiesa²

¹ EPRI Gulf, Abu Dhabi, United Arab Emirates; ² Khalifa University, Abu Dhabi, United Arab Emirates



VISUAL PRESENTATIONS 4CV.1

13:30 - 15:00 Design, Engineering and Installation of PV Systems; BoS

Chairpersons: Kari Lappalainen
Tampere University, Tampere, Finland
Sara Bouguerra
imo-imomec, Diepenbeek, Belgium

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

PANEL DISCUSSION PRESENTATIONS

13:30 - 15:00 CO.7 Perovskites: Evolution or Revolution?

Chairpersons: Delfina Muñoz
CEA, Le Bourget-du-Lac, France
Nikoleta Kyranaki
Hasselt University, Genk, Belgium

Will we see a revolution and perovskite thin film technologies replace wafer based PV? Or will perovskite solar cells shape the PV industries near future in an evolutionary step - as top cell in silicon based tandem devices? Or will perovskites never play a role and it is all a hollow hype?

Join us for an insightful session as we return to 2024's "Hype or Hope" question on Perovskite technologies with a new question – "Evolution or Revolution?" We delve into the pressing challenges surrounding finding the right commercialisation strategy for the perovskite technologies as this innovative material enters the PV market.

Our discussion will encompass crucial aspects such as long-term reliability, scalability, bankability, standardization in testing, availability of suitable infrastructure and the obstacles faced in commercialisation a new technology. Furthermore, gain valuable insights into the strategies adopted by major PV manufacturers in navigating this evolving landscape.

Don't miss this opportunity to gain a comprehensive understanding of the complexities and opportunities at the intersection of technological innovation and market readiness.

Panelist 1 - Nicola Beaumont, Oxford PV, United Kingdom

Panelist 2 - Chen Yang, Microquanta, China

Panelist 3 -Eva-Maria Hammer, ZSW, Germany

Panelist 4 - Bonna Newman, Lightyear, The Netherlands

Panelist 5 - Elina Bosch, Becquerel Institute, Belgium

ORAL PRESENTATIONS

13:30 - 15:00 Late News.10

ORAL PRESENTATIONS 1CO.2

15:15 - 16:45 Recombination, Degradation, and Diagnostics in Silicon Photovoltaics

Chairpersons: Barbara Terheiden
University of Konstanz, Germany
Ronald Sinton
Sinton Instruments, Boulder, United States of America

1CO.2.1 Student Awards Finalist Presentation: Improved Methodology for a Precise Extraction of the Surface Recombination Current Density J_0 of Well-passivated Silicon Wafers

Daniel Beck¹, Michael Winter¹, Jan Schmidt¹
¹ ISFH, Emmerthal, Germany

1CO.2.2 Student Awards Finalist Presentation: Quantifying Light-Trapping in Silicon Solar Cells and Wafers via Photoluminescence Spectra

Aneeqa Shaikh¹, Anh Din Bui¹, Marco Ernst¹, Kean Chern Fong¹, Thorsten Trupke², Daniel Macdonald¹
¹ ANU, Canberra, Australia; ² UNSW, Sydney, Australia

1CO.2.3 Minimizing Surface-related Degradation of Poly-Si-on-Oxide Passivation Stacks by Controlling the Hydrogen Incorporated during Fast-firing

Michael Winter¹, Daniel Beck¹, Jan Schmidt¹
¹ ISFH, Emmerthal, Germany

1CO.2.4 Efficiency–Breakdown Trade-Offs in IBC Solar Cells with Embedded Poly-Si Bypass Junctions

Paul Procel Moya¹, Yifeng Zhao¹, Rene van Swaaij¹, Olindo Isabella¹
¹ TU Delft, Delft, The Netherlands

1CO.2.5 Degradation of TOPCon Surfaces: Influence of poly-Si Deposition, Doping and Thermal Anneals

Wolfram Kwapiel¹, Parth Sachin Sawant², Benjamin Hamann², Sebastian Mack², Jana-Isabelle Polzin², Florian Schindler², Martin C. Schubert²
¹ University of Freiburg, Freiburg, Germany; ² Fraunhofer ISE, Freiburg, Germany

1CO.2.6 Revealing the Mechanism of Reversible UVID in TOPCon Solar Cells Using a Non-Destructive Raman Characterisation

Pengfei Zhang¹, Caixia Li¹, Ziheng Liu¹, Jialiang Huang¹, Jialin Cong¹, Jingwen Cao¹, Martin Green¹, Xiaojing Hao¹
¹ UNSW, Sydney, Australia



ORAL PRESENTATIONS 5CO.5

15:15 - 16:45 Recycling & Reuse of PV Modules

Chairpersons: Sonja Feldbacher
PCCL, Leoben, Austria
Alberto Pico
EPRI, Santiago de Compostela, Spain

5CO.5.1 Physical and Chemical Separation of Backsheet Powders Obtained during Novel Sanding Delamination of PV Panels

Fabrice Coustier¹, Xavier Mackré-Delannoy¹, Roland Riva¹, Jérémie Aimé¹, Romain Duwald²

¹ CEA/INES, Le Bourget du Lac, France; ² CEA, Grenoble, France

5CO.5.2 Student Awards Finalist Presentation: Laser-Assisted Height-Adaptive Milling for Selective Delamination of End-of-Life Photovoltaic Modules

Josefina Maria Ottitsch¹, Julia Singer¹, Gerhard Wiesinger¹, Christoph Einspieler¹, Friedrich Bleicher¹

¹ TU Wien, Vienna, Austria

5CO.5.3 Recycling of Polymeric Backsheets from PV Modules

Katrin Nord-Varhaug¹, Tina Kristiansen¹, Iselin Grauer Moen¹, Asbjørn Iveland¹, Wolfram Palitzsch²

¹ Norner, Porsgrunn, Norway; ² LuxChemtech, Freiberg, Germany

5CO.5.4 Recycling of Lightweight Photovoltaic Module

Umang Desai¹, Melissa Kundert¹, Antonin Faes¹, Christophe Ballif¹

¹ EPFL, Neuchâtel, Switzerland

5CO.5.5 From Operation to Reuse: A System-Level Assessment of Decommissioned PV Modules

Christoph Metzger¹, Vincent Gerber², Natasa Vulic²

¹ FHNW, Brugg, Switzerland; ² FHNW, Muttenz, Switzerland

5CO.5.6 From Wastes to Demonstrator: A Qualification Protocol for the Reuse of PV Modules

Lionel Sicot¹, Jérémie Aimé¹, Marie Lacombe², Anaïs Gouabault², Stéphane Gresset³

¹ CEA, Le Bourget du Lac, France; ² SOREN, Paris, France; ³ Certisolis, Le Bourget du Lac, France

ORAL PRESENTATIONS 4CO.8

15:15 - 16:45 Reliably Assessing PV Plants: Monitoring, Metrics and Field Practices

Chairpersons: Gisele A. dos Reis Benatto
DTU, Roskilde, Denmark
Ioannis (John) Tsanakas
CEA, Le Bourget-du-Lac, France

4CO.8.1 Introductory Presentation: Best Practices in PV Plant Performance Testing: Filters, Tolerances, Uncertainties, and Field Implementation

Lucas Nascimento¹, Eduardo Martins Deschamps¹, André Cechinel¹, Gustavo Xavier¹, João Paulo Veríssimo¹, Helena Flávia Napolini¹, Ricardo Rüther¹

¹ UFSC, Florianópolis, Brazil

4CO.8.2 Uncertainty, Transparency and Trust in PV O&M Analytics

Marios Theristis¹, Kevin Anderson¹

¹ Sandia National Laboratories, Albuquerque, United States of America

4CO.8.3 Reliable and Actionable Performance Metrics for Heavily Curtailed Plants

Julien Deckx¹, Maitheli Nikam¹, Karel De Brabandere¹, Gofran Chowdhury¹

¹ 3E, Brussels, Belgium

4CO.8.5 The Impact of Irradiance Sensor Installation Position on the Performance Ratio Calculation

Marc A. N. Korevaar¹, Shuo Wang², Hesam Ziar¹, Damon Nitzel¹, Silvana Ovaite³

¹ OTT Hydromet, Delft, The Netherlands; ² Turku University of Applied Science, Turku, Finland; ³ NLR, Golden, United States of America

ORAL PRESENTATIONS 3CO.11

15:15 - 16:45 PV Module Materials and Processes for Sustainability

Chairpersons: Max Mittag
Fraunhofer ISE, Freiburg, Germany
Tudor Timofte
ISC Konstanz, Konstanz, Germany

3CO.11.1 Optimising Lamination, Debonding and Environmental Reliability for Laminates Made with Debonding-on-Demand Encapsulants

Arvid van der Heide¹, Bart Reekmans¹, Jonathan Govaerts¹, Arthur Maufort², Fábio Silva², Kristof Proost², Tatjana Vavilkin³, Stefan Dewallef³, Wouter Marchal⁴

¹ imec vzw, Genk, Belgium; ² IP FAB, Mechelen, Belgium; ³ Soltech, Genk, Belgium; ⁴ Hasselt University, Hasselt, Belgium



- 3CO.11.2 Debonding-on-Demand Chemistry in the Encapsulant Layers for Enhanced PV Module Recycling**
Arthur Maufort¹, Fabio Silva¹, Bernard Noppen², Tatjana Vavilkin³, Stefan Dewallef³, Wouter Marchal², Jan D'Haen², Arvid van der Heide⁴, Kristof Proost¹
¹ IP FAB, Mechelen, Belgium; ² UHasselt, Diepenbeek, Belgium; ³ Soltech, Genk, Belgium; ⁴ imec, Genk, Belgium
- 3CO.11.3 Liquid-Encapsulated Photovoltaic Modules for Circular Manufacturing: Scalability, Performance and Industrial Validation**
Alberto Poli¹, Ian Lin¹, Mona T. Hassel¹, Zola Fung-A-Jou¹, Urvashi Bothra², Malte R. Vogt², Mirco Riganti³, Michele Manca³
¹ Biosphere Solar, Rotterdam, The Netherlands; ² TU Delft, Delft, The Netherlands; ³ Leitat Technological Center, Barcelona, Spain
- 3CO.11.4 Student Awards Finalist Presentation: Towards Circular PV Modules: High-Performance and Fully Cell-Recoverable with Non-Adhesive Interlayers**
Asier Murillo Marrero¹, Alicia Buceta¹, Ines Salomon¹, Jaione Bengoechea¹, Cristina Leyre Pinto¹
¹ FUNDACION CENER, Sarriena, Spain
- 3CO.11.5 Developments Towards Lead-Free Low-Temperature Soldering Pastes for Economical Soldering below 120 °C**
Maria Ignacia Devoto Acevedo¹, Nils Kopp², Kazuki Watanabe², Tobias Meßmer¹
¹ ISC Konstanz, Konstanz, Germany; ² TAMURA ELSOLD, Ilsenburg, Germany
- 3CO.11.6 Improving the LCOE of PV using Multilayer Anti-reflection and Fluorine-free Hydrophobic Coatings**
Luke O. Jones¹, Adam M. Law¹, John Michael Walls¹
¹ Loughborough University, Loughborough, United Kingdom

VISUAL PRESENTATIONS 2CV.2

- 15:15 - 16:45 New Materials, Devices and Conversion Concepts | New Modelling and Characterisation Techniques**
Chairpersons: Elisa Antolín
Universidad Politécnica de Madrid, Madrid, Spain
Theresa Magorian Friedlmeier
ZSW, Stuttgart, Germany

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 5CO.3

17:00 - 18:30 Challenges for Manufacturing in Europe

Chairpersons: Maria Getsiou
European Commission DG RTD, Brussels, Belgium
Gaëtan Masson
Becquerel Institute, Brussels, Belgium

- 5CO.3.1 Analysis of the Practical Application of the Net Zero Industry Act - Impact of Awards and Prequalification Mechanisms in Auctions**
Max Mittag¹, Pamela Molina¹, Peter Brailovsky¹, Sebastian Nold¹, Holger Neuhaus¹
¹ Fraunhofer ISE, Freiburg, Germany
- 5CO.3.2 The Socio-economic Impacts of Reshoring the PV Supply Chain to Europe and the Associated Policy Costs**
Tommaso Ferraresi¹, Renato Panicià¹, Leonardo Piccini¹, Giulio Mela², Andrea Danelli², Pierpaolo Girardi², Elisabetta Brivio², Nicola Baggio³
¹ IRPET, Florence, Italy; ² RSE, Milan, Italy; ³ FuturaSun, Cittadella, Italy
- 5CO.3.3 From Manufacturing Sites to Industrial Eco-Systems: Applying Gibrat's Law to PV Manufacturing Growth**
Pietro P. Altermatt¹, Hannes Wagner-Mohnsen¹, Ye Xu¹, Jing Pan¹, Yao Wang¹, Yifeng Chen¹
¹ Trinasolar, Changzhou, China
- 5CO.3.4 Draft Concept of a Tradable Certificate Framework for Achieving 40 % "Made in Europe" Content in PV and BESS Manufacturing**
Johan Lindahl¹, Jens Holm¹, Christoph Podewils¹
¹ European Solar Manufacturing Council, Brussels, Belgium
- 5CO.3.5 European Market Potential of Perovskite-Based Modules until 2050: Multi-Parameter Diffusion Scenarios by PV Segments**
Damien Gautier¹, Philippe Macé², Melodie de l'Epine¹
¹ Becquerel Institute France, Lyon, France; ² Becquerel Institute, Brussels, Belgium
- 5CO.3.6 Circularity as a Strategic Lever for EU Solar PV Manufacturing under the Net-Zero Industry Act**
Alexander Frédéric Degen Székely¹
¹ Utrecht University, Utrecht, The Netherlands



ORAL PRESENTATIONS 5CO.6

17:00 - 18:30 **Raw Materials Recovery and Utilisation from End-of-Life PV Modules**

Chairpersons: Dr. Paula Sanchez-Friera
Solkeys, Gijón, Spain
Dr. Gabriele C. Eder
OFI, Vienna, Austria

5CO.6.1 **Advanced Utilization Strategies for Silicon-Based Industrial Residues**

Wolfram Palitzsch¹, Ingo Röver¹, Arvid Killenberg¹

¹ LuxChemtech, Freiberg, Germany

5CO.6.2 **High-purity Silicon from Photovoltaic Modules using Nanosecond Laser Processing and HF-free Chemical Treatment**

Toon IJzerman¹, Maarten van der Vleuten², Quentin Mottet², Francesc Puchal-Salat², Jelle Rohlf², Remco Koper², Bas Raaijmakers², Johan Bosman², Olaf van der Sluis³, Fallon Colbert¹, Remi Aninat², Mirjam Theelen²

¹ Zuyd University of Applied Sciences, Heerlen, The Netherlands; ² TNO, Eindhoven, The Netherlands; ³ TU Eindhoven, Eindhoven, The Netherlands

5CO.6.3 **Challenges and Opportunities for Solar Glass Recovered from High-Value Recycling**

Claire Agraffei¹, Xavier Mackre-Delannoy¹, Wim Merket², Danny Timmers², Wolfram Palitzsch³

¹ CEA / INES, Le Bourget-du-Lac, France; ² Maltha, Lommel, Belgium; ³ LuxChemtech, Freiberg, Germany

5CO.6.4 **Reintegrating Purified Recycled EVA from End-of-Life PV Modules into New Encapsulant Films**

Lison Marthey¹, Hengyu Li¹, Jacques Levrat¹, Romain Duwald², Cécile Flassayer², Fabrice Coustier³, Roland Riva³, Xavier Mackré-Delannoy³, Bénédicte Bonnet-Eymard¹, Tonio Buonassisi¹, Christophe Ballif¹

¹ CSEM, Neuchâtel, Switzerland; ² CEA Liten, Grenoble, France; ³ CEA INES, Le Bourget du Lac, France

5CO.6.5 **Fluorine Content in Photovoltaic Backsheets: Evolution, Quantification, and Implications for End-of-Life**

Anika Gassner¹, Gabriele C. Eder¹, Jakob Anger², Vasilaki-Maria Archodoulaki³

¹ OFI, Vienna, Austria; ² 2nd Cycle Flexco, Amstetten, Austria; ³ Vienna University of Technology, Vienna, Austria

5CO.6.6 **Low-Energy Conversion of Photovoltaic Manufacturing Wastes into Zeolitic Materials**

Selin Cansu Gölboylu¹, Ramona Davoudnezhad Apaydın¹, Meriç Çalışkan Arslan¹, Burcu Akata Kurç²

¹ Kalyon PV, Ankara, Türkiye; ² METU, Ankara, Türkiye

ORAL PRESENTATIONS 4CO.9

17:00 - 18:30 **Understanding and Detecting Degradation and Losses in PV Systems**

Chairpersons: Mari Øgaard
IFE, Kjeller, Norway
Peter Hacke
National Laboratory of the Rockies, Golden, United States of America

4CO.9.1 **Degradation is not PLR**

Bert Herteleer¹, Ebrar Özkalay¹, Gabi Friesen¹

¹ SUPSI, Mendrisio, Switzerland

4CO.9.2 **Degradation Pathways in PERC, TOPCon and SHJ Modules after Medium-term Desert Exposure**

Hugo Quest¹, Dhanup Somasekharan Pillai², Alessandro Virtuani¹, Olatz Arriaga Arruti¹, Maulid Kivambe², Bénédicte Bonnet-Eymard¹, Matthieu Despeisse¹, Amir Abdallah², Sertac Bayhan², Brahim Aissa², Tonio Buonassisi¹, Christophe Ballif¹

¹ CSEM, Neuchâtel, Switzerland; ² QEERI, Doha, Qatar

4CO.9.3 **Spectrally Resolved Prediction of UV-Induced Degradation for Field-Deployed TOPCon PV Modules**

Shukla Poddar¹, Muhammad Umair Khan¹, Ho Yuet Rachel Yeung¹, Phillip Hamer¹, Bram Hoex¹

¹ UNSW, Sydney, Australia

4CO.9.4 **Studying Real-World Evolution of Cell Cracks in Silicon PV Modules**

Claudia Buerhop-Lutz¹, Thilo Winkler¹, Bernhardt Kaesser¹, Oleksandr Mashkov¹, Ernst Wittmann¹, Ian Marius Peters¹

¹ HI ERN, Erlangen, Germany

4CO.9.5 **Investigation of Low-Energy Glass Crack Detection in Photovoltaic Modules During Daylight Electroluminescence Inspections**

Rodrigo del Prado Santamaría¹, Thøger Kari¹, Gisele Alves dos Reis Benatto¹, Mahmoud Dhimish¹, Peter B. Poulsen¹, Sergiu V. Spataru¹

¹ DTU, Roskilde, Denmark

4CO.9.6 **Field Assessment on the Impact of Robotic Cleaning on PV Modules and Anti-Reflective Coating Degradation in Harsh Climates**

Dhanup Somasekharan Pillai¹, Ben Figgis², Damien Cosme³, Lluvia Ochoa⁴, Maulid Kivambe¹, Brahim Aissa¹, Sertac Bayhan¹

¹ QEERI, Doha, Qatar; ² UWA, Perth, Australia; ³ TotalEnergies Research Center Qatar, Doha, Qatar; ⁴ TotalEnergies OneTech, La Défense, France



ORAL PRESENTATIONS 3CO.12

17:00 - 18:30 Innovation in PV Module Manufacturing

Chairpersons: Hamed Hanifi
AESOLAR, Königsbrunn, Germany
Henning Nagel (/)
Fraunhofer ISE, Freiburg, Germany

3CO.12.1 Increasing the Flexibility and Versatility of Integrated-Photovoltaics (iPV) Manufacturing Lines through the Adoption of Pre-laminated Strings

Lison Marthey¹, Albin Servais¹, Hengyu Li¹, Matthieu Despeisse¹, Bénédicte Bonnet-Eymard¹, Christophe Ballif¹, Tonio Buonassisi¹, Alessandro Virtuani¹
¹ CSEM, Neuchâtel, Switzerland

3CO.12.2 Impact of Ag-Diffusion into Sn-based Solder Alloys during Interconnection on the Reliability of TOPCon Solar Cells and Modules

Benjamin Grübel¹, Derya Güldali¹, Leonhard Böck², Dirk Eberlein¹, Stephan Hoffmann¹, Achim Kraft¹
¹ Fraunhofer ISE, Freiburg, Germany; ² University of Freiburg, Freiburg, Germany

3CO.12.3 Manufacturing Process and Reliability Assessment of Flexible IBC Mini-Modules

Paola Jakuza¹, Giacomo Garbelotto¹, Matteo Buffolo¹, Alessandro Caria¹, Carlo De Santi¹, Nicola Trivellin¹, Stefano Rampino², Francesco Pattini², Gabriella Gonnella³, Laura Maturi³, Gaudenzio Meneghesso¹, Enrico Zanoni¹, Matteo Meneghini¹
¹ University of Padua, Padova, Italy; ² IMEM-CNR, Parma, Italy; ³ Eurac Research, Bolzano, Italy

3CO.12.4 Anti-glare Module Glass Textures with Enhanced Light In-coupling

Benedikt Bläsi¹, Lasse Bienkowski¹, Janina Willmann¹, Martin Zimmer¹, Bernd-Uwe Sander², Erdmut Schnabel¹, Andreas A. Brand¹, Marc Hofmann¹, Thomas Kroyer¹, Jan Nekarda¹
¹ Fraunhofer ISE, Freiburg, Germany; ² RENA Technologies, Gütenbach, Germany

3CO.12.5 Fabrication Strategies for High-Performance Perovskite Solar Modules on FTO Substrates

Yuzhe Liu¹, Tsvetelina Merdzhanova¹, Oleksandr Astakhov¹, Christoph Zahren¹, Stefan Haas¹, Gaosheng Huang¹, Christoph Brabec¹, Thomas Kirchartz¹
¹ FZJ, Jülich, Germany

3CO.12.6 Exploring the Boundary Conditions of Multiwire Interconnection for Perovskite/Silicon Tandems

Valerie Depauw¹, Bart Reekmans¹, Hamed Javanbakht Lomeri¹, Jonathan Govaerts¹, Felipe Saenz², Quentin Jeangros², Hariharsudan Sivaramakrishnan Radhakrishnan¹
¹ imec, Genk, Belgium; ² CSEM, Neuchâtel, Switzerland

VISUAL PRESENTATIONS 2CV.3

17:00 - 18:30 Perovskite-based Tandem and Multijunction Devices | Perovskites

Chairpersons: Perrine Carroy
CEA, Le Bourget-du-Lac, France
Nikoleta Kyranaki
Hasselt University, Genk, Belgium
Sjoerd Veenstra
TNO Energy Transition, Eindhoven, The Netherlands

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.



Thursday, 17. September 2026

ORAL PRESENTATIONS 4DO.1

08:30 - 10:00 Solar PV Forecasting in Urban Areas | Yield in Bifacial PV Plants

Chairpersons: Bijan Nouri
German Aerospace Center, Almería, Spain
Josselin Le Gal La Salle
University of la Réunion, Sant-Denis, Réunion

4DO.1.1 Student Awards Finalist Presentation: Integrating All Sky Imager-Based Hybrid AI Forecasting into Building Energy Management: Predictive Battery Control and Operational Validation in Positive Energy Buildings

Khadija Barhmi¹, Sara Golroodbari¹, Wilfried Van Sark¹
¹ Utrecht University, Utrecht, The Netherlands

4DO.1.2 Impact of Intraday Solar Forecasting on Household Demand-Side Management in PV Self-Consumption

Sylvain Cros¹, Venkat Aashray Nayini¹, Valentin Duchemin¹, Jordi Badosa¹
¹ Sorbonne University, Palaiseau, France

4DO.1.3 Improving Physical PV Forecasts with Data-Driven Shading Estimation: A Comparison with Black-Box Methods

Karel De Brabandere¹, Julien Deckx¹, Maitheli Nikam¹, Gofran Chowdhury¹
¹ 3E, Brussels, Belgium

4DO.1.4 Student Awards Finalist Presentation: Beyond Expected Gains: Measured Performance and Cost Limits of Reflective Ground Covers for Utility-Scale Bifacial PV Plants

Marília Braga¹, Rafael Antunes Campos¹, Gustavo Xavier de Andrade Pinto¹, Kevin Luiz Rocha de Azevedo¹, Anelise Medeiros Pires¹, Helena Flávia Napolini¹, Ricardo Rüther¹
¹ UFSC, Florianópolis, Brazil

4DO.1.5 Understanding Energy Yield Bias in Bifacial PV: Lessons from a 300 MWp Utility Scale Plant

Marie Syre Wiig¹, Magnus Moe Nygard¹, Elin Dypvik Sødahl¹
¹ IFE, Kjeller, Norway

4DO.1.6 Maximizing Revenues: Vertical Bifacial PV and South PV with Storage

Yannick Kloos¹, Marc-André Schüller¹
¹ Next2Sun Technology, Freiburg, Germany

ORAL PRESENTATIONS 1-2DO.6

08:30 - 10:00 Silicon Bottom Cells & Perovskite/Silicon Tandems

Chairpersons: Delfina Muñoz
CEA, Le Bourget-du-Lac, France
Bertrand Paviet-Salomon (*i*)
CSEM, Neuchâtel, Switzerland

1DO.6.1 A Silicon-based Recombination Junction for >31 % Efficient TCO-free Interconnection Perovskite-Silicon Tandem Solar Cells

Julien Humi¹, Kerem Artuk², Michele De Bastiani², Audrey Morisset², Quentin Jeangros², Bertrand Paviet-Salomon², Christian Wolff¹, Christophe Ballif¹, Franz-Josef Haug¹
¹ EPFL, Neuchâtel, Switzerland; ² CSEM, Neuchâtel, Switzerland

1DO.6.2 Impact of Nanoscale Pyramidal Textures on the Mechanical and Device Performance of Si Bottom Cells for Perovskite/Si Tandem Solar Cells

Yuya Sato¹, Takuto Ikeda¹, Takuya Matsui¹, Hiroyuki Wada², Hitoshi Sai¹
¹ AIST, Tsukuba, Japan; ² Institute of Science Tokyo, Yokohama, Japan

1DO.6.3 Impact of TCO-Based Recombination Layer on Selfassembled Monolayers Hole Selectivity for Monolithic Two Terminal Perovskite/Silicon Tandem Solar Cells

Sofia Flores Bahamondez¹, Perrine Carroy¹, Delfina Muñoz¹, David Muñoz²
¹ CEA, Le Bourget-du-Lac, France; ² CNRS, Grenoble, France

2DO.6.4 Controlling Hybrid Route Perovskite Conversion via Substrate Surface Properties in Fully-Textured Perovskite/Silicon Tandem Solar Cells

Oussama Er-Raji¹, Sandhya Padmaraj¹, Bhushan P. Kore¹, Martin Bivour¹, Patricia S. C. Schulze¹, Stefan W. Glunz¹, Juliane Borchert¹
¹ Fraunhofer ISE, Freiburg, Germany

2DO.6.5 Inorganic Scaffold Engineering for Scalable Hybrid Processing of Perovskite Thin Films in High Performance Perovskite/Silicon Tandems

Ulrich W. Paetzold¹, Julian Petry¹, Ronja Pappenberger¹, Raphael Pesch¹, Kristina Geistert¹, Renjun Guo¹, Jinzhao Li¹, Paul Fassl¹
¹ KIT, Karlsruhe, Germany

2DO.6.6 Optimal Energy Alignment and Surface Adhesion Improvement for Highly Efficient Perovskite-Silicon Tandem Solar Cells

Gaosheng Huang¹, Yanxun Li², Nan Sun¹, Bingbing Chen¹, Niklas Scheer¹, Benjamin Klingebiel¹, Andreas Lambert¹, Alex K.-Y. Jen², Thomas Kirchartz¹, Uwe Rau¹, Kaining Ding¹
¹ FZJ, Jülich, Germany; ² City University of Hong Kong, Hong Kong, Hong Kong



ORAL PRESENTATIONS 5DO.11

08:30 - 10:00 Supporting Innovative PV Deployment for the TW Era

Chairpersons: Sandra Gallmetzer
Eurac Research, Bolzano, Italy
Puzant Baliozian (i)
VDMA, Frankfurt am Main, Germany

5DO.11.1 A Building-Resolution Assessment of Rooftop and Façade PV, Towards a Solar Europe

Georgia Kakoulaki¹, Sandor Szabo¹, Christian Thiel¹, Robert Kenny¹, Arnulf Jäger-Waldau¹

¹ European Commission JRC, Ispra, Italy

5DO.11.2 Projection of Photovoltaic System Deployment in Japan Toward 2040

Koichi Sugibuchi¹, Naofumi Ezawa¹, Yoshiyuki Ohashi¹, Haruki Yamaya¹, Satsuki Kanai¹, Izumi Kaizuka¹, Osamu Ikki¹

¹ RTS Corporation, Tokyo, Japan

5DO.11.3 Defining Agrivoltaics: An Evolving Regulatory Landscape

Celeste Mellone¹, Giulia Guidetti², Chiara Grotto², Valeria Viti³, Lorenzo Massaro⁴, Cesare Gatti³, Alessandra Scognamiglio⁵, Fabio Salis⁶

¹ Green Horse Legal Advisory, Rome, Italy; ² Green Horse Legal Advisory, Milan, Italy; ³ Pedersoli Gattai, Milan, Italy; ⁴ Pedersoli Gattai, Rome, Italy; ⁵ ENEA - AIAS, Naples, Italy; ⁶ Iberdrola, Rome, Italy

5DO.11.4 Climate Change Impacts on Renewables Energy Resources

Gaetana Anamati¹, Gerardo Guerra¹, Pau Mercade Ruiz¹, Lars Landberg², Asuncion Lera St. Clair³, Pragya Vishwakarma⁴, Annika Wybrow⁵

¹ DNV, Barcelona, Spain; ² DNV, Copenhagen, Denmark; ³ DNV, Hovik, Norway; ⁴ DNV, Bristol, United Kingdom; ⁵ DNV, London, United Kingdom

5DO.11.5 Geospatial Mapping for Localization of Utility-Scale PV Power Plants on Java, Madura, and Bali Islands

Martin Opatovsky¹, Juraj Betak¹, Maryam Karimah², Solene Gondrexon²

¹ Solargis, Bratislava, Slovakia; ² Trama TecnoAmbiental, Barcelona, Spain

5DO.11.6 Strengthening Climate-Resilient Photovoltaics through Coordinated Research Infrastructures: Outcomes of the CACTUS EU–Latin America Project

Ioannis (John) A. Tsanakas¹, Delfina Muñoz¹, Romain Couderc¹, Hervé Colin¹, Aitor Marzo², Asier Sanz³, Jose Domingo Santos³, Cristina Polacchi⁴, Felipe Valencia⁵, Luis Alejandro Cardenas⁶, Fernando Augusto Herrera Leon⁶, Ernesto Perez Gonzalez⁶, Thu Nhi Tran Caliste⁷, Edward Mitchell⁷, Mark Robert Johnson⁸, Thomas Saerbeck⁸, Sarah Essam⁹, Jose V. de Seoane¹⁰

¹ CEA / INES, Le Bourget du Lac, France; ² University of Granada, Granada, Spain; ³ Tecnalia, Bilbao, Spain; ⁴ Eurac Research, Bolzano, Italy; ⁵ ATAMOS-TEC, Santiago, Chile; ⁶ UNAL, Bogota, Colombia; ⁷ ESRF, Grenoble, France; ⁸ ILL, Grenoble, France; ⁹ EU-SOLARIS, Almeria, Spain; ¹⁰ Becquerel Institute, Brussels, Belgium

ORAL PRESENTATIONS 3DO.16

08:30 - 10:00 Advanced Imaging and AI-Based Diagnostics for Photovoltaic Modules

Chairpersons: Mario Martinez Gonzalez
Enerdis Applus+, Madrid, Spain
Lukas Koester (i)
Eurac Research, Bolzano, Italy

3DO.16.1 Comparison of Daylight Luminescence Methods during Inverter Operation for Fault Detection in Solar Modules

Chencheng Xu¹, Andrej Wentnagel¹, Michael Siebert¹, Marc Köntges¹

¹ ISFH, Emmerthal, Germany

3DO.16.2 A First-Principles Algorithm for Solar-Cell Feature-Segmentation, for Benchmarking, Labeling, and AI-Model Enhancement

Thøger Kari¹, Rodrigo Del Prado Santamaría¹, Mahmoud Dhimish¹, Gisele del Reis Bennato¹, Peter Behrensdoerff Poulsen¹, Sergiu Spataru¹

¹ DTU, Roskilde, Denmark

3DO.16.3 Quantitative Evaluation of Open-Circuit Voltage Losses from Electroluminescence Images of Si Solar Modules

João Victor Oliveira Santos¹, Daniel Ory², Damien Barakel³, Olivier Palais³, Christine Abdel Nour¹, Julien Dupuis¹

¹ EDF R&D, Moret Loing Orvanne, France; ² EDF R&D, Palaiseau, France; ³ Aix Marseille Université, Marseille, France

3DO.16.4 Student Awards Finalist Presentation: In Situ Degradation Monitoring of PID-p in Crystalline Silicon Photovoltaic Modules with Electroluminescence Imaging

Aysha Mahmood¹, Sune Thorsteinsson¹, Peter Hacke², Gisele Alves dos Reis Benatto¹, Peter B. Poulsen¹, Sergiu V. Spataru¹

¹ DTU, Roskilde, Denmark; ² NREL, Golden, United States of America

3DO.16.5 Long-Tail Challenges in Electroluminescence-Based Photovoltaic Defect Detection

Irfan Haider¹, Sandra Gallmetzer¹, Lukas Koester¹, Luis Fialho¹

¹ Eurac Research, Bolzano, Italy

3DO.16.6 Accelerating EL Defect Annotation in PV Modules via a Web-Based, AI-Assisted Workflow

Ayyoub Ahar¹, Camilo Velázquez-Rodríguez¹, Pieter-Jan Delvaux¹, Pol Bikhari¹, Steven Sagaert¹, Laurent Declercq¹, Abdellatif Bey-Temsamani¹, Raf Vranken¹

¹ Flanders Make, Lommel, Belgium



VISUAL PRESENTATIONS 4DV.1

08:30 - 10:00 Agri-PV | Other PV Applications (Floating, Infrastructure, etc.); CPV; PV in Space | Hybrid Systems and Storage; Direct Uses of PV Generated Electricity

Chairpersons: Roland M. E. Valckenborg
TNO, Eindhoven, The Netherlands
Angele Reinders
Eindhoven University of Technology, The Netherlands
Tsvetelina Merdzhanova
Forschungszentrum Jülich, Germany

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 4DO.2

10:30 - 12:00 Hybrid Systems and Storage; Direct Uses of PV Generated Electricity

Chairpersons: Gerhard Mütter
Gerhard Mütter e.U., Waldneukirchen, Austria
Jieun Lee
K-water, Yuseong-gu, Daejeon, South Korea

4DO.2.1 Student Awards Finalist Presentation: Impacts of Climate Change on the Irradiance Distributions for Floating Photovoltaic Technology within the Context of a Hybrid Wind-PV Offshore Energy Park

Claudio Francesco Nicolosi¹, Giuseppe Marco Tina¹, Amr Osama², Sara Golroodbari³

¹ University of Catania, Catania, Italy; ² Port-Said University, Port Fuad, Egypt; ³ Utrecht University, Utrecht, The Netherlands

4DO.2.2 Modeling and Quantifying Dynamic Wind-Turbine Shading Losses in Hybrid Wind-Solar Systems: Onshore PV and Offshore Floating PV

Sathya Shanka Vasuki¹, Vasiliki Psaraki¹, Tijn Weij¹, Teddy Simanjuntak², Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands; ² Shell Global Solutions International, Amsterdam, The Netherlands

4DO.2.3 Photovoltaic Power-to-heat Conversion with Seasonal Underground Thermal Energy Storage for Winter Heating: A Modelling Study

Zain Ul Abdin¹, Friso Lems¹, Farnaz Pourbarghisofiyani¹, Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands

4DO.2.4 Performance and Resilience Impacts of EV-Charging and V2H in Residential PV/BES Systems

Michiel van Noord¹, Patrik Ollas², Mohammad Kharezy³, Georgios Foskolos⁴

¹ RISE, Stockholm, Sweden; ² RISE, Gothenburg, Sweden; ³ RISE, Borås, Sweden; ⁴ Swedish Energy Agency, Eskilstuna, Sweden

4DO.2.5 Breaking Solar Electrolysis Constrains: Batteries Boost Efficiency, Stability and Reduced Electrolyzer Stress

Tsvetelina Merdzhanova¹, Thérèse Cibaka¹, Uchechi Chibuko¹, Sergey Shcherbachenko¹, Oleksandr Astakhov¹, Christoph Brabec¹, Peter Strasser²

¹ FZJ, Jülich, Germany; ² TU Berlin, Berlin, Germany

4DO.2.6 Direct Solar Water Splitting using Photovoltaic Thin-Film Technology

Marko Turek¹, Robert Maßmann¹, Stefan Eiternick¹, Sina Swatek¹, Stefan Lange¹, Syed Mubeen²

¹ Fraunhofer CSP, Halle (Saale), Germany; ² SunHydrogen, Santa Barbara, United States of America

ORAL PRESENTATIONS 2DO.7

10:30 - 12:00 Novel Materials and Device Architectures for Perovskite based Multijunctions

Chairpersons: Perrine Carroy
CEA, Le Bourget-du-Lac, France
Luana Mazzarella
Delft University of Technology, The Netherlands

2DO.7.1 30%-Efficient Perovskite-Perovskite-Silicon Triple-Junction Solar Cells

Kerem Artuk¹, Deniz Turkey², Austin Kuba², Stefan Riemelmoser³, Julian A. Steele⁴, Julien Hurni², Joël Alexandre Spitznagel², Hugo Quest², Michele De Bastiani¹, Jun Zhao¹, Jonas Diekmann², Chiara Ongaro², Mostafa Othman², Maryamsadat Heydarian⁵, Oliver Fischer⁵, Huagui Lai⁶, Jonathan S. Austin⁶, Stefan Zeiske⁷, Rafael López-Arteaga⁷, Cheng Liu⁷, Mounir D. Mensi³, Andrés-Felipe Castro-Méndez⁸, Muzhi Li⁹, Thomas W. Gries¹⁰, Siddha Hill¹⁰, Felipe Saenz¹, Lisa Champault¹, Hilal Aybike Can², Mohammad Reza Golobostanfard², Umang Desai², Paul Rémondeau², Eduardo Solano¹¹, Giuseppe Portale¹², Antonin Faes², Felix Lang⁸, Artem Musiienko¹⁰, Nicholas Rolston⁹, Fan Fu⁶, Martin C. Schubert⁵, Florian Schindler⁵, Bin Chen⁷, Alfredo Pasquarello³, Edward H. Sargent⁷, Aïcha Hessler-Wyser², Quentin Jeangros¹, Christophe Ballif², Christian M. Wolff²

¹ CSEM, Neuchâtel, Switzerland; ² EPFL, Neuchâtel, Switzerland; ³ EPFL, Lausanne, Switzerland; ⁴ The University of Queensland, Brisbane, Australia; ⁵ Fraunhofer ISE, Freiburg, Germany; ⁶ EMPA, Dübendorf, Switzerland; ⁷ Northwestern University, Evanston, United States of America; ⁸ University of Potsdam, Potsdam, Germany; ⁹ Arizona State University, Tempe, United States of America; ¹⁰ HZB, Berlin, Germany; ¹¹ ALBA Synchrotron, Cerdanyola del Vallès, Spain; ¹² University of Groningen, Groningen, The Netherlands



- 2DO.7.2 Manufacturing Flexible Two-terminal All-perovskite Tandem Solar Devices via Scalable Methods**
 Mehrdad Najafi¹, Nitish Rai¹, Klaas Bakker¹, Anne Biezemans¹, Subhadra Venkataraman¹, Chandu Mohan¹, Drishya Rajan Pillai¹, Johannes Lambooi¹, Markos Rikos¹, Casper Van Kessel¹, Dorrit Roosen¹, Marie-Sarah Regragui¹, Corne Frijters¹, Johan Bosman¹, Wiljan Verhees¹, Joris De Riet¹, Remi Aninat¹, Marcel Simor¹, Ryley Ratnasigham¹, Mirjam Theelen¹, Hindrik de Vries², Adriana Creatore³, Urs Aeberhard⁴, Valerio Zardetto¹, Ilker Dogan¹, Hadi Dashtaki Hesari¹, Sjoerd Veenstra¹
¹ TNO Energy Transition, Eindhoven, The Netherlands; ² SALD, Eindhoven, The Netherlands; ³ Plasma & Materials Processing, Eindhoven, The Netherlands; ⁴ Fluxim, Winterthur, Switzerland
- 2DO.7.3 Novel Indium-free Recombination Junction and Hole Transport Layer Using Spatial Atomic Layer Deposition for Tandem Solar Cells**
 Jons Bolding¹, Radha Kothandaraman², Floor Souren¹, Hindrik De Vries¹, Ivo Aretz¹, Hande Ciftipinar³, Valerio Zardetto², Mert Kaplan⁴, Hisham Nasser⁴, Bart Geerlings³
¹ SALD, Eindhoven, The Netherlands; ² TNO Solar Technologies and Application, Eindhoven, The Netherlands; ³ TNO Solar Energy, Petten, The Netherlands; ⁴ METU, Ankara, Türkiye
- 2DO.7.4 Integrating Inkjet-Printed Green Solvent-based Perovskite Layer into Perovskite/Silicon Tandem Solar Cells**
 Uma Kousalya Dangudubiyam¹, Raphael Pesch¹, Ozan Karakaya¹, Theresa Kuechle¹, Faranak Sadegh¹, Henry Weber², Ralf Niemann², Fabian Fertig², Johannes Sutter¹, Jinzhao Li¹, Gerardo Hernandez Sosa¹, Ulrich W Paetzold¹
¹ KIT, Karlsruhe, Germany; ² Hanwha Q CELLS, Karlsruhe, Germany
- 2DO.7.5 Student Awards Finalist Presentation: Systematic Study of Functional Groups Leads to the Development of a Novel Efficient and Stable Passivation Molecule for Perovskite-Based Solar Cells**
 Jann B. Landgraf¹, Yashika Gupta¹, Aleksandra Oranskaia², Oliver Fischer³, Sofiia Kosar², Adi Prasetyo², Christian Schwarz¹, Christoph Messmer¹, Sithisak Chanthavong¹, Stefaan De Wolf², Udo Schwingenschloegl², Patricia S. C. Schulze³, Anna Fischer¹, Stefan W. Glunz³, Juliane Borchert¹
¹ University of Freiburg, Freiburg, Germany; ² KAUST, Thuwal, Saudi Arabia; ³ Fraunhofer ISE, Freiburg, Germany
- 2DO.7.6 High-Efficiency Solvent-Free Solar Cells for Tandem Applications: from Sequentially-Evaporated Perovskites to Evaporated Contacts Optimisations**
 Mohamed A. A. Mahmoud¹, Juan S. O. Vivas¹, Oliver Fischer¹, Adi Prasetyo², Salma Al Khuwaitem², Bhushan P. Kore¹, Stephan Riepe¹, Ulrike Hatt¹, Oussama Er-Raji¹, Martin Bivour¹, Martin Hermle¹, Stefaan De Wolf², Stefan W. Glunz¹, Andreas W. Bett¹, Juliane Borchert¹
¹ Fraunhofer ISE, Freiburg, Germany; ² KAUST, Thuwal, Saudi Arabia

ORAL PRESENTATIONS 3DO.12

10:30 - 12:00 Circularity and Materials in Modules Design

Chairpersons: Maria Ignacia Devoto Acevedo
 ISC Konstanz, Germany
 Petra Christöfl (i)
 PCCL, Leoben, Austria

- 3DO.12.1 PV Module Layouts for Silicon Perovskite Tandem Solar Cells: Electrical Parameters and Shading Behavior**
 Li Carlos Rendler¹, Leonhard Böck¹, Torsten Rößler¹, Alexander Aguilar-Protti², Christian Reichel¹, Martin Heinrich¹
¹ Fraunhofer ISE, Freiburg, Germany; ² University of Freiburg, Freiburg, Germany
- 3DO.12.2 Module Efficiency of 31.3% with Monolithic III-V/Si Tandem Solar Cells using Automated Shingling Interconnection**
 Leonhard Böck¹, Jonas D. De Rose¹, Tadeo Schweigstill¹, Jan Benick¹, Ralph Müller¹, Julian Weber², Torsten Rößler¹, Gerald Siefer¹, Holger Neuhaus¹, Frank Dimroth¹, Florian Clement¹, Oliver Höhn¹
¹ Fraunhofer ISE, Freiburg, Germany; ² PV Freelancer, Freiburg, Germany
- 3DO.12.3 3D Multi-Ribbon Interconnection for Bifacial Interdigitated Back Contact (IBC) Solar Modules**
 Tom Borgers¹, Hamed Javanbakht Lomeri¹, Filip Duerinckx¹, Jonathan Govaerts¹, Hariharsudan Sivaramakrishnan Radhakrishnan¹, Jef Poortmans¹
¹ imec vzw, Genk, Belgium
- 3DO.12.4 Material Matters: Understanding EPE Encapsulants**
 Nikolina Pervan¹, Gabriele C. Eder², Yuliya Voronko², Gernot Oreski¹
¹ PCCL, Leoben, Austria; ² OFI, Vienna, Austria
- 3DO.12.5 A New Prelamination Technique based on a Robust and Fast Curing Process**
 Philippe Thony¹, Antoine Bardin¹, Mathieu Rouaud¹, Antonio Valor², Endika Martin², Jean-Philippe Aguerre², Aitor Apraiz²
¹ CEA, Le Bourget-du-Lac, France; ² Mondragon Assembly, Aretxabaleta, Spain
- 3DO.12.6 Numerical Simulation and Experimental Validation of Mechanical Stress in High-efficiency Zebra-Life Modules with 95 % Less Encapsulant Material**
 Christoph Pönisch¹, Guy Beaucarne², Julius Reiner¹, Daniel Kray¹
¹ Offenburg University of Applied Sciences, Offenburg, Germany; ² Dow Silicones Belgium, Seneffe, Belgium



ORAL PRESENTATIONS 4DO.17

10:30 - 12:00 Floating PV "Onshore"

Chairpersons: Josefine Helene Selj
Institute for Energy Technology, Kjeller, Norway
Thomas Reindl
SERIS, Singapore, Singapore

4DO.17.1 STEWART: Science-based Environmentally Friendly Layouts for Floating PV — First-Year Insights to Sustainability Assessment of FPV

Karolina Baltins¹, Çağla Meral Akgül², Reza Mohajer Barough², Mete Çubukçu³, Alexander Graef¹, Maria Ikhennicheu⁴, Konstantin Ilgen¹, Alexandra Klyuvak⁵, Stefano Lucarini⁶, Leonardo Micheli⁷, Polina Vasilenko⁵, Esra Sirch¹, Simon Tonnel⁴

¹ Fraunhofer ISE, Freiburg, Germany; ² METU, Ankara, Türkiye; ³ Ege University, Izmir, Türkiye; ⁴ OWC, Nantes, France; ⁵ HelioRec, Nantes, France; ⁶ Tonucci&Partners, Rome, Italy; ⁷ Sapienza University of Rome, Rome, Italy

4DO.17.2 Student Awards Finalist Presentation: Development of a Multi-Domain System-Level Model for Performance Simulation of Floating Photovoltaic Systems

Oreoluwa Lawale¹, Simon P. Philbin¹, Sahand Hosouli¹

¹ Kingston University London, London, United Kingdom

4DO.17.3 Thermal–Radiative–Shading Coupled Modelling and Performance Optimization of Floating Photovoltaic Systems with Back-Side Reflectors

Konstantinos Polychronakis¹, Dimitrios N. Korres², Christos Sammouris¹, Christos Tzivanidis¹

¹ National Technical University of Athens, Athens, Greece; ² CERTH, Athens, Greece

4DO.17.4 Target-Costing Analysis of Bifacial Modules in Floating Photovoltaic Systems Across Europe

Leonardo Micheli¹, Diego L. Talavera², Giuseppe Marco Tina³, Wilfried van Sark⁴

¹ Sapienza University of Rome, Rome, Italy; ² University of Jaén, Jaén, Spain; ³ University of Catania, Catania, Italy; ⁴ Utrecht University, Utrecht, The Netherlands

4DO.17.5 Assessing Floating Photovoltaic Potential in the Netherlands: a Spatial Evaluation of Solar Energy Production and Evaporation Reduction

Eline Bouma¹, Mehmet Seren Korkmaz², Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands; ² Samsun University, Samsun, Türkiye

4DO.17.6 Integrating Inland Floating Solar into the Dutch Grid

Annanta Kaul¹, Sara Golroodbari¹, Wilfried van Sark¹

¹ Utrecht University, Utrecht, The Netherlands

VISUAL PRESENTATIONS 5DV.2

10:30 - 12:00 Sustainability of PV

Chairpersons: Wolfram Palitzsch
LuxChemtech, Freiberg, Germany
Malte Vogt
Delft University of Technology, The Netherlands
Silvana Ovaite (i)
National Laboratory of the Rockies, Golden, United States of America

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS 4DO.3

13:30 - 15:00 Modeling and Optimization of PV Systems / Power Electronics for 4-Terminal Modules

Chairpersons: Kari Lappalainen
Tampere University, Finland
Auriane Canese
PVsyst, Satigny, Switzerland

4DO.3.1 Dual Input MPPT Circuit Design for 4T Tandem PV Modules

Baris Dai¹

¹ TNO, Eindhoven, The Netherlands

4DO.3.2 Submodule-Level Power Electronics for 4-Terminal Perovskite/Silicon Tandems Under Partial Shading: A Modeling Study

Imran Zeb Durrani¹, Youri Blom¹, Rudi Santbergen¹, Olindo Isabella¹

¹ TU Delft, Delft, The Netherlands

4DO.3.3 A Comparative Assessment of TMY and SCADA Data for DC Electro-Mechanical Design of Utility-Scale PV Plants

Ricardo Velasco¹, Jose Muñoz², Imke Meyer³

¹ Mott MacDonald, Bogota, Colombia; ² Mott MacDonald, Seville, Spain; ³ Mott MacDonald, Brighton, United Kingdom

4DO.3.4 Simulation-based Analysis of Energy Yield and Profitability of PV Tracking Systems in Europe - Revealing the Importance of Hourly Electricity Price Fluctuation

Tibo Martens¹, Youri Blom¹, Malte Ruben Vogt¹, Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands

4DO.3.5 Worldwide Operational Benchmarking of SolarFarmer for PV Energy Yield Modeling

Anja Neubert¹, Camelia Farchado², Javier Lopez-Lorente³

¹ DNV, Oldenburg, Germany; ² DNV, Paris, France; ³ DNV, Arnhem, The Netherlands

4DO.3.6 Influence of Climate on Microgrid Energy Systems

Josselin Le Gal La Salle¹, Philippe Lauret¹, Charles Voivret¹, Mathieu David¹

¹ University of La Reunion, Saint-Pierre, Réunion



ORAL PRESENTATIONS 2DO.8

13:30 - 15:00 Scalability and Real-world Performance of Perovskite based Tandems

Chairpersons: Annamaria Petrozza
IIT POLIMI, Milan, Italy
Gianluca Coletti
FuturaSun, Cittadella, Italy

2DO.8.1 Industrial Progress and Challenges of Silicon and Perovskite/Silicon Tandem Photovoltaics Devices

Yifeng Chen¹, Xueling Zhang¹, Shu Zhang¹, Daming Chen¹, Yanfeng Cui¹, Guangtao Yang¹, Zhigang Xie¹, Jifan Gao¹

¹ Trina Solar, Changzhou, China

2DO.8.2 Up-Scaling Perovskite Growth using Hybrid Methods for Silicon/Perovskite Tandem Solar Cells

Kristell Carreric¹, Polyxeni Tsoulka¹, Louis Grenet², Elodie Gerente², Solenn Berson¹

¹ CEA / INES, Bourget du Lac, France; ² CEA, Grenoble, France

2DO.8.3 Sustainable and Scalable Perovskite/Silicon Tandem Devices based on Vacuum Processes: Three Years of Development under the Horizon Europe-funded NEXUS Project

Perrine Carroy¹, Vincent Barth¹, Amandine Boulanger¹, Delfina Muñoz¹, Jordi Veirman², Atse Louwen², Cristina Polacchi², Ulrich W. Paetzold³, Paul Fassl³, Thomas Feeney³, Alexander Diercks³, L. Jan Anton Koster⁴, Sander Heester⁴, Jons Bolding⁵, Floor Souren⁵, Hendrik J. Bolink⁶, Sofia Chozas⁶, Manuel Piot⁶, Federico Ventosinos⁶, Melodie De l'Epine⁷, Anna Barguès⁷, Damien Gautier⁸, Henry J. Snaith⁹, Ece Aktas⁹, David McMeekin⁹, Rahul Nambiar⁹, Xinji Shen⁹, Sam Teale⁹, Fionnuala Grifoni¹⁰, Severin Habisreutinger¹⁰, Markus Lenz¹¹, Victor Misev¹¹, Anika Sidler¹¹, Hisham Nasser¹², Diego Di Girolamo¹³, Marina Foti¹³

¹ CEA / INES, Le Bourget-du-Lac, France; ² Eurac Research, Bolzano, Italy; ³ KIT, Karlsruhe, Germany; ⁴ Rijksuniversiteit Groningen, Groningen, The Netherlands; ⁵ SALD, Eindhoven, The Netherlands; ⁶ University of Valencia, Valencia, Spain; ⁷ Becquerel Institute, Lyon, France; ⁸ Becquerel Institute, Bruxelles, Belgium; ⁹ University of Oxford, Oxford, United Kingdom; ¹⁰ Oxford PV, Oxford, United Kingdom; ¹¹ University of Applied Sciences and Arts Northwestern Switzerland, Basel, Switzerland; ¹² ODTÜ-GÜNAM, Ankara, Türkiye; ¹³ 3SUN, Catania, Italy

2DO.8.4 High-Throughput Perovskite–Silicon Tandem Solar Cells Enabled by Transport-Gas-Assisted Sequential Evaporation

Hajar Moumine¹, Jens Baumann², Arman Mahboubi Soufiani¹, Tobias Bertram¹, Max Wander Bernardes¹, Viktor Skorjanc¹, Marcel Roß¹, Stefanie Severin¹, Steve Albrecht¹, Angelika Harter¹, Bernd Stannowski¹, Jona Kurpiers¹

¹ HZB, Berlin, Germany; ² VON ARDENNE, Dresden, Germany

2DO.8.5 Process-driven Material Selection of Encapsulants for Perovskite-Silicon Tandem Module Lamination

Chiara Barretta¹, Petra Christoeffl¹, Marcel Kuehne², Markus Franke², Frans Op den Buijsch³, Roland Milatz³, Lisa Champault⁴, Quentin Jeangros⁴, Quiterie Emery⁵, Mark Khenkin⁵, Carolin Ulbrich⁵, Gernot Oreski¹

¹ PCCL, Leoben, Austria; ² Hanwha Q CELLS, Bitterfeld-Wolfen, Germany; ³ The Compound Company, Enschede, The Netherlands; ⁴ CSEM, Neuchâtel, Switzerland; ⁵ HZB, Berlin, Germany

2DO.8.6 Bringing Control Outdoors: Temperature-Regulated Monitoring and Energy Yield Modeling of Perovskite–Silicon Tandem Solar Cells

Špela Tomšič¹, Marko Jošt¹, Kristijan Brecl¹, Gašper Matič¹, Marko Jankovec¹, Jueming Bing², Guoliang Wang², Runmin Tao², Suer Zhou², Anita Ho-Baillie², Marko Topič¹

¹ University of Ljubljana, Ljubljana, Slovenia; ² University of Sydney, Sydney, Australia

ORAL PRESENTATIONS 3DO.18

13:30 - 15:00 Metrology and Performance Characterisation of PV Modules

Chairpersons: Jaione Bengoechea
CENER, Sarriguren, Spain
Mauro Pravettoni
Technology Innovation Institute, Abu Dhabi, United Arab Emirates

3DO.18.1 Spectral Linearity of Spectroradiometers Definition, Assessment and Impact on PV Performance Measurements

Diego Pavanello¹, Stefano Alessandrini¹, Davide Tome¹, Antonio Romano², Luigi Stingo², Elisabetta Canuti¹, Edoardo Celi³, Alessandro Minuto³, Rodrigo Costa⁴, Andre Goncalves⁴, Sylvio Luis Mantelli Neto⁵, Fernando Matrins⁶, Flavio Valoti⁷, Juan Jose Stivanello⁸, Pietro Raffaelli⁸, Marco Potenza⁹, Luca Teruzzi⁹, Fabio Fribbi⁹, Leonardo Longo⁹, Stefano Rimoldi⁹, Aziz Nairi¹⁰, Paola Russo Ganon¹¹, Kevin Murray¹², Aodhan Murray¹², Fatemeh Behrouznejad¹³, Tobias Weigner¹⁴

¹ European Commission JRC, Ispra, Italy; ² ENEA, Portici, Italy; ³ RSE, Piacenza, Italy; ⁴ INPE, Sao Jose dos Campos, Brazil; ⁵ UFSC, Sao Paulo, Brazil; ⁶ NIFESP, Sao Paulo, Brazil; ⁷ SUPSI, Mendrisio, Switzerland; ⁸ EURAC, Bolzano, Italy; ⁹ University degli Studi Milan, Milan, Italy; ¹⁰ SERIS, Singapore, Singapore; ¹¹ University de la Republica LES, Montevideo, Uruguay; ¹² Solar PI, Derry, United Kingdom; ¹³ University Rome Tor Vergata, Rome, Italy; ¹⁴ PVLAB Germany, Potsdam, Germany

3DO.18.2 A Comparison of Direct Sunlight Method and Sunlight Simulator for Measuring PV Module Power

Frank Weinrich¹, Stefan Riechelmann¹, Stefan Winter¹

¹ PTB, Braunschweig, Germany

3DO.18.3 A New Non-Destructive Method to Quantify the Antireflective Properties of PV Modules

Julien Dupuis¹, Christine Abdel Nour¹, Lorena Hernandez da Silva Leme¹

¹ EDF R&D, Moret Loing et Orvanne, France



3DO.18.4 Improving Photovoltaic System Modeling with High-Accuracy Measurement of the Incidence Angle Modifier

Todd Karin¹, Jean-Nicolas Jaubert¹

¹ Kiwa PVEL, Napa, United States of America

3DO.18.5 How to Deal with Agile Metastable Effects on Current Cell - Respectively Module Architectures

Alexandra Schmid¹, Ulli Kräling¹, Daniel Philipp¹

¹ Fraunhofer ISE, Freiburg, Germany

3DO.18.6 Power Rating of PV Modules – An International Round-Robin Comparison on G-T Power Matrix Measurements in Accordance with IEC 61853-1

Giorgio Bardizza¹, Werner Herrmann², Alexandra Schmid³, Michael Raurer³, Giovanni Bellenda⁴, Gabriele Friesen⁴, Chencheng Xu⁵, Stefan Riechelmann⁶, Hendrik Sträter⁶, Stefan Winter⁶, Hanna Ellis⁷, Diego Pavanello⁷, Harald Müllejjans⁷

¹ TÜV Rheinland Italy, Milan, Italy; ² TÜV Rheinland Solar, Cologne, Germany; ³ Fraunhofer ISE, Freiburg, Germany; ⁴ SUPSI, Mendrisio, Switzerland; ⁵ ISFH, Emmerthal, Germany; ⁶ PTB, Braunschweig, Germany; ⁷ European Commission JRC, Ispra, Italy

VISUAL PRESENTATIONS 5DV.3

13:30 - 15:00 Grid Integration and Flexibility Enablers | Scenarios for Renewables, Policy, Resilience, Global Challenges | Costs, Economics, Finance and Markets | Societal Challenges; Citizens' Participation, Awareness

Chairpersons: Philippe Malbranche
Solar Action, Le Bourget-du-Lac, France
Izumi Kaizuka
RTS Corporation, Tokyo, Japan
Ana Belen Cristóbal
UPM, Madrid, Spain
Elham Shirazi (i)
University of Twente, Enschede, The Netherlands

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

PANEL DISCUSSION PRESENTATIONS

13:30 - 15:00

Chairpersons:

DO.13 Floating PV: Calm Waters or Stormy Seas?

Thomas Reindl
SERIS, Singapore

Floating PV (FPV) is widely seen as the 3rd pillar of the solar industry, after ground-mounted and rooftop solar. By the end of 2025, around 11 GWp have been installed cumulatively. While not small, it is still a niche application when compared to the ~3 TWp of global installed PV capacity. Nevertheless, the potential for FPV is enormous. SERIS has recently published reports detailing global potentials for onshore and for near- and offshore FPV, respectively. The possibilities are in the multi-Terawatt range for both onshore and for near-/offshore. Against this backdrop, our expert panelists from the research and industrial sectors will shed light on what are the barriers for a wider adoption and what needs to concretely happen to unlock this huge potential. The issues typically range from bankability to still evolving technology, unclear performance, unknown environmental impacts, and logistics in remote areas. For offshore FPV, the challenges are aggravated by the stronger dynamic forces from wind & waves, higher salinity levels and biofouling. Ultimately, it's the techno-economics of FPV that will make the difference and will determine whether the technology rises out of its niche and eventually becomes mainstream.

This panel discussion will bring together leading experts to examine the opportunities, challenges, and market outlook for Floating PV. Topics will include technology development, project economics, environmental considerations, and investment perspectives, with a particular focus on one key question: What will it take for Floating PV to move from a niche application to a mainstream segment of the global solar industry?

Panelist 1 - Jan Kroon, TNO, The Netherlands

Panelist 2 - Sara Mirbagheri Golroodbari, Utrecht University, The Netherlands

Panelist 3 - Michele Tagliapietra, BayWa r.e., Italy

Panelist 4 - Josefine Helene Selj, IFE, Norway

Panelist 5 - Don Hoogendoorn, SolarDuck, The Netherlands

Panelist 6 - TBC



ORAL PRESENTATIONS 4DO.4

15:15 - 16:45 Agrivoltaic Systems: Design, Monitoring and Digital Modelling

Chairpersons: Carmen Alonso-García
CIEMAT, Madrid, Spain
Silvia Ma Lu
Mälardalen University, Västerås, Sweden

4DO.4.1 Introductory Presentation: Vertical Agrivoltaic Systems Support Crop Growth

Erlend Hustad Honningdalsnes¹, Erik Stensrud Marstein¹, Helge Bonesmo², Dag Lindholm¹, Jonathan Rizzi³, Heine Nygard Riise¹
¹ IFE, Kjeller, Norway; ² NIBIO, Trondheim, Norway; ³ NIBIO, Ås, Norway

4DO.4.2 The Power of Agrivoltaic Control Systems to Achieve Required Crop Yield Limits

Leonhard Gfuellner¹, Matthew Berwind¹, Maddalena Bruno¹
¹ Fraunhofer ISE, Freiburg, Germany

4DO.4.3 Modelling Heat and Mass Transfer in Open-Field Agrivoltaic Orchards: A Tool to Estimate Temperature Distribution

Marta Amorós-Trepat¹, Odysseas Alexandros Katsikogiannis¹, Rudi Santbergen¹, Olindo Isabella¹, Hesari Ziar¹
¹ TU Delft, Delft, The Netherlands

4DO.4.4 Student Awards Finalist Presentation: Leveraging CFD and ML to Predict Convection and Air Temperature within Photovoltaic Power Plants

Joseph Vernier¹, Baptiste Berlioux², Baptiste Amiot¹, Sylvain Edouard³, Eric Dupont¹, Vincent Trotin⁴, Didier Combes³, Patrick Massin¹
¹ CERE, Champs-sur-Marne, France; ² CETHIL, Lusignan, France; ³ INRAE, Lusignan, France; ⁴ EDF PS, Nanterre, France

4DO.4.5 Precipitation Model for Land Based PV Systems

Anna Carr¹, Latifa El Boujdaini¹, Bas Van Aken¹
¹ TNO Energy Transition, Petten, The Netherlands

ORAL PRESENTATIONS 5DO.14

15:15 - 16:45 Environmental Impact and Sustainability; Life Cycle Analysis

Chairpersons: Claire Agraffail
CEA, Le Bourget-du-Lac, France
Garvin Heath
National Laboratory of the Rockies, Golden, United States of America

5DO.14.1 Relocating Photovoltaic Manufacturing to Europe: A Necessary but Insufficient Condition for Sustainable Photovoltaics by 2050

Déborah Moerlen¹, Nouha Gazbour¹
¹ CEA / INES, Le Bourget-du-Lac, France

5DO.14.2 Environmental Impacts of Repowering Across European Solar Farms

Kyle Richard Affleck¹, Bethany L. Willis¹, Sophie L. Pain², John D. Murphy², Nicholas E. Grant³, Ruy Sebastian Bonilla⁴, Antonio Saponaro⁵, Neil S. Beattie¹

¹ Northumbria University, Newcastle upon Tyne, United Kingdom; ² University of Birmingham, Birmingham, United Kingdom; ³ University of Warwick, Warwick, United Kingdom; ⁴ University of Oxford, Oxford, United Kingdom; ⁵ Island Green Power, London, United Kingdom

5DO.14.3 Conceptual Engineering and Environmental Trade-offs of 3 GW Perovskite-Silicon Tandem Module Manufacturing

Julian Reichle¹, Mehul Raval¹, Markus Beck¹, Wolfgang Jooss¹, Peter Fath¹
¹ RCT Solutions, Konstanz, Germany

5DO.14.4 Key Drivers of Low Environmental Impact Triple-Junction Perovskite/Perovskite/Silicon Tandem Modules at Industrial-Scale Manufacturing

Alejandra Galarza¹, Sebastian Nold², Lars Oberbeck³
¹ IPVF, Palaiseau, France; ² Fraunhofer ISE, Freiburg, Germany; ³ TotalEnergies OneTech, Paris, France

5DO.14.5 A Comparative Life Cycle Assessment of Alternative Agrivoltaic System Configurations

Maria Anna Cusenza¹, Andrea Danelli¹, Sofia Spagnolo¹, Pierpaolo Girardi¹
¹ Research on Energy System, Milan, Italy

5DO.14.6 Circularity Evaluation for Agrivoltaic Support Structures: A MIVES-based Comparison of Galvanized Steel and Timber

Angel Campos-González¹, Marcel Macarulla², Irene Josa³, Santiago Gassó-Domingo¹
¹ UPC, Barcelona, Spain; ² Polytechnic University of Catalonia, Barcelona, Spain; ³ University College London, London, United Kingdom

ORAL PRESENTATIONS 5DO.19

15:15 - 16:45 PV in the Electricity Grid

Chairpersons: Elham Shirazi
University of Twente, Enschede, The Netherlands
Fatima-Zahra Ouchani (i)
Green Energy Park, Benguerir, Morocco

5DO.19.1 Risk-Averse Bidding for Stand-Alone Photovoltaic Power Plants in the Balancing Market Based on Time-Series Decomposition

Jindan Cui¹, Yuzuru Ueda¹
¹ Tokyo University of Science, Tokyo, Japan

5DO.19.2 Comparative Analysis of Regional PV Production Models: from Regional to Municipality Resolution

Mohamed Ennhi¹, Alessia Boccalatte¹, Stéphan Plassart², Boris Nérot¹, Martin Thebault¹
¹ LOCIE, Le Bourget-du-Lac, France; ² LISTIC, Annecy-le-Vieux, France



5DO.19.3 Effects of Power Consumption Temporal Resolution on Photovoltaic Hosting Capacity Studies in Nordic Distribution Grids

Lauri Aaltonen¹, Kari Lappalainen¹

¹ Tampere University, Tampere, Finland

5DO.19.4 Nowcasting of Austrians PV Power Plants based on Satellite Image Data

Stefan Übermayer¹, Fabian Leimgruber¹, Mufaddal Kapasi², Robert Höller²

¹ AIT, Vienna, Austria; ² FH Oberösterreich, Wels, Austria

5DO.19.5 Firm Power Generation 2026

Jan Remund¹, Richard Perez², Marc Perez³

¹ Meteotest, Bern, Switzerland; ² SUNY, Albany NY, United States of America; ³ Clean Power Research, Napa CA, United States of America

5DO.19.6 Assessing Electric Vehicles as Distributed Storage for Photovoltaic Integration in Workplace Environments: A Seasonal Analysis

Siwoo Lee¹, Carlos Meza¹, Matthias Ebert²

¹ Anhalt University of Applied Sciences, Köthen, Germany; ² Fraunhofer IMWS, Halle (Saale), Germany

VISUAL PRESENTATIONS 4DV.4

15:15 - 16:45 Advances in PV Performance and O&M: Bridging Research with Field Practices

Chairpersons: Alessandro Virtuani

CSEM, Neuchâtel, Switzerland

Gisele A. dos Reis Benatto

DTU, Roskilde, Denmark

Marie Syre Wiig

Institute for Energy Technology, Kjeller, Norway

Detailed information on this session is presented in the section entitled 'EU PVSEC 2026 Visual Presentations'.

ORAL PRESENTATIONS

15:15 - 16:45 Late News.9

ORAL PRESENTATIONS 4DO.5

17:00 - 18:30 Agrivoltaics: Crop Performance, Materials, Field Experiments and Applications

Chairpersons: Alessandra Scognamiglio

ENEA, Portici, Italy

Anatoli Chatzipanagi

European Commission JRC, Ispra, Italy

4DO.5.1 Assessing the Impact of Transmittance and Light Scattering on Lettuce Growth under c-Si PV Modules for Agrivoltaics: from Prototyping to Outdoor Testing

Marco Memminger¹, Alessandro Minini¹, Bouchra El Omari¹, Pietro Raffaelli¹, Enrico Dalla Maria¹, Alvaro De Gruijter Eguiluz¹, Jordi Veirman¹, Luis Fialho¹

¹ EURAC Research, Bolzano, Italy

4DO.5.2 Agrivoltaics in a Mediterranean Vineyard: First-Season Evidence for Synergistic Energy Gains and Maintained Grapevine Performance

Marco Ernst¹, Billy Xynas², Arjun Pandey², Christopher Jones¹, Chris Barnes², Sabine Tausz-Posch²

¹ ANU, Canberra, Australia; ² University of Melbourne, Melbourne, Australia

4DO.5.3 Semi-transparent Blue, Red, and Magenta Thin-film PV Modules in Agrivoltaics: Insights from Basil Cultivation

Silvia Ma Lu¹, Reyhaneh Gorji¹, Arash Khosravi¹, Giovanni Urso², Simone Coluccia³, Pietro Elia Campana¹

¹ Mälardalen University, Västerås, Sweden; ² University of Palermo, Palermo, Italy; ³ University of Naples Federico II, Naples, Italy

4DO.5.4 Optimizing Agrivoltaic Systems in the Netherlands: A Design Framework for CIGS Technology Integration

Marios Mechilis¹, Sara Mirbagheri Golroodbari¹, Pita Verweij¹, Wilfried van Sark¹

¹ Utrecht University, Utrecht, The Netherlands

4DO.5.5 AGRIPV with Cattle and Single-Axis Trackers

Ricardo Nery de Castro¹, Victor Eduardo Cauvilla de Oliveira¹

¹ FIT Nextpower, Sorocaba, Brazil

4DO.5.6 Experimental Evidence for Improved Vegetation Growth in Dense PV Systems by Using Optical Elements

R.O. Apaydin¹, A.R. Burgers¹, B.B. Van Aken¹, F.F. van der Zee², E.M. de Goede², S. Leone³, S. De Boer⁴, I. Cesar¹

¹ TNO, Petten, The Netherlands; ² Wageningen University Research, Wageningen, The Netherlands; ³ Novar, Groningen, The Netherlands; ⁴ Pyrasied, Leeuwarden, The Netherlands



ORAL PRESENTATIONS 4DO.10

17:00 - 18:30 Environmental Impacts on PV Systems Performance and O&M

Chairpersons: Stephanie Malik
Fraunhofer CSP, Halle (Saale), Germany
Erik Stensrud Marstein
Institute for Energy Technology, Kjeller, Norway

4DO.10.1 Extreme Weather Events: Impact, Risks and Research Perspectives

Alireza Khaksar¹, Mounir Abraim², Abdellatif Ghennioui², Leonardo Micheli¹

¹ Sapienza University of Rome, Rome, Italy; ² Green Energy Park, Ben Guerir, Morocco

4DO.10.2 Optimized Machine Learning Framework for Predicting Photovoltaic Soiling in Arid Desert Climates

Usman Zafar¹, Dhanup Somasekharan Pillai¹, Mohamed Abdelrahim¹, Farhat Mahmood¹, Tareq A. Al-Ansari¹, Brahim Aissa¹

¹ QEERI, Doha, Qatar

4DO.10.3 Multi-Year Performance, Soiling and Ageing Assessment of a 14 MW Floating PV Plant Using Multi-Scale Diagnostics

Hervé Colin¹, Lionel Sicot¹, Frédéric Mezzasalma¹, Alexandre Mignonac¹, Ioannis (John) A. Tsanakas¹

¹ CEA / INES, Le Bourget-du-Lac, France

4DO.10.4 From Droppings to Losses: a Statistical Framework for Bird Soiling Losses on Floating PV Systems

Maarten Dörenkämper¹, Khalid Baig¹, Marcus Reitz¹, Minne de Jong¹, Jan Kroon¹

¹ TNO, Eindhoven, The Netherlands

4DO.10.5 Improving Snow Loss Modeling for PV Systems Using Hybrid Deep Learning Methods

Shuo Wang¹, Mayur Patel¹, Hugo Medina Huerta¹, Juha A. Karhu², Anders V. Lindfors², Mari Benedikte Øgaard³, Mattias Lindh⁴, Alexander Granlund⁵, Samuli Ranta¹

¹ TUAS, Turku, Finland; ² Finnish Meteorological Institute, Helsinki, Finland; ³ IFE, Kjeller, Norway; ⁴ RISE, Umeå, Sweden; ⁵ RISE, Piteå, Sweden

4DO.10.6 Alternative PV System Designs to Tackle Snow and Wind in High Latitude Conditions: Empirical First Winter Results from Northern Sweden

Mattias Lindh¹, Atse Louwen¹, Alexander Granlund², Gabriel Sabau³, Anna Malou Petersson², Robin Andersson⁴

¹ RISE, Umeå, Sweden; ² RISE, Piteå, Sweden; ³ RISE, Borås, Sweden; ⁴ Luleå University of Technology, Luleå, Sweden

ORAL PRESENTATIONS 5DO.15

17:00 - 18:30 Circular Economy and Waste Streams of PV Modules

Chairpersons: Wolfram Palitzsch
LuxChemtech, Freiberg, Germany
Déborah Moerlen
CEA, Le Bourget-du-Lac, France

5DO.15.1 Development of a Dashboard for Exploring PV Waste Stream Scenarios in Europe

Anna Rebecca Siemer¹, Stefan N. Grösser¹

¹ Bern University of Applied Sciences, Biel, Switzerland

5DO.15.2 A Data-Driven Approach to Forecasting End-of-Life Photovoltaic Module Waste

Michael Straub-Mück¹, Andreas W. Rathgeber¹

¹ University of Augsburg, Augsburg, Germany

5DO.15.3 Silicon Recovery from PV Panel End-of-Life: Towards More Closing Loop Scenarios

Mattia Gianvincenzi¹, Enrica Leccisi¹, Concetta Lodato¹, Fabrice Mathieux¹

¹ European Commission JRC, Ispra, Italy

5DO.15.4 From Throughput to Value Retention: a KPI-based Sustainability Assessment Framework for PV Recycling Technologies

Ferozan Azizi¹, Josefina Ottitsch², Sonja Feldbacher³, Anika Gassner⁴, Gabriele Eder⁴, Milutin Bjelic¹, Roland Furbacher², Daniel Schwabl⁵, Daniel Forstner⁶, Ewald Perndorfer⁷, Thomas Nigl¹

¹ Technical University of Leoben, Leoben, Austria; ² Technical University of Vienna, Vienna, Austria; ³ PCCL, Leoben, Austria; ⁴ OFI, Vienna, Austria; ⁵ Circulyzer, Niklasdorf, Austria; ⁶ MGG Müller Guttenbrunn, Amstetten, Austria; ⁷ Perndorfer Maschinenbau, Kallham, Austria

5DO.15.5 Assessment of Allowed Economic and Environmental Thresholds for Delamination-based PV Recycling

Elina Bosch¹, Ian Kenchington¹, Philippe Macé¹, Gaëtan Masson¹

¹ Becquerel Institute, Brussels, Belgium

5DO.15.6 Who Pays, Who Collects, Who Enforces? End-of-Life PV Regulation Across 63 Jurisdictions

Penelope Crossley¹

¹ The University of Sydney Law School, Sydney, Australia



ORAL PRESENTATIONS 3DO.20

17:00 - 18:30 Thermal Performance of PV Modules in Operation

Chairpersons: Hanna Ellis
European Commission JRC, Ispra, Italy
Juan Lopez-Garcia
STS-Certified, Boadilla del Monte, Spain

3DO.20.1 High-Irradiance PV Modules Performance: Experimental Insights and Implications for Design

Anelise Medeiros Pires¹, Marília Braga¹, Ana Carolina Oliveira Machado¹,
Thamires Alves Silva¹, Ícaro Eiras da Cunha¹, Helena Flávia Napolini¹,
Ricardo Rütther¹

¹ UFSC, Florianópolis, Brazil

3DO.20.2 Evolution of Temperature Coefficients in Degraded PV Modules: Evidence from Long-term High-Precision Field Monitoring

Andreas Schneider¹, Thomas Nierhoff¹

¹ University of Applied Sciences Gelsenkirchen, Gelsenkirchen, Germany

3DO.20.3 Impact of Photovoltaic Module Degradation on the Temperature Coefficients

Christine Abdel Nour¹, Julien Dupuis¹, Daniel Ory², Tom Chargos¹, Paul
Lefillastre³

¹ EDF R&D, Moret Loing et Orvanne, France; ² EDF R&D, Palaiseau, France; ³ EDF Power
Solutions, Nanterre, France

3DO.20.4 Nominal Module Operating Temperature of TOPCon, HJT and Back-Contact Photovoltaic Modules: Experimental and Model-Based Comparative Analysis

Jun Wu¹, Jun Wang¹, Yuanjie Yu¹

¹ Canadian Solar, Suzhou, China

3DO.20.5 First Results from a Rooftop Mock-up Covered with PV Panels for Temperature Flux Measurements

Michael Schrempf¹, Stefan Riechelmann¹

¹ PTB, Braunschweig, Germany

3DO.20.6 Albedo-Dependent Thermal Modeling of Bifacial PV Modules

Aline Kirsten Vidal de Oliveira¹, Isadora Maciel Queiroz¹, Marília Braga¹,
Helena Flávia Napolini¹, Ricardo Rütther¹

¹ UFSC, Florianópolis, Brazil

OTHER PRESENTATIONS

17:00 - 18:30 Poster Awards Winners Session

Friday, 18. September 2026

ORAL PRESENTATIONS 5EO.1

08:30 - 10:00 PV Markets, Value of Storage and Manufacturing Economics

Chairpersons: Izumi Kaizuka
RTS Corporation, Tokyo, Japan
Nabih Cherradi
Desert Technologies, Pully, Switzerland

5EO.1.1 A Snapshot of the Global PV Market – 2025

Gaetan Masson¹, Melodie de l'Epine¹, Arnulf Jäger-Waldau², Izumi Kaizuka³,
Johan Lindahl⁴, José Donoso⁵

¹ IEA PVPS Task 1, Brussels, Belgium; ² European Commission JRC, Ispra, Italy; ³ RTS
Corporation, Tokyo, Japan; ⁴ Becquerel Sweden, Stockholm, Sweden; ⁵ UNEF, Madrid,
Spain

5EO.1.2 Energy Storage and Vertical Installation as Potential Answer to Societal Challenges: Cannibalisation, Soil Ecology and Grid Connection

Bas B. Van Aken¹, Latifa El Boujdaini¹, Ilkay Cesar¹

¹ TNO Energy Transition, Petten, The Netherlands

5EO.1.3 Framework for Back-testing PV+BESS Revenue Stacks Using Satellite-based Solar Resource and Historical Forecast Data

Daniel Chrkavy¹

¹ Solargis, Bratislava, Slovakia

5EO.1.4 A Decommissioning and Repowering Cost Model and a Modeling Framework for Operating Utility-Scale PV Systems

Hanan Wehbi¹, Joseph Simon¹, Heather Mirlitz¹, Silvana Ovatt¹, Brian
Mirlitz¹, Matthew Prilliman¹, Garvin Heath¹, Chris Deline¹, Jal Desai¹, Cara
Libby², Robin Bedilion², Anand Kumar²

¹ NLR, Golden, United States of America; ² EPRI, Palo Alto, United States of America

5EO.1.5 Cost Drivers & Manufacturing Pathways for Shingled Integrated Solar PV Modules in Europe

Juan Ignacio Martinez¹, Philippe Macé², José María Vega de Seoane¹,
Torsten Rößler³, Mehdi Sahli⁴, Maria Planells Valencia⁵, Gaétan Carrier⁶,
John Morello⁶

¹ Becquerel Institute Spain, San Sebastian, Spain; ² Becquerel Institute, Brussels, Belgium; ³
Fraunhofer ISE, Freiburg, Germany; ⁴ Voltec Solar, Dinsheim-sur-Bruche, France; ⁵ Heliup,
Chambéry, France; ⁶ Fresuns, Vaud, Switzerland

5EO.1.6 All-Perovskite Tandem Manufacturing Cost at Gigawatt Scale

Matthew Hull¹, Lian Duan², Van-Son Nguyen², Iwan Zimmermann², Lars
Oberbeck³, Sebastien Lizin¹

¹ Hasselt University, Hasselt, Belgium; ² IPVF, Palaiseau, France; ³ TotalEnergies, Paris La
Défense, France



ORAL PRESENTATIONS 4EO.2

08:30 - 10:00 Floating PV “Offshore”; VIPV; Space PV; CPV

Chairpersons: Bonna Newman
Lightyear, Helmond, The Netherlands
Ignacio Antón Hernández
UPM, Madrid, Spain

4EO.2.1 Thermal Resistive Model for Offshore Floating PV Systems

Sathya Shanka Vasuki¹, Aryeshah Akbar¹, Ioannis Patokas¹, Teddy Simanjuntak², Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands; ² Shell Global Solutions International, Amsterdam, The Netherlands

4EO.2.2 Effect of Waves on the Electrical Performance of an Offshore Floating Solar Pilot System at the North Sea

Mirza Khalid Baig¹, Minne M. de Jong¹, Maarten Dörenkämper¹

¹ TNO, Eindhoven, The Netherlands

4EO.2.3 Benchmark of VIPV Versus Static PV

Lenneke H. Slooff¹, Anna J. Carr¹, Rene van Gijlswijk²

¹ TNO Energy Transition, Petten, The Netherlands; ² TNO Mobility and Built Environment, The Hague, The Netherlands

4EO.2.4 Asymmetric Concentration of Diffuse Light for Photovoltaic Applications

Jelle Westerhof¹, Casper van den Berg¹, Mathis Van de Voorde¹, Jian-Yao Zheng¹, Lisanne Einhaus¹, Rebecca Saive¹

¹ University of Twente, Enschede, The Netherlands

4EO.2.5 Radiation Tolerant Ultrathin InP Solar Cells with Rear Reflectors for Space Applications

Toluwalase Agoro¹, Venkata Chaluvadi¹, Stefan Diesing², James Shin¹, Iwan Davies³, Louise Hirst¹

¹ University of Cambridge, Cambridge, United Kingdom; ² University of Sheffield, Sheffield, United Kingdom; ³ IQE, Cardiff, United Kingdom

4EO.2.6 Impact of Reverse Current on CPV Module Degradation

Elizabeth M. Hagemann¹, Frederik J. Vorster¹, E. Ernest van Dyk¹

¹ Nelson Mandela University, Port Elizabeth, South Africa

ORAL PRESENTATIONS 5EO.3

08:30 - 10:00 Photovoltaics for and with Society

Chairpersons: Silvia Caneva
WIP Renewable Energies, Munich, Germany
Elina Bosch
Becquerel Institute, Genval, Belgium

5EO.3.1 Gender Diversity in Photovoltaics: Experiences and Support Mechanisms in the EU

Pinar Derin Gure¹, Ezgi Pehlivanli¹, Chiara Busto², Niki Fodor³, Ivan Gordon⁴, Ulrike Jahn⁵, Perine Fluery⁶, Ioannis Tsanakas⁷, Busra Yilmaz⁸, Delfina Munoz⁷, Eren Cihan Gülsoy¹, Rita Ebner⁹, Hande Eryilmaz¹⁰

¹ METU, Ankara, Türkiye; ² Eni, Rome, Italy; ³ SolarPower Europe, Brussels, Belgium; ⁴ imec, Leuven, Belgium; ⁵ Fraunhofer CSP, Halle, Germany; ⁶ Biosphere Solar, Rotterdam, The Netherlands; ⁷ CEA, Paris, France; ⁸ Kameleon Solar, Roosendaal, The Netherlands; ⁹ AIT, Vienna, Austria; ¹⁰ ODTÜ-GÜNAM, Ankara, Türkiye

5EO.3.2 Potential-Normalized Rooftop PV Adoption Reveals Persistent Equity Gaps

Lamprini Papargyri¹

¹ Stanford University, Stanford, United States of America

5EO.3.3 Changing the Paradigm: Lessons Learned from Establishing a Rooftop Photovoltaic System Crowdsourced by Local Neighbours at a Spanish School

Ana Belen Cristóbal¹, Luis Miguel Carrasco¹, Luis Narvarte¹, Genoveva Lopez², Laura Feijoo², Mario Sánchez-Herrer²

¹ UPM, Madrid, Spain; ² Ecooo, Madrid, Spain

5EO.3.4 From Labs to Labour Market: Educating the Next Generation of Solar-PV Professionals in SolarNL

Renee Heller¹, Ruud Bakker¹, Elgin Blankwater¹, Yannick Busser², Fallon Colberts³, Ferrie van Hattum², Bas Kluit¹, Arnette Overweel-Vogelaar⁴

¹ Amsterdam University of Applied Sciences, Amsterdam, The Netherlands; ² Saxion University of Applied Sciences, Enschede, The Netherlands; ³ Zuyd University of Applied Sciences, Heerlen, The Netherlands; ⁴ Hanze University of Applied Sciences, Groningen, The Netherlands

5EO.3.5 Testing Multi-Level Co-Design Approaches in Agrivoltaic Systems: Learnings from the Symbiosyst Research Project

Paolo Picchi¹, Lucia Montoni¹, Gaetano Calise¹, Silvia Tomasi², Angela Grassi¹, Pascal Vullo³, Anna Maria Gras⁴, Marcel Macarulla Marti⁴, Giovanni Borz², Federica Colucci⁵, Agata Buscemi⁶, Alessandra Scognamiglio⁷

¹ ETA Florence, Florence, Italy; ² Eurac Research, Bolzano, Italy; ³ Südtiroler Bauernbund, Bolzano, Italy; ⁴ UPC, Barcelona, Spain; ⁵ ENEA, Rome, Italy; ⁶ B2B Arquitectes, Barcelona, Spain; ⁷ ENEA, Naples, Italy



5EO.3.6 Student Awards Finalist Presentation: Conceptualization and Implementation of an Automated Pipeline for Big Data Analysis of Vocal Minority vs. Silent Majority in Social Media Discourse on the Energy Transition using Machine Learning

Jannik Achenbach¹, Eva-Maria Grommes¹, Valérie Varney¹

¹ University of Applied Sciences Cologne, Cologne, Germany

PLENARY PRESENTATIONS EP.1

10:30 - 12:30 Reliable PV Everywhere

Chairpersons: Alessandro Virtuani
CSEM, Neuchâtel, Switzerland
Claudia Buerhop-Lutz
HI ERN, Erlangen, Germany

EP.1.1 What do PV Module Warranties Reveal about Reliability? Insights from Financial Disclosures and Independent Testing

Bert Herteleer¹, Silvana Ovatt²

¹ SUPSI, Mendrisio, Switzerland; ² NLR, Golden, United States of America

EP.1.2 IEA PVPS Task 13 Highlights - Extreme Weather, Multiple Use, Failure Modes, and Energy Security

Ulrike Jahn¹

¹ Fraunhofer CSP, Halle (Saale), Germany

EP.1.3 Reframing PV Inspections at Scale: Techno-Economic Benchmarking and a Roadmap for Intelligent PV O&M and Market Transformation

Ioannis (John) A. Tsanakas¹, David Moser², Dhanup S. Pillai³, Juan Lopez Garcia⁴, Veronica Bermudez Benito⁵

¹ CEA / INES, Le Bourget-du-Lac, France; ² Becquerel Institute Italia, Trento, Italy; ³ QEERI, Doha, Qatar; ⁴ Senergy Technical Services, Lyon, France; ⁵ Berbetin, Saint-Malo, France

EP.1.4 Global Assessment of Wave-Induced Losses for Offshore Floating PV using the SWIFT Surrogate Model

Sathya Shanka Vasuki¹, Teddy Simanjuntak², Olindo Isabella¹, Rudi Santbergen¹

¹ TU Delft, Delft, The Netherlands; ² Shell Global Solutions International, Amsterdam, The Netherlands

EP.1.5 The Italian PNRR Funding Programme for Agrivoltaics: Overview, Preliminary Results and Future Perspectives

Alessandra Scognamiglio¹

¹ ENEA, Portici, Italy

EP.1.6 From Energy Access to Green Industrialisation: PV Partnerships with Africa and the Global South

Caroline Nijland¹

¹ Helios Infinitas, Amersfoort, The Netherlands

12:30 – 13:30 CONFERENCE CLOSING

Welcome to the Closing Session

Highlights of the Conference

Ceremony of the Student Awards

Ceremony of the Poster Awards

Announcement upcoming PV Events



EU PVSEC 2026 VISUAL PRESENTATIONS

Monday, 14. September 2026

VISUAL PRESENTATIONS 3AV.1

13:30 - 15:00 PV Module Design and Manufacturing

Chairpersons: Sonja Feldbacher
 CCCL, Leoben, Austria
 Veronica Bermudez Benito
 BERBETIN, Antibes, France
 Ralf Preu (i)
 Fraunhofer ISE, Freiburg, Germany

3AV.1.1 Light Transmitting Conductive Substrate for Bifacial Back-Contact Modules

Nicolas Guillemin¹, Eelko Hoek¹, Jan Kroon¹

¹ TNO Solar Energy, Petten, The Netherlands

3AV.1.2 Investigation of Polybutadiene as a Co-Reagent for the Peroxide Crosslinking of Photovoltaic Encapsulants

Michael Wendt¹, Lionel Riou², Pauline Vitoux², Megan Casey², Anton Mordvinkin¹, Robert Heidrich¹

¹ Fraunhofer CSP, Halle (Saale), Germany; ² TotalEnergies Cray Valley, Saint-Avoid Cedex, France

3AV.1.3 Thermoplastic Busbars – Reversible Low Temperature Interconnection for Solar Cells

Fabian Glaum¹, Tillman Finger¹, Norbert Willenbacher¹

¹ KIT, Karlsruhe, Germany

3AV.1.4 Water-based Fluxes for Cu + Ag Metallization

Karl Wienands¹, Tobias Messmer¹, Markus Geßner², Andre Bremser²

¹ International Solar Energy Research Center Konstanz, Constance, Germany; ² Emil Otto Flux- und Oberflächentechnik, Eltville, Germany

3AV.1.5 Encapsulant Selection and Accelerated Lamination for TOPCon PV Modules: from Material Screening to Full-Size Validation

Aksel Kaan Öz¹, Christine Wellens¹, Angelika Beinert¹, Meric Caliskan Arslan², Cansel Düz³, Martin Heinrich¹

¹ Fraunhofer ISE, Freiburg, Germany; ² Kalyon PV, Ankara, Türkiye; ³ Kalyon PV, Ankara, Germany

3AV.1.6 Mitigating Module Power Dispersion via Systematic Sorting Strategies

Soohyun Bae¹

¹ KIER, Daejeon, South Korea

3AV.1.7 Effect of Silicone Repair Coating on Degradation of PV Modules with Faulty Backsheet

Guy Beaucarne¹, Emmanuel Jadot¹, Berhane Darsene Dimd², Martin Bellmann², Sean McGibbon³, Jo Gjessing⁴

¹ Dow Silicones Belgium, Seneffe, Belgium; ² Sintef, Trondheim, Norway; ³ Scatec, Cape Town, South Africa; ⁴ Scatec, Oslo, Norway

3AV.1.8 Inkjet Printing for Mass Production of Perovskite Modules: High-Throughput Patterned Deposition and Enhanced Manufacturing Consistency

Tian Hou¹, Yuelong Huang¹, Yue Ma¹

¹ Huzhou Phoenixolar, Huzhou, China

3AV.1.9 Scalable Electrospun PVA/SiO₂ Nanofiber Mats Enabling Daytime Passive Radiative Cooling

Rameeja T. Abdul Rasheed¹, Sneha Mohanan¹, Akhil A. C.¹, Dhanya P. Jacob¹, Aldrin Antony¹

¹ Cochin University of Science and Technology, Ernakulam, India

3AV.1.10 Honeycomb-structured Light-Weight Photovoltaic Module with High Strength and Durability

Taiyufei Liu¹, Takuto Ikeda¹, Michio Kondo², Hiroyuki Wada¹

¹ Institute of Science Tokyo, Yokohama, Japan; ² Waseda University, Tokyo, Japan

3AV.1.11 Integrated Photovoltaic Façades for Industrial Buildings: Adhesion Approaches between Backsheet and Galvanized Steel

Nikolina Pervan¹, Lukas Geymayer², Martin Fleischanderl³, Hannes Kurz³, Gregor Kitzberger³, Friedrich Füreder-Kitzmüller³, Gernot Oreski¹

¹ Polymer Competence Center Leoben, Leoben, Austria; ² voestalpine Stahl, Linz, Austria; ³ voestalpine Stahl, Linz, Austria

3AV.1.12 Investigation of P1/P2/P3 Laser Patterning using Femtosecond and Nanosecond Regimes in Kesterite Thin-Film Solar Cells

Fernando Zahid Anguiano Olivares¹, D. Canteli², Cristina Muñoz García²,

David Muñoz Martín², Jacob Antonio Andrade Arvizu³, Victor Izquierdo Roca³, Pedro Vidal Fuentes³, Gilberto Gomez Rosas¹, Miguel Morales Furió², Carlos Molpeceres Álvarez²

¹ University of Guadalajara, Jalisco, Mexico; ² UPM, Madrid, Spain; ³ IREC, Barcelona, Spain

3AV.1.13 Ultrasonic Monitoring of Ethylene-Vinyl Acetate Encapsulants during Glass-Glass Module Lamination

Christopher Bruce Konu¹, Rico Meier¹

¹ HTW Berlin, Berlin, Germany

3AV.1.14 A Lamination-Stage Soldering Approach for Lead-Free, Low-Temperature Cell Interconnection: Towards Industrially Relevant Interconnection Solutions

Raphael Shanmugam¹, M. Ignacia Devoto Acevedo¹, Jonas Buddgard², Torgny Lagerstedt², Anirudh Ingishetty², Abhinav Mulasi², Tobias Meßmer¹

¹ ISC Konstanz, Konstanz, Germany; ² Sticky Solar Power, Sollentuna, Germany

3AV.1.15 A Self-Healing and Self-Cleaning Transparent Coating for Photovoltaic Solar Panels

Mehmet Bilgehan Bilgic¹, Ceylan Zafer¹

¹ Ege University, Izmir, Türkiye

3AV.1.16 Cost of Ownership Comparison of 3-cut and Shingled Modules with Standard TOPCon Half-cut PV Modules

Sraisth Sraisth¹, Julian Reichle¹, Hardik Gohil², Mehul Raval¹, Markus Beck¹, Xinyang Li³, Ehtesham Anwer⁴, Wolfgang Jooss¹

¹ RCT Solutions, Constance, Germany; ² RCT Solutions India, Hyderabad, India; ³ Wuhan RCT PV Technology, Wuhan, Germany; ⁴ RCT Solutions India, Hyderabad, Germany



- 3AV.1.17 Design and Manufacture of Hybrid Photovoltaic Thermal Module using Aluminium Tube Based Thermal Absorber**
Paulius Laurikėnas¹, Julius Denafas¹, Povilas Lukinskas¹, Pal Tetlie², Martin Bellmann², Yijiang Xu²
¹ SoliTek R&D, Vilnius, Lithuania; ² SINTEF Industry, Trondheim, Norway
- 3AV.1.18 Understanding and Mitigating Encapsulation-Induced Voltage Losses in Perovskite Solar Modules**
Yves Abou Khalil¹, Cynthia Farha¹, Mathis Duploux¹, Van Son Nguyen¹, Liam Gollino¹, Marion Provost¹, Thomas Guillemot¹, Jean Rousset², Karim Medjoubi¹
¹ IPVF, Palaiseau, France; ² EDF, Palaiseau, France
- 3AV.1.19 Platform for Process Development for Glass Cutting, Glass Drilling, Glass-Glass and Glass-Metal welding on 1m² Substrates**
Stefan Bergfeld¹, Tsvetelina Merdzhanova²
¹ Aachen University of Applied Science, Jülich, Germany; ² FZJ, Jülich, Germany
- 3AV.1.20 Flexible Lamination Concepts for Durable CIGS Photovoltaic Modules**
Nikolina Pervan¹, Nikoleta Kyranaki², Casper van Kessel³, Dorrit Roosen-Melsen³, Michaël Daenen⁴, Gernot Oreski¹
¹ PCCL, Leoben, Austria; ² Hasselt University, Genk, Belgium; ³ TNO, Eindhoven, The Netherlands; ⁴ imec, Leuven, Belgium
- 3AV.1.21 New Developments of Transparent Polymer Materials in Frontsheet Films as Valid Alternative to Glass**
Alessandro Anderlini¹
¹ Coveme, Gorizia, Italy
- 3AV.1.22 Implementation of an Industrial Process for Interconnection of Busbarless IBC ZEBRA Cells using Ribbons with Electrically Conductive and Non-Conductive Adhesive Pads**
Tudor Timofte¹, Jolina Schmid¹, Simon Emmerich², Susana Soto³, Jean Philippe Aguerre³, Xabier Hernandez³, Maximilian Pospischil⁴, Andreas Dörflinger⁴, Jonas Albrecht⁴, Maximilian Weil⁴, Stephan Großer⁵, Giuseppe Galbiati⁶, Tobias Nitsche⁶, Daniel Buckland⁶, Joris Libal¹, Tobias Messmer¹
¹ ISC Konstanz, Konstanz, Germany; ² Mondragon Assembly, Radolfzell, Germany; ³ Mondragon Assembly, Aretxabaleta, Spain; ⁴ HighLine Technology, Freiburg, Germany; ⁵ Fraunhofer CSP, Halle (Saale), Germany; ⁶ Henkel, Düsseldorf, Germany
- 3AV.1.23 Multi-Wire Module Modeling, Measuring and More**
Jonathan Govaerts¹, Bart Reekmans¹, Hamed Javanbakht Lomeri¹, Tom Borgers¹, Mihir Mahajan¹, Valerie Depauw¹, Hariharsudan Sivaramakrishnan Radhakrishnan¹
¹ imec-EnergyVille-UHasselt, Genk, Belgium
- 3AV.1.24 Development of a Photovoltaic Facade Module**
Ringo Koepge¹, Matthias Pander¹, Sophia Jahreis¹, Nick Schröter¹, Paul Schenk¹, Ali Kanou¹, Wiebke Wirtz², Kevin Meyer², Henning Schulte-Huxel², Stephan Großer¹, Bengt Jaeckel¹
¹ Fraunhofer CSP, Halle (Saale), Germany; ² ISFH, Emmerthal, Germany

- 3AV.1.25 STOKED! Spectral Tuning and Optimized Kinetics via Energy Down-Shifting in PV Packaging**
Dana Kern¹, Peter Hacke¹, B. Edward Sartor¹, Matthew O. Reese¹, Emily Warren¹, David C. Miller¹
¹ NLR, Golden, United States of America

VISUAL PRESENTATIONS 3AV.2

- 15:15 - 16:45 PV Module Durability and Reliability**
Chairpersons: Paul Gebhardt
Fraunhofer ISE, Freiburg, Germany
Olatz Arriaga Arruti
CSEM, Neuchâtel, Switzerland
Ralph Gottschalg (i)
Fraunhofer CSP, Halle (Saale), Germany

- 3AV.2.1 Experimental Repair Technique for Glass Defects of Glass-glass Photovoltaic modules – A Performance Assessment**
Chris Heynen¹, Mathijs Tas², Maurice Goris³, Petra Manshanden⁴, Pim Broekhuizen², Ben Reijntjes⁵, Veronique Gevaerts⁴, Wilfried Van Sark¹
¹ Utrecht University, Utrecht, The Netherlands; ² Boldz, Amsterdam, The Netherlands; ³ TNO, Petten, The Netherlands; ⁴ TNO, Eindhoven, The Netherlands; ⁵ Glass Solution Windowfilm, Purmerend, The Netherlands
- 3AV.2.2 Country-Scale Monitoring of PV Soiling and Atmospheric Conditions: The Qatar Dust Atlas**
Brahim Aissa¹, Atef Zekri¹, Mohamed Abdellrahim¹, Mosab Subeh¹, Mohammad Hossain¹, Dhanup Somasekharan Pillai¹
¹ QEERI, Doha, Qatar
- 3AV.2.3 PVSPICE: Integration of Electrical Circuit Simulations for PV Degradation Simulations**
Norman Jost¹, Brandon K. Byford¹, Jennifer L. Braid², Clifford W. Hansen²
¹ Sandia National Laboratories, Albuquerque, United States of America; ² Sandia National Labs, Albuquerque, United States of America
- 3AV.2.4 UVID Test Results and Early Indicators**
Matthias Pander¹, Bengt Jaeckel¹
¹ Fraunhofer CSP, Halle (Saale), Germany
- 3AV.2.5 Determination of the Optical Properties of Encapsulants during UV Weathering Using a Four-Flux Model**
Rosa Zaigouche-Feldis¹, Mathieu Hebert², Maxime Darnon², Philippe Thony¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² LabHC, Saint-Etienne, France
- 3AV.2.6 UV-Induced Degradation of PV Modules: a Comparative Study of Light Spectra and Encapsulants**
Markus Babin¹, Yuliya Voronko², Gabriele C. Eder², Sune Thorsteinsson¹, Markus Feichtner³
¹ DTU, Roskilde, Denmark; ² OFI, Vienna, Austria; ³ Sonnenkraft, St. Veit/Glan, Austria



- 3AV.2.7 Evaluation of a Custom-built Integrated Setup for Microscopic Characterization of the Mechanical Stability of Flexible Perovskite Solar Cells**
Andreas Bartelt¹, Rico Meier¹
¹ University of Applied Science Berlin, Berlin, Germany
- 3AV.2.8 Outdoor Degradation Assessment from Field Measurements: Isolating Irreversible Degradation from Measured Performance Indicators**
Robinson Cavieres¹, Felipe Valencia¹
¹ ATAMOSTEC, Antofagasta, Chile
- 3AV.2.9 Indoor Characterizations of Modules made from Recycled Silicon**
Mickael Albaric¹, Etienne Pihan², Marion Serasset³, Guillaume Capron²
¹ CEA / INES, Le Bourget du Lac, France; ² CEA/INES, Le Bourget du Lac, France; ³ CEA/INES, Le Bourget du lac, France
- 3AV.2.10 NIR Spectroscopy and Chemometrics as a Tool for Non-Destructive Polymer Degradation Analysis in PV Modules**
Anika Gassner¹, Gabriele C. Eder¹, Benedikt Hufnagl², Vasilaki-Maria Archodoulaki³
¹ OFI, Vienna, Austria; ² Hufnagl Chemometrics, Mödling, Austria; ³ Vienna University of Technology, Vienna, Austria
- 3AV.2.11 PVcracks: Python Repository for Electroluminescence Image Processing, Current-voltage Curve Fitting and Power Loss Estimation**
Norman Jost¹, Brandon K. Byford¹, Rodrigo d. Prado Santamaria², Clifford W. Hansen¹, Jennifer L. Braid¹
¹ SNL, Albuquerque, United States of America; ² DTU, Roskilde, Denmark
- 3AV.2.12 Acceleration of Thermal Cycling Test for PV Modules**
Ebrar Özkalay¹, Anika Gassner², Gabriele C. Eder², Gabi Friesen¹, Markus Feichtner³
¹ SUPSI, Mendrisio, Switzerland; ² OFI, Vienna, Austria; ³ Sonnenkraft Energy, St.Veit a.d. Glan, Austria
- 3AV.2.13 Reliability Comparison of P-Type PERC and N-Type TOPCon PV Modules Based on IEC Testing and Encapsulation Materials**
San-Yu Ting¹, Yung-Jen Shyong¹, Sheng-Cong You¹, Min-An Tsai¹
¹ ITRI, Hsinchu, Taiwan
- 3AV.2.14 ReBEL Imaging to Understand Reverse Bias Breakdown Behaviour in Perovskite Devices**
Remi Aninat¹, Klaas Bakker¹, Jonathan Henzel¹, Mehrdad Najafi¹, Sjoerd Veenstra¹, Mirjam Theelen¹
¹ TNO, Eindhoven, The Netherlands
- 3AV.2.15 Lightweight SHJ Modules with Reduced Environmental Impact: an Iterative Approach of BOM Development and Validation**
Timea Bejat¹, Lison Marthey², Adeline Lanterne¹
¹ CEA-INES, Le Bourget du Lac, France; ² CSEM, Neuchâtel, Switzerland
- 3AV.2.16 New Encapsulants Polymers in Photovoltaic Modules**
Francesco Levi¹, Valeria Fiandra², Lucio Sannino², Concetta Andreozzi², Antonella De Maria², Paola Delli Veneri², Lucia Vittoria Mercaldo², Odda Ruiz de Ballesteros¹, Finizia Auriemma¹
¹ University of Naples Federico II, Naples, Italy; ² ENEA, Portici, Italy

- 3AV.2.17 Research on IEC Test Method to Assess Resistance of PV Modules to Foot Traffic During Installation or Maintenance**
Tong Yu¹
¹ Jinko Solar, Jiaxing, China
- 3AV.2.18 Usage, Market Trends, and Moisture Ingress Simulation of Edge Sealants for Photovoltaics Modules**
Ashish D. Rana¹, Nikoleta Kyranaki¹, Ismail Kaaya², Loic Guillemot³, Camille Bainier³, Michael Daenen⁴
¹ UHasselt, Hasselt, Belgium; ² imec, Genk, Belgium; ³ Total Energies, Paris, France; ⁴ UHasselt, Hasselt, France
- 3AV.2.19 Two Years Outdoor Performance Measurement of Two Different 35cm² Perovskite Mini-modules**
Jonathan Lehmann¹, Aranzazu Aguirre², Tom Aernouts², Yinghuan Kuang², Tamara Merckx², Anurag Krishna², Stijn Scheerlinck¹, Quentin Van Nieuwenhoven¹
¹ ENGIE Laborelec, Linkebeek, Belgium; ² imec, Genk, Belgium
- 3AV.2.20 FEM Model Development and Extensive Verification of Glass/Backsheet and Glass/Glass PV Modules Using Solar Cell Integrated Stress Sensors**
Pascal Romer¹, Eric Heppner¹, Andreas J. Beinert¹, Jochen Markert¹, Christof Erban²
¹ Fraunhofer ISE, Freiburg, Germany; ² SUNOVATION, Freiburg, Germany
- 3AV.2.21 Investigating the Impact of Mounting Clamps and Frame Adhesive Joints on Glass Breakage of PV Modules**
Pascal Romer¹, Andreas J. Beinert¹, Jochen Markert¹, Dennys Koch²
¹ Fraunhofer ISE, Freiburg, Germany; ² RWE Renewables, Hannover, Germany
- 3AV.2.23 Strength Testing of Full-Size Solar Glass**
Matthias Pander¹, Paul Schenk¹, Bengt Jaeckel¹
¹ Fraunhofer CSP, Halle (Saale), Germany
- 3AV.2.24 Non-Destructive Detection of Moisture Ingress in PV Modules Using NIR Spectroscopy and Hyperspectral Imaging**
Lukas Neumaier¹, Martin De Biasio¹, Anika Gassner², Markus Feichtner³, Simon Prüller⁴, Gabriele C. Eder²
¹ SAL, Villach, Austria; ² OFI, Vienna, Austria; ³ Sonnenkraft, St.Veit/Glan, Austria; ⁴ 2nd Cycle FlexCo, Amstetten, Austria
- 3AV.2.25 Characterization Methods for Perovskite Mini-Module Analysis**
Claudia Buerhop-Lutz¹, Ones Ghaffari¹, Shudi Qiu², Michael Wagner¹, Oleksandr Stroyuk¹, Ian Marius Peters¹
¹ HI ERN, Erlangen, Germany; ² FAU, Erlangen, Germany
- 3AV.2.26 Degradation Mechanisms of Perovskite Solar Cells Under Arid Environmental Conditions**
Mohammad Istiaque Hossain¹, Alaa Elsafi¹, Brahim Aissa¹
¹ QEERI, Doha, Qatar
- 3AV.2.27 Reliability of Screen-Printed Copper Metallization in SHJ Modules**
E. Busra Kucuk¹, Lars A. G. Okel¹, Yu Wu¹, Astrid Gutjahr¹, Bart Geertligns¹, Victor Rosca¹
¹ TNO, Petten, The Netherlands



- 3AV.2.28 Mechanical Behaviour of Framed Glass/Backsheet PV Modules: Influence of Frame Geometry and Mounting Configuration**
Paul Messaoudi¹, Maxime Babics¹, Francesco Giordano², Vincent Barth¹, Timea Bejat¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² 3SUN, Catania, Italy
- 3AV.2.29 Reverse-bias Onset under Bird-Dropping Soiling: a Parametric Electrical Model for PV Module Hotspot Risk**
Baris Dai¹, Minne de Jong¹, Jan Kroon²
¹ TNO, Eindhoven, The Netherlands; ² TNO, Petten, The Netherlands
- 3AV.2.30 Reliability of TOPCon Super Multi Busbar Modules: Role of the Soldering Flux**
Germain Rey¹, Marion Serasset¹, William Denis¹, Lucie Pirot-Berson¹, Rémi Monna¹, Sandra Desvergne²
¹ CEA / INES, Le Bourget du Lac, France; ² CEA, Le Bourget-du-Lac, France
- 3AV.2.31 New Encapsulants Polymers in Photovoltaic Modules**
Francesco Levi¹, Valeria Fiandra², Lucio Sannino², Concetta Andreozzi², Antonella De Maria², Paola Delli Veneri², Lucia Vittoria Mercaldo², Odda Ruiz de Ballesteros³, Finizia Auriemma¹
¹ University of Naples Federico II, Naples, Italy; ² ENEA, Portici, Italy; ³ ENEA, Naples, Italy
- 3AV.2.33 Investigation of the UV-Induced Degradation of Lightweight Silicon Heterojunction Solar Modules**
Rongda Zhang¹, Kai Zhang¹, Andreas Lambertz¹, Luo Bin¹, Henrike Gattermann¹, Karsten Bittkau¹, Andreas Gerber¹, Benedikt Fischer¹, Yanxin Liu¹, Uwe Rau¹, Sebastian Münstermann², Kaining Ding¹
¹ FZJ, Jülich, Germany; ² RWTH Aachen University, Aachen, Germany
- 3AV.2.34 New Method for Evaluation of Resistances inside PV Modules**
Ilya Chebunin¹, Jonathan Govaerts¹
¹ Imec, Genk, Belgium
- 3AV.2.35 Increased Degradation of n-type PV Modules in Field Operational Systems**
Ariel Holin¹, Rafael Fleischman¹, Lior Sarig¹
¹ SolarEdge Technologies, Herzliya, Israel
- 3AV.2.36 Accelerated Life Testing for Photovoltaic Modules: Correlating Damp Heat (DH) and Pressure Cooker Test (PCT)**
Jiaqi Song¹, Xian Jiang¹, Jikai Kang¹, Hansong Guo¹, Yu Chen¹, Chen Li¹, Zhenguo Li¹
¹ Longi Green Energy Technology, Xi'an, China
- 3AV.2.38 Anti-Soiling and Anti-Reflective Properties of a Durable Coating for Solar Cover Glass**
Carmen Wang¹, Madupa Abeywardena¹, QianFeng Xu², Alan Lyons¹
¹ City University of New York, New York, United States of America; ² ARL Designs, Summit, United States of America
- 3AV.2.39 Development of Polymer-Modified Polyvinylidene Fluoride and Glass Fiber Composites for the Functional Repair of Photovoltaic Backsheets**
Carlos González Montesdeoca¹, Luis Manuel Ocaña González¹, Benjamín González-Díaz², Sara González-Pérez², María Elena Llairema García¹
¹ ITER, Granadilla de Abona, Spain; ² ULL, San Cristóbal de La Laguna, Spain

- 3AV.2.40 Investigating Liquid vs Vapor Moisture Ingress and Resulting Degradation in TOPCon Modules**
Nathan Roosloot¹, Gaute Otnes¹, Jan Kroon², Oguzhan Apaydin², Thomas Kaltenbach³, Josefine Selj¹
¹ IFE, Kjeller, Norway; ² TNO, Petten, The Netherlands; ³ Fraunhofer ISE, Freiburg, Germany
- 3AV.2.41 When Spectra Speak: AI Maps Hidden Polymer Degradation**
Brahim Anis Belferkous¹, Chiara Barretta¹, Gernot Oreski¹
¹ PCCL, Leoben, Austria
- 3AV.2.42 Examples of Real-Life Failure and Claim Challenges of PV Modules at Different Stages of the Life-Cycle from Planning and Production to O&M and Monitoring**
Hamed Hanifi¹
¹ AESOLAR, Königsbrunn, Germany
- 3AV.2.43 Development of a Durable Poly(methyl Methacrylate) Frontsheet for Solar Modules**
Jalal El Yagoubi¹, Aziz Fihri¹, Matthias Pander², Michael Wendt², Daniel Schüsler², Volker Eberhardt³, Christian Rabe³, Anton Mordvinkin²
¹ Aramco, Dhahran, Saudi Arabia; ² Fraunhofer CSP, Halle (Saale), Germany; ³ Fraunhofer IAP, Potsdam-Golm, Germany
- 3AV.2.44 Alpine PV Modules: Mechanically Robust, Yet UV-Sensitive Insights from Mechanical Load and UV Stress Testing**
Ebrar Özkalay¹, Gabi Friesen¹, Mauro Caccivio¹
¹ SUPSI, Mendrisio, Switzerland
- 3AV.2.46 Destructive and Non-Destructive Screening Approach for Encapsulant Compatibility with Novel Solar Cell Technologies**
Maria Isabel Uribe Galeano¹, Chiara Barretta¹, Andreas Brandstätter², Karl Wienands³, Tudor Timofte³, Markus Geßner⁴, Gernot Oreski¹
¹ PCCL, Leoben, Austria; ² Lenzing Plastics, Lenzing, Austria; ³ ISC Konstanz, Konstanz, Germany; ⁴ Emil Otto Flux- und Oberflächentechnik, Eltville, Germany
- 3AV.2.47 Development of a Robust, Efficient and Repeatable Method of Analysing EL Images for Mobile-Laboratory Quality-Control Campaign**
Vanina Amblas¹
¹ Certisolis, Le-Bourget-du-lac, France
- 3AV.2.48 Degradation of SHJ Solar Cells after 20 Equivalent Years of Visible and UV Light Exposure**
Fabrizio Loviseti¹, Matteo Buffolo¹, Carlo De Santi¹, Nicola Trivellini¹, Alessandro Caria¹, Francesco Piva¹, Enrico Zanoni¹, Gaudenzio Meneghesso², Mario Tucci³, Matteo Meneghini²
¹ University of Padova, Padova, Italy; ² University of Padua, Padova, Italy; ³ ENEA, Rome, Italy
- 3AV.2.49 Validation of Monitoring-based PV Degradation Assessments with Indoor Lab Measurements**
Martin Bartholomäus¹, Juan Santamaría², Sergiu V. Spataru¹, Peter Poulsen¹
¹ DTU, Roskilde, Denmark; ² UPM, Madrid, Spain



- 3AV.2.50 Long-term Multifactor Degradation Analysis of Photovoltaic Modules Using Operational Field Data**
 Juan Santamaría¹, Martin Bartholomäus², Sergiu V. Spataru², Peter Poulsen²
¹ UPM, Madrid, Spain; ² DTU, Roskilde, Denmark
- 3AV.2.51 Long-term Reliability Testing of Metal-Based Facade and Roof PV Modules Under Outdoor and Damp Heat Conditions**
 Algirdas Baležentis¹, Matas Rudzikas², Juras Ulbikas³, Piotr Dubravskij⁴, Skirmantė Baležentienė⁴
¹ UAB Modernios E-Tehnologijos, Vilnius, Lithuania; ² The Applied Research Institute for Prospective Technologies, Vilnius, Lithuania; ³ Applied Research Institute for Prospective Technologies, Vilnius, Lithuania; ⁴ Protech, Vilnius, Lithuania
- 3AV.2.52 Development and Thermal Modelling of a Repairable Junction Box for Photovoltaic Modules**
 Thomas Spreng¹, Oliver Pfeiffer², Tobias Pfeiffer³, Sarah Backeshoff¹, Olver Dubbel¹, Ulf Blieske⁴
¹ University of Applied Science, Cologne, Germany; ² University of Applied Science Cologne, Cologne, Germany; ³ University of Applied Science Cologne, Köln, Germany; ⁴ TH Köln, Cologne, Germany

VISUAL PRESENTATIONS 3AV.3

17:00 - 18:30 PV Module Performance – Modelling, Testing, Standards

Chairpersons: Marco Ernst
 ANU, Canberra, Australia
 Giorgio Bardizza (i)
 TÜV Rheinland Solar, Milan, Italy

- 3AV.3.1 Cell-Resolved Quantification of Shunt Resistance in Photovoltaic Modules via Electroluminescence Imaging**
 Riya Sharma¹, K. L. Narasimhan¹, B. M. Arora¹, Anil Kottantharayil¹, Narendra Shiradkar¹
¹ IIT Bombay, Mumbai, India
- 3AV.3.2 Development and Light Transmittance Measurements of Semitransparent c-Si PV Modules for Agrivoltaics**
 Shu-Ngwa Asa'a¹, Arvid van der Heide², Giacomo Bizinoto Ferreira Bosco³, Hariharsudan Sivaramakrishnan Radhakrishnan², Jef Poortmans², Michael Daenen¹
¹ UHasselt, Hasselt, Belgium; ² imec, Leuven, Belgium; ³ FOTONIQ, Delft, The Netherlands
- 3AV.3.3 Energy Yield and Lifetime Climate Classification via Machine Learning for Optimizing PV Module Designs and Bill of Materials**
 Youri Blom¹, Sofia Dutto², Jing Sun¹, Rudi Santbergen¹, Olindo Isabella¹, Malte Ruben Vogt¹
¹ TU Delft, Delft, The Netherlands; ² University of Naples Federico II, Naples, Italy
- 3AV.3.4 Implementation of an Optimized Multi-Spectrum Method for Determining the Spectral Responsivity of Solar Cells and Modules**
 Ronak Mahpeyma¹, Ingo Kröger¹, Hendrik Sträter¹, Stefan Winter¹
¹ PTB, Braunschweig, Germany

- 3AV.3.5 Characterizing Early Commercial Perovskite Modules**
 Claudia Buerhop-Lutz¹, Ones Ghaffari¹, Bernhardt Kaesser¹, Ian Marius Peters¹
¹ HI ERN, Erlangen, Germany
- 3AV.3.6 Scanning System for Field Photoluminescence Imaging of PV Modules based on Modulated Light Source**
 Gisele A. dos Reis Benatto¹, Carl Emil Elling², Jeppe Elias Ekberg Jensen¹, Peter Behrendorff Poulsen¹, Liviu Stoicescu³, Sergiu V. Spataru¹
¹ DTU, Roskilde, Denmark; ² Danish PV Service, Roskilde, Denmark; ³ Solarzentrum Stuttgart, Stuttgart, Germany
- 3AV.3.7 Energy-yield Modelling of Low-footprint SHJ Modules with Transparent Passivating Contacts**
 M. Zeman¹, P. Procel Moya², Y. Zhou¹, M. Verkou¹, M. Leonardi³, D. Di Girolamo³, G. Giuliano³, F. Rametta³, M. Foti³, C. Gerardi⁴, K. Bittkau⁵, A. Eberst⁵, K. Ding⁵, Y. Blom², M. R. Vogt², R. Santbergen², O. Isabella²
¹ PV Works, Delft, The Netherlands; ² TU Delft, Delft, The Netherlands; ³ 3SUN, Catania, Italy; ⁴ 3SUN, Catania, The Netherlands; ⁵ FZJ, Jülich, Germany
- 3AV.3.8 Temperatur Behaviour of Different Solar Cells Architectures for Reverse Breakdown**
 Bengt Jaeckel¹, Matthias Pander¹, Hamed Hanifi²
¹ Fraunhofer CSP, Halle (Saale), Germany; ² AESOLAR, Koenigsbrunn, Germany
- 3AV.3.9 Impact of Spectral Response Variability on Power Determination of Single-Junction Perovskite Modules**
 Wenhao Xu¹, Yating Zhang¹, Mengdi Liu¹, Christos Monokroussos¹, Giorgio Bardizza², Max Koentopp³, Zhen Li⁴, Ralph Gottschalg⁵
¹ TÜV Rheinland (Shanghai), Shanghai, China; ² TÜV Rheinland (Italy), Milan, Italy; ³ TÜV Rheinland Solar, Cologne, Germany; ⁴ UNSW, Sydney, Australia; ⁵ Fraunhofer CSP, Halle, Germany
- 3AV.3.10 Soiling Dynamics and Performance Mitigation in Bifacial Photovoltaic Modules Enabled by Anti-Dust Coatings**
 Brahim Aissa¹, Amir Abdallah¹, Mohammad I. Hossain¹, Dhanup Somasekharan Pillai¹
¹ QEERI, Doha, Qatar
- 3AV.3.11 Investigation of Soiling Losses on Ethylene Tetrafluoroethylene (ETFE) Front-sheets for Flexible Thin-film PV Applications**
 K. P. Sreejith¹, Kenneth Mathew¹, Peer Sluijs¹, Arno H. M. Smets¹
¹ TU Delft, Delft, The Netherlands
- 3AV.3.12 Characterization and Reliability Testing of Segmented PV Modules and their Main Components based on a Practical Outdoor Test**
 Simon Karl¹, Jens Schneider², Jens Froebel¹, Matthias Pander¹, Pouya Pourshafi³, Andreas Maixner³, Bengt Jaeckel¹, Hamed Hanifi³
¹ Fraunhofer CSP, Halle (Saale), Germany; ² HTWK, Leipzig, Germany; ³ AESOLAR, Koenigsbrunn, Germany
- 3AV.3.13 Wind-Interactive Surface Micro-Elements for Mitigating Light Soiling on PV Modules: Performance Mechanism and Preliminary Evaluation**
 Yoel Sefi¹, Hadar Sefi¹
¹ Dustoss, Malkiya, Israel



- 3AV.3.14 Exploring fast and low Cost I-V Characterization Techniques to extract PV Module Characteristics**
Tommaso Michelon¹, Giacomo Peruzzi¹, Andrea Targa¹, Alessandro Caria¹, Matteo Meneghini¹, Gaudenzio Meneghesso¹, Alessandro Pozzebon¹, Nicola Trivellin¹
¹ University of Padova, Padova, Italy
- 3AV.3.15 Innovative Urban PV Installations using Matrix Shingle Technology – Solar Tiles, Noise Barriers and Carports**
Paul Rémondeau¹, Florian Ollagnon¹, Gaétan Carrier², Mehdi Sahli³, Jacob Forster⁴, Christian Reise⁴, Davide Avantaggiato⁵, John Morello⁶, Antonin Faes¹, Christophe Ballif¹
¹ EPFL, Neuchâtel, Switzerland; ² FREESUNS Solar Roofs, Colombier, Switzerland; ³ Voltec Solar, Dinsheim sur Bruche, France; ⁴ Fraunhofer ISE, Freiburg, Germany; ⁵ Etway, Trento, Italy; ⁶ FREESUNS SA Solar Roofs, Colombier, Switzerland
- 3AV.3.16 Soiling Loss Study of Solar Photovoltaics using Glass Coupons Approach in Outdoor Conditions of Sydney, Australia**
Naveed Hussain¹, Stephen Bremner¹, Fiacre Rougieux¹, Abhnil Prasad¹, Merlinda Kay¹
¹ UNSW, Sydney, Australia
- 3AV.3.17 Assessment of Bifacial PV Modules Power Matrix under Indoor Conditions**
Teodora Stoyanova Lyubenova¹, Ewan D. Dunlop¹
¹ Joint Research Centre, Ispra, Italy
- 3AV.3.18 Review of WPVS Missuses in Solar Simulator Calibration**
Gilles Arnoux¹, Christian Dreier¹, Damien Etienne¹, Bertrand Paviet-Salomon², Jonas Geissbühler², Tonio Buonassisi², Vincent Paratte¹
¹ PASAN, Neuchâtel, Switzerland; ² CSEM, Neuchâtel, Switzerland
- 3AV.3.19 Uncertainty in I-V Measurements of IBC Photovoltaic Modules using Spire and Pasan Sun Simulators**
Nishant Kumar¹, K. L. Narasimhan¹, B. M. Arora¹, Narendra Shiradkar¹
¹ IIT Bombay, Mumbai, India
- 3AV.3.20 Daily and Seasonal Investigation of the Spectral Mismatch Factor of Perovskite Based Devices**
Sumeet Santosh Mujumdar¹, Matthew Norton¹, Vasiliki Paraskeva¹, Elias Peraticos¹, Andreas Kyprianou¹, George E. Georghiou¹, Maria Hadjipanayi¹
¹ University of Cyprus, Nicosia, Cyprus
- 3AV.3.21 Comparative Field Validation of an Integrated Agrivoltaic System in a Desert Environment**
Sagarika Kumar¹, Min Hsian Saw¹, Mauro Pravattoni¹
¹ TII, Abu Dhabi, United Arab Emirates
- 3AV.3.22 Wireless In-situ Monitoring of Temperature, Humidity and Outgassing in Encapsulated Perovskite Solar Cells**
Marko Jankovec¹, Mark Urbančič¹, Arslan Ali¹, Kristijan Brecl¹, Špela Tomšič¹, Antonin Faes², Marko Jošt¹, Marko Topič¹
¹ University of Ljubljana, Ljubljana, Slovenia; ² EPFL, Neuchâtel, Switzerland

- 3AV.3.23 Modular and Tunable Open-source LED Solar Simulator for Enhanced Spectral Fidelity**
Leonardo Sollazzo¹, Rachele Grazzi¹, Valentina Diolaiti¹, Nazim Aslam¹, Fabio Rossi¹, Diego Bernardoni¹, Eleonora Baccaga¹, Donato Vincenzi²
¹ University of Ferrara, Ferrara, Italy; ² Consorzio Futuro in Ricerca, Ferrara, Italy
- 3AV.3.24 Impact of Wind on Vertical Bifacial Photovoltaic Systems: Thermal Modeling and CFD Analysis**
Amr Osama¹, Giuseppe Marco Tina¹, Antonio Gagliano¹, Stefano Aneli¹
¹ University of Catania, Catania, Italy
- 3AV.3.25 Extension of Analytical Thermal Models to Assess Integrated Photovoltaics and Mobile Applications**
Max Mittag¹, Alexander Protti¹, Christian Reichel¹, Holger Neuhaus¹
¹ Fraunhofer ISE, Freiburg, Germany
- 3AV.3.26 Spectral Mismatch Uncertainty in Energy Rating Calculations in Accordance with IEC 61853**
Werner Herrmann¹, Giorgio Bardizza², Christos Monokroussos³, Harald Müllejšans⁴, Lorenz Rimmelspacher⁵
¹ TÜV Rheinland, Cologne, Germany; ² TÜV Rheinland, Milan, Italy; ³ TÜV Rheinland, Shanghai, China; ⁴ European Commission JRC, Ispra, Italy; ⁵ Lorenz Rimmelspacher, Cologne, Germany
- 3AV.3.27 Comparative Analysis of I-V Curve Correction Methods for WPVS Reference Cells**
Wenhao Xu¹, Yating Zhang¹, Mengdi Liu¹, Christos Monokroussos¹, Giorgio Bardizza², Werner Herrmann³, Max Koentopp³, Ingo Kröger⁴, Stefan Winter⁴
¹ TÜV Rheinland (Shanghai), Shanghai, China; ² TÜV Rheinland (Italy), Pogliano Milanese, Italy; ³ TÜV Rheinland Solar, Cologne, Germany; ⁴ PTB, Braunschweig, Germany
- 3AV.3.28 Passive Geothermal-Assisted Thermal Regulation for Enhanced Photovoltaic Module Performance in Desert Environments**
Saji Salkalachen¹, Lokabhiraman Subbaraya¹
¹ Independent Researcher, Bangalore, India
- 3AV.3.29 Effect of Metastable States of Modern Solar Modules on Module Calibrations and Dark I-V-Curves**
Hasan Manavbasi¹, Stefan Riechelmann¹, Stefan Winter¹
¹ PTB, Braunschweig, Germany
- 3AV.3.30 Long-term Reliability Study of the Oldest PV System in Sweden**
Yusuf Rostom¹, Emmanouil Psimopoulos¹, André Augusto¹
¹ Dalarna University, Borlänge, Sweden
- 3AV.3.31 Reducing PV Operational Temperature by Radiative Cooling Coatings: a Thermal Transport Modeling Approach Using COMSOL**
Or Gindi¹, Sara Golroodbari¹, Wilfried Van Sark¹
¹ Utrecht University, Utrecht, The Netherlands
- 3AV.3.32 Estimation of the Effective DC Power Rating for Bifacial PV Arrays in an Arid Climate**
José R. Angulo Abanto¹, Juan de la Casa², Jan Amaru Töfflinger¹
¹ PUCP, Lima, Peru; ² University of Jaén, Jaén, Spain



3AV.3.33 Performance Assessment of Bifacial and Monofacial PERC Modules using an Accurate Method based on Superellipse Model

Khadija El Ainaoui¹, Mhammed Zaimi², Said Elhamaoui¹, Yasmine El mrabet¹, Khadija Ibaaren², Youssef Bouasria², Abdellatif Ghennioui¹, El Mahdi Assaid²

¹ Green Energy Park, Benguerir, Morocco; ² Chouaib Doukkali University, El Jadida, Morocco

3AV.3.34 Beyond Efficiency: Shading Tolerability as a Driver for Architecture Selection in Perovskite-on-Silicon Modules

Jose Maria Cuevas Davila¹, Hariharsudan Sivaramakrishnan Radhakrishnan², Patrizio Manganiello¹, Quentin Jeangros³, Jozef (Jef) Poortmans²

¹ imec, Genk, Belgium; ² imec, Leuven, Belgium; ³ CSEM, Switzerland, Slovenia

3AV.3.35 Thermo-Mechanical Analysis and Prediction of Shear Stresses by FEM in ECA/NCA Interconnects of IBC Solar Cells

Matthias Pander¹, Stephan Grosser¹, Tudor Timofte², Tobias Nitsche³, Daniel Buckland³, Giuseppe Galbiati³, Bengt Jaeckel¹

¹ Fraunhofer CSP, Halle (Saale), Germany; ² ISC Konstanz, Konstanz, Germany; ³ Henkel, Düsseldorf, Germany

3AV.3.36 Orientation-based Optimization of BIPV Colored Module Arrangement

Hyoungbeen Kim¹, Jaehyeong Lee²

¹ Sungkyunkwan University, Suwon, South Korea; ² University of Sungkyunkwan, Suwon, South Korea

Tuesday, 15. September 2026

VISUAL PRESENTATIONS 1BV.1

08:30 - 10:00 Single Junction Silicon Cells | Silicon Bottom Cells for Tandem Photovoltaics | Characterisation & Modelling of Silicon Cells

Chairpersons: Delfina Muñoz (i)
CEA, Le Bourget-du-Lac, France
Hisham Nasser
ODTÜ-GÜNAM, Ankara, Türkiye
Aloña Otaegi
UPV/EHU, Bilbao, Spain

1BV.1.1 Optimization of n-type nc-SiOx:H Window Layer for Silicon Heterojunction Solar Cells via CO2-H2 Pretreatment, Oxygen Content, and Thickness Variation

Vahdet Özyahni¹, Karsten Bittkau¹, Andreas Lambert¹, Alexander Eberst¹, Uwe Rau¹, Kaining Ding¹

¹ FZJ, Jülich, Germany

1BV.1.2 Approaches to Enhance the VOC of Moly-Poly Hybrid c-Si Solar Cells

Yingwen Zhao¹, Yi Zheng¹, Liqi Cao¹, Paul Procel¹, Martijn Tjissen¹, Engin Özkol¹, Luana Mazzarella¹, Yifeng Zhao¹, Miro Zeman¹, Olindo Isabella¹

¹ Delft University of Technology, Delft, The Netherlands

1BV.1.3 Optimization of Boron-Doped Polycrystalline Silicon Passivating Contacts on Textured Silicon Surfaces

Clarisse Laurens-Berge¹, Raphaël Cabal¹, Sébastien Dubois¹

¹ CEA, Le-Bourget-du-Lac, France

1BV.1.4 Application of nc-SiC:H as Transparent Passivation Contacts in Silicon Heterojunction (SHJ) Solar Cells on Industrial Sizes

Karsten Bittkau¹, Alexandr Zamchuy¹, Binbin Xu¹, Alexander Werner¹, Andreas Lambert¹, Alexander Eberst¹, Kaining Ding¹

¹ FZJ, Jülich, Germany

1BV.1.5 Viability of Ultrathin Crystalline Silicon Solar Cells below 70 µm

Vanessa Fano¹, Mario Cruz¹, Alvaro Briones¹, Alona Otaegi¹, Eneko Cereceda¹, Nekane Azkona¹, Eneko Ortega¹, Federico Recart¹, Jose Ruben Gutierrez¹, Juan Carlos Jimeno¹

¹ UPV/EHU, Bilbao, Spain

1BV.1.6 Research on the Dark-annealing-induced Passivation Degradation of TOPCon Solar Cell

Bangzhao Hong¹, Weiwei Deng¹, Haiyan Chen¹, Tao Xu¹

¹ Canadian Solar, Suzhou, China

1BV.1.7 Organic-Inorganic Hybrid Layer as a Passivating Electron-Selective Contact in Silicon Solar Cells

Milad Ghasemi¹, Naser Beyraghi¹, Selcuk Yerci¹, Rasit Turan¹, Hisham Nasser¹

¹ ODTÜ-GÜNAM, Ankara, Türkiye



1BV.1.8 High-Pressure Sputtered Sub-Stoichiometric TiO_x Electron-Selective Contacts Formed by In-Situ Plasma Oxidation for Crystalline Silicon Solar Cells

Francisco José Pérez-Zenteno¹, Sebastian Duarte¹, Rafael Benítez-Fernández¹, Ignacio Torres², Rocio Barrio², Sari Algaidy³, Rodrigo García-Hernansanz¹, Javier Olea¹, David Pastor¹, Álvaro del Prado¹, Eric García-Hemme¹, Enrique San Andrés¹

¹ Complutense University of Madrid, Madrid, Spain; ² CIEMAT, Madrid, Spain; ³ UPM, Madrid, Spain

1BV.1.9 Greener TOPCon processing using UV/O₃ Oxidation and Microwave Annealing

Rafael Benítez-Fernández¹, Cecilia Mata-Alonso¹, Francisco Pérez-Zenteno¹, Sebastián Duarte-Cano¹, Ignacio Torres², Rocio Barrio², Nieves Gonzalez², Sari Algaidy¹, Javier Olea¹, David Pastor¹, Álvaro del Prado¹, Ignacio Martí¹, Enrique San Andrés¹, Rodrigo García-Hernansanz¹, Eric García-Hemme¹

¹ Complutense University of Madrid, Madrid, Spain; ² CIEMAT, Madrid, Spain

1BV.1.10 Optimization of Back-Contacted polyZEBRA Solar Cell Characteristics for Industrial Fabrication and Application

Jonathan Linke¹, Saman Sharbat Kalaghichi¹, Jan Hoß¹, Florian Buchholz¹, Lejo Joseph Koduvelikulathu¹

¹ International Solar Energy Research Center Konstanz , Konstanz, Germany

1BV.1.11 Gettering Effects of Topcon Processing on N-Type and P-Type CZ Silicon Substrates

Nerea Dasilva Villanueva¹, Yiğit Mert Kaplan², Hisham Nasser², Rasit Turan², David Fuertes Marrón¹, Luis Jaime Caballero¹, Usman Shah¹, Andrés David Pardo¹, Cristian Miguel Luis Antoine¹, Özlem Coşkun³, Çağrı Taha Delikanlı³, Ece Çamkara³, Meriç Çalışkan Arslan⁴, Carlos del Cañizo¹

¹ UPM, Madrid, Spain; ² ODTÜ-GÜNAM, Ankara, Türkiye; ³ Kalyon PV, Ankara, Türkiye; ⁴ Kalyon PV, Ankara, Spain

1BV.1.12 Suitability and Validation of Different Lignosulfonates for Silicon Wafer Texturing in Photovoltaic Applications

Rocio Barrio Martín¹, Nieves González Peñalba¹, Ignacio Torres Almarza¹, Jose Javier Gandía Alabau¹, Rafael Benítez-Fernández², Francisco José Pérez-Zenteno², Enrique San Andrés², Rodrigo García-Hernansanz², Eric García-Hemme²

¹ CIEMAT, Madrid, Spain; ² UCM, Madrid, Spain

1BV.1.13 Improved Sustainability of Heterojunction Cells by Nanometer Pyramid Texturization for Silicon

Sebastian Pingel¹, Katrin Krieg¹, Stefan Schmidt¹, Winfried Wolke¹, Andreas Wolf¹, Jonas De Rose¹, Benedikt Bläsi¹

¹ Fraunhofer ISE, Freiburg, Germany

1BV.1.14 Laser Annealing for the Crystallization of Amorphous Silicon Layers in TOPCon Solar Cells

David Canteli¹, Rocio Barrio², Vladimir Garcia Rodriguez³, Nieves Gonzalez², David Munoz-Martin¹, Ignacio Torres², Jose Javier Gandia², Carlos Molpeceres¹

¹ UPM, Madrid, Spain; ² CIEMAT, Madrid, Spain; ³ National Polytechnic Institute, Mexico City, Mexico

1BV.1.15 In-situ Plasma-Grown Tunnel Oxides via Noble-Gas (He, Ar) Diluted CO₂ Precursors for TOPCon Silicon Solar Cells

Ignacio Torres¹, Rocío Barrio¹, Nieves González¹, J. Javier Gandía¹, Rafael Benítez-Fernández², Francisco J. Pérez-Zenteno², Enrique San Andrés², Rodrigo García-Hernansanz², Eric García-Hemme²

¹ CIEMAT, Madrid, Spain; ² UCM, Madrid, Spain

1BV.1.16 Enhanced Light Trapping in Black Silicon: Comparative Study of Scalable Hybrid NaOH and H₂SO₄ Chemical Etching and Inductively Coupled Plasma Reactive Ion Etching (ICP-RIE)

Aleena Nadeem¹, Ozan Aydin¹, Gokhan Altiner², Agageldi Muhammetgulyyev³, Ayca Berfin Aydogdu³, Rasit Turan², Hisham Nasser², Milad Ghasemi²

¹ METU, Ankara, Türkiye; ² ODTÜ-GÜNAM, Ankara, Türkiye; ³ CW Energy Research and Development Center, Antalya, Türkiye

1BV.1.17 PECVD Preparation of Silicon Carbide Layers as Passivating Contacts for POLO Solar Cells

Steffen Börner¹, Frank Wunsch¹, Robby Peibst², Jan-Dirk Kähler³, Thomas Pernau³, Jan Krügener¹

¹ Leibniz University Hannover, Hannover, Germany; ² Leibniz University Hannover, Hameln, Germany; ³ centrotherm international, Blaubeuren, Germany

1BV.1.18 Advanced TCAD Modelling of High-Efficiency Bifacial TOPCon Silicon Solar Cells

Savita Kashyap¹, Adarsh Kumar Mishra¹, Sanjeev Kumar¹, Arun Kumar Singh¹

¹ Punjab Engineering College, Chandigarh, India

1BV.1.19 Laser-Assisted Doping of Crystalline Silicon Using Doped Amorphous Silicon Source for Local Electrical Property Control in Photovoltaic Applications

Narendra Bandaru¹, Asbjørn Moltke², Ole Bang², Rasmus Schmidt Davidsen¹

¹ Aarhus University, Aarhus, Denmark; ² DTU, Lyngby, Denmark

1BV.1.20 Influence of Inkjet Deposition Temperature on the Passivation and Stability of PEDOT:PSS/Amorphous Silicon Hybrid Silicon Structures

Narendra Bandaru¹, Devabharathi Nehru¹, Dheeraj Sah¹, Mohammadhossein Mohammadi¹, Roberto Boccardi², Rasmus Schmidt Davidsen¹

¹ Aarhus University, Aarhus, Denmark; ² DTU, Roskilde, Denmark

1BV.1.21 Interface Engineering of ALD-TiO_x Electron-Selective Contacts in Dopant-Free Silicon Heterojunction Solar Cells

Liqi Cao¹, Roel Theeuwes², Leonard Simeonov², Yifeng Zhao¹, Paul Procel Moya¹, Luana Mazzarella¹, Erwin Kessels², Olindo Isabella¹

¹ Delft University of Technology, Delft, The Netherlands; ² Eindhoven University of Technology, Eindhoven , The Netherlands

1BV.1.22 Low-Cost Conversion of Existing TOPCon Production Lines Toward High-Efficiency Back-Contact Solar Cells

Chun-Ping Lin¹, Han-Chen Chang¹, Sung-Yu Chen¹, Ying-Yuan Huang²

¹ Industrial Technology Research Institute, Tainan, Taiwan; ² National Cheng Kung University, Tainan, Taiwan



1BV.1.23 Stability of Indium-Free Antireflective Layer Based on Aluminum-Doped Zinc Oxide for Heterojunction Solar Cells

Anthony Valla¹, Benjamin Thiriot¹, Frédéric Jay¹, Anne-Sophie Ozanne¹, Rémi Monna¹, Christine Denis¹, Florence Naudin¹, Wilfried Favre¹

¹ CEA / INES, Le Bourget-du-Lac, France

1BV.1.24 Transparent Conductive Electrodes with Reduced Indium Content Based on Ultra-Thin ITO/SnO₂/ITO Stacks for Silicon Heterojunction Solar Cells

Emine Hande Ciftipinar¹, Corné Frijters², Astrid Gutjahr¹, Eric Kossen¹, Johannes Lambooi², L.J. (Bart) Geerligs¹

¹ TNO, Petten, The Netherlands; ² TNO, Eindhoven, The Netherlands

1BV.1.25 Synergistic Interface Engineering in Hybrid Silicon/Organic Solar Cells: the Role of 1D/2D Nanocomposites and Surface Texturing

Sergii Mamykin¹, Tetiana Lunko¹, Iryna Mamontova¹, Olga Kondratenko¹, Volodymyr Romanyuk¹

¹ National Academy of Sciences of Ukraine, Kiev, Ukraine

1BV.1.26 Corona-Induced Field-Effect Passivation and Injection-Dependent Current Extraction in Carrier Selective Silicon Solar Cells

Rameeja T. Abdul Rasheed¹, Ajmal Mon A.¹, Aldrin Antony¹

¹ Cochin University of Science and Technology, Ernakulam, India

1BV.1.27 Innovative Tin Oxide Deposition Solutions for In-free SHJ Solar Cells

Adeline Lanterne¹, Frédéric Jay¹, Pia Javiera Vasquez Rivera², Virginie Brizé¹, Florence Naudin¹, David Muñoz-Rojas²

¹ CEA / INES, Le Bourget-du-Lac, France; ² CNRS, Grenoble, France

1BV.1.28 Analyzing the Systemic Effects of Hydrogenated Silicon Nitride Film Deposition on Photovoltaic Performance: A Comprehensive Study

Sang Hee Lee¹, Hee-eun Song², Kyung Taek Jeong²

¹ KIER, Dong-gu, South Korea; ² KIER, Daejeon, South Korea

1BV.1.29 Understanding Low-Temperature SnO₂ TCOs for Photovoltaic Applications

Takashi Koida¹, Naoko Miura¹, Takuya Matsui¹, Hitoshi Sai¹

¹ AIST, Tsukuba, Japan

1BV.1.41 Reproducibility Challenges of Ultrathin Transparent Conductive Oxides in Perovskite-Silicon Tandem Solar Cells

Nan Sun¹, Vahdet Özyahni¹, Gaosheng Huang¹, Bingbing Chen¹, Jürgen Hüpkes¹, Alexander Eberst¹, Karsten Bittkau¹, Thomas Kirchartz¹, Kaining Ding¹

¹ FZJ, Jülich, Germany

1BV.1.42 Direct Current Sputtered Ce-Doped In₂O₃ Thin Films for Silicon-Based Tandem Solar Cell Applications

Hyunju Lee¹, Yoshio Ohshita², Atsushi Ogura¹

¹ Meiji University, Kanagawa, Japan; ² Toyota Technological Institute, Nagoya, Japan

1BV.1.43 Optimizing the Optoelectronic Trade-off in TOPCon2 Bottom Cells for High-Efficiency Tandem Applications

Yiğit Mert Kaplan¹, Seda Kılıçkaya Ünver¹, Gökhan Altın¹, Hisham Nasser¹, Raşit Turan¹

¹ ODTÜ-GÜNAM, Ankara, Türkiye

1BV.1.44 Dopant Free Carrier Transport Layers for C-Si Heterojunction Solar Cells

Laura Lancellotti¹, Eugenia Bobeico¹, Marco Della Noce¹, Giuseppe Nasti¹, Elena Santoro¹, Gennaro Vincenzo Sannino¹, Pietro Scognamiglio¹, Iurie Usatii¹, Paola Delli Veneri¹, Lucia Vittoria Mercaldo¹

¹ ENEA, Portici, Italy

1BV.1.45 Silver- and Indium-Free Half TBC IBC Silicon Bottom Cells for Tandem Applications

Veysel Unsur¹, Melisa Korkmaz Arslan¹, Seda Kilickaya¹, Busra Altinsoy¹, Mustafa Buyukguzel¹

¹ ODTÜ-GÜNAM, Ankara, Türkiye

1BV.1.46 Performance Comparison of TOPCon2 and Silicon Heterojunction Based Tandems from 1 to 60 cm² Scale

Julien Humi¹, Kerem Artuk², Michele De Bastiani², Audrey Morisset², Quentin Jeangros², Bertrand Paviet-Salomon², Christian Wolff¹, Christophe Ballif¹, Franz-Josef Haug¹

¹ EPFL, Neuchâtel, Switzerland; ² CSEM, Neuchâtel, Switzerland

1BV.1.51 Plasma-Induced Control of Fixed Charges in PECVD SiN_x Films via N₂O Treatment

Ayşe Can¹, Seda Kılıçkaya Ünver¹, Hasan Hüseyin Canar², Gökhan Altın³, İlker Yıldız⁴, Hisham Nasser¹, Raşit Turan¹

¹ ODTÜ-GÜNAM, Ankara, Türkiye; ² Aselsan, Ankara, Türkiye; ³ Middle East Technical University, Center for Solar Energy Research and Applications (ODTU-GUNAM), Ankara, Türkiye; ⁴ ODTÜ Central Laboratory, Ankara, Türkiye

1BV.1.52 Microscopic Characterization of SHJ Interdigitated Back-Contacts

Swarnendu Banerjee¹, Robert Hlaváč¹, Aleš Vlček¹, Roman Dvořák¹, Matěj Hývl¹, Antonín Fejfar¹, Boris Legradic², Loris Barraud², Niels Holm², Damien Lachenal², Martin Ledinský¹

¹ Czech Academy of Sciences, Prague, Czech Republic; ² Meyer Burger Research, Huterive, Switzerland

1BV.1.53 Spatially Resolved Characterization of TOPCon Precursors and Copper-Plated Solar Cells via Photoluminescence Imaging

Gisele Alves dos Reis Benatto¹, Roberto Boccardi¹, Rodrigo Del Prado Santamaria¹, Markus Babin¹, Peter Behrendorff Poulsen¹, Sune Thorsteinsson¹

¹ DTU, Roskilde, Denmark

1BV.1.54 Performance Evolution of Aged Mono-Crystalline Silicon Solar Cells under Outdoor, Thermal, and Combined Stress Conditions

Jaeyoung Jang¹, Jeong-eun Jeon², Yoon-Sung Lee¹, Sumi Yang¹

¹ Far East University, Eumseong-gun, South Korea; ² Far East University, Eumseong-gun, CB, South Korea

1BV.1.55 A Reactive Molecular Dynamics Study of Oxygen Concentration Effects on Silicon Nanocrystal Growth

Genta Tamura¹, Kazuhiro Gotoh², Noritaka Usami³, Takashi Tokumasu¹

¹ Tohoku University, Sendai-shi, Japan; ² Niigata University, Niigata-shi, Japan; ³ Nagoya University, Nagoya-shi, Japan



- 1BV.1.56 The Effect of Front-Contacting Configurations on Measuring SMBB TOPCon Solar Cell Efficiency**
Yung-Tsung Liu¹, Yean-San Long¹, San-Yu Ting¹, Min-An Tsai¹, Cho-Fan Hsieh¹
¹ ITRI, Hsinchu, Taiwan
- 1BV.1.57 Modeling I-V and Luminescence Characteristics of Bifacial Solar Cells Affected by Potential Induced Degradation using Griddler**
Aysha Mahmood¹, Sune Thorsteinsson¹, Rodrigo Del Prado Santamaria¹, Gisele Alves dos Reis Benatto¹, Peter B. Poulsen¹, Sergiu V. Spataru¹
¹ DTU, Roskilde, Denmark
- 1BV.1.58 Self-Calibrated Photoconductance Decay measurement: Application to TOPCon Precursor Structures**
Gergely Havasi¹, David Krisztián¹, Ferenc Korsós¹, Saman Sharbat², Lejo Joseph Koduvelikulathu²
¹ SEMILAB, Budapest, Hungary; ² ISC Konstanz, Konstanz, Germany
- 1BV.1.60 Impact of the Intrinsic a-Si:H(i) Spacer Resistance on the Open Circuit Voltage and Temperature Coefficient of Heterojunction Silicon Solar Cells**
Moustafa Y. Ghannam¹
¹ Kuwait University, Safat, Kuwait
- 1BV.1.61 Non-Destructive Evaluation of Surface Recombination and Interface States in Textured Solar Silicon via Spectral Surface Photovoltage**
Beyza Durusoy¹, Maaz Soomro¹, Stefan Lange², Nadine Schüler³, Christian Hagendorf¹
¹ Anhalt University of Applied Sciences, Köthen, Germany; ² Fraunhofer CSP, Halle, Germany; ³ Freiberg Instruments, Freiberg, Germany
- 1BV.1.62 Advanced Injection-dependent Carrier Lifetime Analysis Method of Silicon Solar Cells for Industrial Applications**
Kyung Taek Jeong¹, Hee-eun Song¹, Sang Hee Lee²
¹ KIER, Daejeon, South Korea; ² KIER, Dong-gu, South Korea

VISUAL PRESENTATIONS 2BV.2

10:30 - 12:00 Compound (Chalcogenide, Kesterite, III-V) and Organic Devices

Chairpersons: Alessandro Romeo
University of Verona, Italy
Mirjam Theelen
TNO/Solliance, Eindhoven, The Netherlands

- 2BV.2.1 Epitaxial 19.4% Efficient InGaP/GaAs/Si Triple-junction Solar Cell with 1.7 eV Wide Bandgap n-AlGaAs Buffer**
Hyun-Beom Shin¹, Yeonhwa Kim², Yunki Min², In-Hwan Lee³, Won Jun Choi², Ho Kwan Kang¹, Daehwan Jung²
¹ KANC, Suwon, South Korea; ² KIST, Seoul, South Korea; ³ Korea University, Seoul, South Korea

- 2BV.2.2 Silver Introduction to Cu(In,Ga)Se₂ to overcome the Copper-rich Growth Stage**
Oliver Klement¹, Christian A. Kaufmann², Daniel Schildhammer¹, Damilola Adeleye², Felix Mai³, Nikolaus Weinberger¹
¹ University of Innsbruck, Innsbruck, Austria; ² HZB, Berlin, Germany; ³ Berlin University of Applied Sciences, Berlin, Germany
- 2BV.2.3 Deposition and Characterization of High Mobility Titanium Doped Indium Oxide for Thin Film PV Devices**
Ana Jurado Estrada¹, Kieran Curson¹, Samuel Machin¹, Luke Jones¹, Mustafa Togay¹, Jake Bowers¹, Michael Walls¹
¹ Loughborough University, Loughborough, United Kingdom
- 2BV.2.4 Comparative Degradation Behavior of Emerging Photovoltaic Technologies under Indoor Storage**
Özcan Bazkir¹, Hatice İlhan²
¹ National Metrology Institute, Kocaeli, Türkiye; ² İzmir Institute of Technology, İzmir, Türkiye
- 2BV.2.5 Sustainable Magnetron-Sputtered Sub-Micrometre CIGS_{Se} Flexible Solar Cells Via H₂S Sulfurization and Inkjet Ag Grid Contacts**
Ana R. Pires¹, André F. Violas¹, João B. Vilão¹, Rui Bastos¹, Andrés Perdomo¹, António J. N. Oliveira¹, Ricardo M. L. Silva¹, Xavier L. Pinheiro¹, Bárbara L. Seira¹, Diogo Carvalho¹, Jennifer P. Teixeira¹, Paulo A. Fernandes¹, Pedro M. P. Salomé¹
¹ INL, Braga, Portugal
- 2BV.2.6 Photovoltaic Properties of Hydroxy Minerals in Polymer Electrolytes on Dye-Sensitized Solar Cells**
Mi-Ra Kim¹, Sungsoo Park¹
¹ Dong-Eui University, Busan, South Korea
- 2BV.2.7 How the Molybdenum Process Influences the Growth of CZTS: a Comparative Study of Different Lab-Grown and Commercial Molybdenum Substrates**
Alessandro Veneri¹, Ikram Anefnaf¹, Elisa Artegiani¹, Alessandro Romeo¹
¹ University of Verona, Verona, Italy
- 2BV.2.8 Numerical Simulation of CIGS/Si Tandem Solar Cells**
Juan Carlos Jimeno¹, Alejandro Garcia¹, Nekane Azkona¹, Vanesa Fano¹, Aloña Otaegi¹, Eneko Cereceda Moris¹, Rubén Gutiérrez¹, Federico Recart¹
¹ EHU, Bilbao, Spain
- 2BV.2.9 Comparison of Sb₂Se₃ Thin Films Deposited by Vacuum Evaporation and Vapor Transport Deposition**
Elisa Artegiani¹, Sharmiladevi Ramamoorthy¹, Alessandro Veneri¹, Mariyam Mukhtar¹, Alessandro Romeo¹
¹ University of Verona, Verona, Italy
- 2BV.2.10 CdCl₂ Treatment for Either Doping or Alloying Cu₂ZnSn(S,Se)₄ to Enhance the Solar Cell Performance**
Alessandro Romeo¹, Prabeesh Punathil², Solidea Zanetti¹, Elisa Artegiani¹
¹ University of Verona, Verona, Italy; ² University of Northumbria, Newcastle, United Kingdom



2BV.2.11 Impact of AM1.5G Co-illumination on the Device Performance of Laser Power Converters

Sho Aonuki¹, Takaya Oshimo², Kotona Tabata², Takeru Yamada², Junichi Suzuki³, Reo Aoyama³, Shiro Uchida³, Kouichi Akahane⁴, Masato Suzuki¹, Natsuha Ochiai¹, Yukiko Suzuki¹, Kazuto Kashiwakura¹, Yuka Oshima¹, Kensuke Nishioka², Masakazu Arai², Yohei Toriumi¹, Madoka Takahashi¹
¹ NTT, Musashino, Japan; ² University of Miyazaki, Miyazaki, Japan; ³ Chiba Institute of Technology, Narashino, Japan; ⁴ National Institute of Information and Communications Technology, Koganei, Japan

2BV.2.12 Fabrication of High Efficient Alkali-Alloyed CZTSSe Solar Cells

Namunundari Otgontamir¹, Md Matiur Rahman¹, Md Hamin Sharif¹, Haehoon Jeong¹, JunHo Kim¹
¹ Incheon National University, Incheon, South Korea

2BV.2.13 Enhanced Near-Infrared Photo-Absorption of Copper-Indium-Selenide Thin Film

Temujin Enkhbat¹, Hyun-Beom Shin², Ho Kwan Kang², Seongju Park¹, Jae-Hyung Jang¹
¹ Korea Institute of Energy Technology, Naju, South Korea; ² Korea Advanced Nanofab Center, Suwon, South Korea

2BV.2.14 Metallic Nanoparticles through Solid State Dewetting for Light Trapping in Ultrathin Solar Cells

Antonio J. N. Oliveira¹, Jennifer P. Teixeira¹, Bruna S. Tinoco¹, Enzo J. Ribeiro¹, André F. Violas¹, Vitor Lopes¹, Paulo A. Fernandes¹, Pedro M. P. Salomé¹
¹ INL, Braga, Portugal

2BV.2.15 Broad Spectrum Absorption Enhancement in GaAs-based Quantum Dot Solar Cells with the Two-Dimensional Photonic Crystal Trapping Layer

Xiaoling Chen¹, Yidi Bao¹, Chunxue Ji¹, Xiaoyang Zhao¹, Wen Liu¹, Xiaodong Wang¹
¹ Chinese Academy of Sciences, Beijing, China

2BV.2.16 New Approach to Enhance the Efficiency of Organic Solar Cells Using Azobenzene Derivatives

Beata Derkowska-Zielinska¹, Seyedeh Arasteh Jahani¹, Robert Czaplicki¹, Vitaliy Smokal², Oksana Krupka³, Dorota Kowalska¹
¹ Nicolaus Copernicus University in Toruń, Torun, Poland; ² Taras Shevchenko National University of Kyiv, Kyiv, Ukraine; ³ University of Angers, Angers, France

2BV.2.17 Toward High-Quality CIGS Thin Films Grown by Three-Stage Co-Evaporation under UHV Conditions

Juchan Choi¹, Jin Ho Yang², Jae Ho Yun¹
¹ Korea Institute of Energy Technology (KENTECH), Naju-si, South Korea; ² Korea Institute of Energy Technology, Naju-si, South Korea

2BV.2.18 Role of Alkali Metal Cations in Regulating Interfacial Electrostatics and Non-equilibrium Charge-transfer Dynamics in Biancaea Sappan-sensitized Dye-sensitized Solar Cells

Steeve Shiny¹, Leo Rajeesh²
¹ Pondicherry University, Pondicherry, India; ² Pondicherry University, pondicherry, India

VISUAL PRESENTATIONS 4BV.3

13:30 - 15:00 Solar Resource and Forecasting

Chairpersons: Jan Remund
Meteotest, Bern, Switzerland
Dunia Bachour (i)
HBKU/ Qatar Foundation, Doha, Qatar
Khadija Barhmi
Utrecht University, The Netherlands

4BV.3.1 Ensemble Learning and Model Transfer in Machine Learning Algorithms for Photovoltaics Performance Prediction

Nina Sophie Sturm¹, Marcus Rennhofer², Bernhard Kubicek², Stefan Übermasser²
¹ University of Vienna, Vienna, Austria; ² AIT, Vienna, Austria

4BV.3.2 Diffuse Irradiance Modeling in Sub-Hourly PV System Yield Simulations

Michele Oliosi¹, Luca Antognini¹, Auriane Canesse¹, André Mermoud¹, Robin Vincent¹, Bruno Wittmer¹
¹ PVsyst SA, Satigny, Switzerland

4BV.3.3 Satellite-driven Convolutional Neural Network for Near-Term Irradiance Forecasting to Support PV Power Nowcasting Models

Jacopo Baldacci¹, Ciro Lanzetta¹, Antonio Piazza¹
¹ I-EM, Livorno, Italy

4BV.3.4 Limitations of Typical Meteorological Year Datasets for High DC/AC PV Systems in Yield Assessments

Bassel Helmy¹, Scott McKecknie²
¹ Orsted, 2 Lochrin, United Kingdom; ² Orsted, 2 Lochrin Square, United Kingdom

4BV.3.6 Implementation of Uncertainty Information to the CAMS Radiation Service Irradiance Estimates

Jorge Lezaca¹, Arindam Roy¹, Marion Schrödter-Homscheidt¹
¹ DLR, Oldenburg, Germany

4BV.3.7 The Effect of Climatic Change on Austrian PV Production

Bernhard Kubicek¹, Marcus Rennhofer¹, Kristofer Hasel¹, Marianne Bügelmayer-Blaschek¹, Nina Sturm¹, Kerstin Haslehner², Manfred Dörninger²
¹ AIT, Vienna, Austria; ² University of Vienna, Vienna, Austria

4BV.3.8 Vehicle Integrated PV Potential for Europe-Results of a European Wide Measurement Campaign

Christian Braun¹, Moditya Gupta¹, Barbaros Inak¹, Lenneke Slooff², Anna Carr²
¹ Fraunhofer ISE, Freiburg, Germany; ² TNO, Den Haag, The Netherlands

4BV.3.9 All-Sky Images Foundation Models for PV-relevant Cloud Analysis and Irradiance Nowcasting

Yassine Ribouh¹, Andreas Boschert², Grit Behrens¹, Mike Zehner²
¹ Bielefeld University of Applied Science and Art, Minden, Germany; ² Technical University of Applied Science, Rosenheim, Germany



4BV.3.10 Photovoltaic and Wind Power Forecasting Using Kernel Recursive Least Squares with WSN Based Data Acquisition

Sarvar Hussain Nengroo¹

¹ KFUPM, Dharan, Saudi Arabia

4BV.3.11 Zero-Shot Foundation Models for Solar Power Forecasting: a Systematic Benchmarking Study

Mohamed Abdelmagid¹, Maher Maalouf¹, Tarek EL-Fouly¹

¹ Khalifa University, Abu Dhabi, United Arab Emirates

4BV.3.12 Short-Term PV Forecasting with Heterogeneous Sensor Data using Transfer Learning

Naheel Faisal Kamal¹, Amir Abdallah¹, Sertac Bayhan¹

¹ Qatar Environment and Energy Research Institute (QEERI), Hamad Bin Khalifa University, Doha, Qatar, Doha, Qatar

4BV.3.13 Physics-Conditioned PatchGAN Refinement for Long-Horizon All-Sky Nowcasting and PV Irradiance Uncertainty

Naoufal El Atmioui¹, Andreas Boschert², Grit Behrens¹, Mike Zehner²

¹ Bielefeld University of Applied Science and Art, Minden, Germany; ² Technical University of Applied Sciences, Rosenheim, Germany

4BV.3.14 SkyDiff: All Sky Scenario Nowcasting using Diffusion Models

Max Aragon¹, Quentin Paletta², Jose Gomez¹, Nicolas Courty³, Yves-Marie Saint-Drenan¹

¹ Mines Paris PSL, Sophia Antipolis, France; ² European Space Agency, Frascati, Italy; ³ University Bretagne Sud, Vannes, France

4BV.3.15 Short-Term Multistep PV Power Forecasting Using Deep Learning: Performance Comparison of CNN-LSTM and Transformer Architectures

Caixia Li¹, Ziheng Liu¹, Pengfei Zhang¹, Xiaojing Hao¹

¹ UNSW, Sydney, Australia

4BV.3.16 IEA PVPS Task 16 – Phase IV

Jan Remund¹, Manajit Sengupta², Stefan Wilbert³, Elke Lorenz⁴, Rodrigo Amaro e Silva⁵, Yehia Eissa⁶, Adam R. Jensen⁷

¹ Meteotest AG, Bern, Switzerland; ² NLR, Boulder, United States of America; ³ German Aerospace Center, Almeria, Spain; ⁴ Fraunhofer ISE, Freiburg, Germany; ⁵ University of Lisbon, Lisbon, Portugal; ⁶ Mines Paris - PSL, Sophia Antipolis, France; ⁷ Technical University of Denmark, Lyngby, Denmark

4BV.3.17 Deep Learning-based Sky Image Analysis for Solar Irradiance Prediction in Arid Regions

Nassma Mohands¹, Dunia Bachour¹, Daniel Perez-Astudillo¹

¹ Hamad Bin Khalifa University/Qatar Environment and Energy Research Institute, Doha, Qatar

4BV.3.19 Characterizing Temporal and Spatial Variability of DNI and GHI in Moroccan Mining Sites: Insights from Ben Guerir

Abdellatif Ghennioui¹, Mounir Abraim¹, Mohamed Smouni¹

¹ Green Energy Park, Ben Guerir, Morocco

4BV.3.20 Evaluation of Data Augmentation Techniques for Overirradiance Event Detection in Photovoltaic Systems

Alan Rodrigues de Sousa¹, João Vitor Fonseca Mendonça¹, Lucio Carlos Pimentel Paiva², Samira de Azevedo Santos Emiliavaca¹

¹ SENAI, Natal, Brazil; ² Casa dos Ventos, Fortaleza, Brazil

4BV.3.21 Quantification of Alpine Irradiance Peaks on PV Modules under Consideration of Aggregation Windows

Christof Bucher¹, Matthias Hügi¹, Vincent Guerdat¹, Marcus Rennhofer², Bernhard Kubicek², Jan Remund³, Matthias Burri⁴

¹ Bern University of Applied Science (BFH), Burgdorf, Switzerland; ² Austrian Institute of Technology (AIT), Wien, Austria; ³ Meteotest, Bern, Switzerland; ⁴ Bern University of Applied Sciences, Burgdorf, Switzerland

4BV.3.22 Evaluating Pyranometer Uncertainties with Novel Tools

Bernhard Kubicek¹, Mariella Josefina Rivera Aguilar², Kazadzis Stelios³, Bert Herteleer⁴, Fredrik Edhborg⁵, Marko Jankovec⁶, Marcus Rennhofer¹

¹ AIT, Vienna, Austria; ² Fraunhofer ISE, Freiburg, Germany; ³ PMOD WRC, Davos, Switzerland; ⁴ SUPSI, Manno, Switzerland; ⁵ RISE, Borås, Sweden; ⁶ University of Ljubljana, Ljubljana, Slovenia

4BV.3.24 Data-driven Solar Irradiance Forecasting under Aerosol Variability: Performance Analysis in Semi-Arid Region

Samira Abousaid¹, Abdelatif Ghennioui¹

¹ Green Energy Park, Benguerir, Morocco

4BV.3.26 Analysis of Geographical Smoothing and Variability Reduction in a Cluster of Solar PV Plants

Manoj Bisht¹, Rhythm Singh¹

¹ IIT, Roorkee, India

4BV.3.27 Satellite-Based Nowcasting with U-Net for Improving Blended Solar Irradiance Forecasting: a Tropical Island Case Study

Anthony Voitus¹, Clément Caron¹, Benjamin Adrien¹, Mathieu Turpin¹, Nicolas Sébastien¹, Nicolas Schmutz¹

¹ Reuniwatt, Sainte-Clotilde, France

4BV.3.28 Joint Spatial and Temporal Modeling for Township-Level Photovoltaic Power Forecasting

Jhang Shuo Luo¹, Hsin Fu Huang¹, Ya-Ching Hsu², Winston H. Hsu²

¹ thingnario, Taipei, Taiwan; ² National Taiwan University, Taipei, Taiwan

4BV.3.29 Assessing the Impact of Cloud Parameters on Solar Irradiance for PV Systems Using Keogram- and ASI-Based Analysis

Mike Zehner¹, Konrad Randl¹, Blerim Zeka¹, Fabian Pauls¹, Grit Behrens², Bernhard Mayer³

¹ Rosenheim Technical University of Applied Sciences, Rosenheim, Germany; ² University of Applied Sciences Bielefeld, Minden, Germany; ³ LMU, Munich, Germany

4BV.3.31 Operational Satellite-Based Photovoltaic Power Nowcasting via Optimized Irradiance Retrieval and Physical Model Chain

Dávid Markovics¹, Martin Janos Mayer²

¹ Budapest University of Technology and Economics, Veszprém, Hungary; ² Budapest University of Technology and Economics, Budapest, Hungary

4BV.3.32 Do Skill Scores Induce Forecast Hedging? Evidence from Probabilistic Solar Irradiance Forecasting

Josselin Le Gal La Salle¹, Philippe Lauret¹, Mathieu David²

¹ University of la Réunion, Saint-Denis, Réunion; ² University of la Réunion, Saint-Denis, France



VISUAL PRESENTATIONS 4BV.4

15:15 - 16:45 PV and Buildings

Chairpersons: Eduardo Román Medina
Tecnalia, Derio, Spain
Simona Villa
TNO, Eindhoven, The Netherlands

4BV.4.1 Vertical Photovoltaic Systems with Multi-Azimuth Orientation Integrated into Noise Barriers: Experimental, Modeling, and Economic Assessment

Matas Rudzikas¹, Juras Ulbikas¹, Algirdas Baležentis¹, Aušra Brokė², Tomas Barakauskas², Vitas Mačiulis¹

¹ Applied Research Institute for Prospective Technologies, Vilnius, Lithuania; ² House Tech Construction Company, Klaipėda, Lithuania

4BV.4.2 Colored BIPV Panels By Multilayer Interference Coatings: Tailored Lab and Outdoor Performance Monitoring

Fallon Colberts¹, Mustafa Abed Alrhman¹, Raymond Dresens¹, Roberto Habets², Daniel Mann², Stefan Hiller¹, Stefan Consten¹, Peter van Nijnatten³, Serge Timmermans³, Jurgen de Wolf³, Chiraag Reddy⁴, Pascal Buskens², Zeger Vroon¹

¹ Zuyd University, Heerlen, The Netherlands; ² TNO, Geleen, The Netherlands; ³ OMT Solutons, Eindhoven, The Netherlands; ⁴ Kameleon Solar, Roosendaal, The Netherlands

4BV.4.3 Simulation-based Study of Building Photovoltaics and Passive Cooling Strategies on Indoor Heat Stress: Integration and Sensitivity Analysis

Yingxin Feng¹, Guang Hu¹, Roel Loonen¹, Angele Reinders¹

¹ Eindhoven University of Technology, Eindhoven, The Netherlands

4BV.4.4 Color Degradation of Wall-Mounted BIPV Modules in the Nordics Compared with Temperate Climates

Sigrid Rønneberg¹, Chang Chuan You¹, Bent Thomassen¹, Nathan Roosloot¹, Gaute Otnes¹

¹ Institute for Energy Technology, Kjeller, Norway

4BV.4.5 Validation in Operation of Key Performance Indicators of BIPV Solutions for Decision-Makers

Simon Boddart¹, Yoann Servant¹, Olaia Aurrekoetxea Arratibel², Julius Jacob³, Simone Germani⁴, Hervé Lamblot⁵, Tatjana Vavilkin⁶, Maria Jimenes⁷, Tonis Eelma⁸

¹ CSTB, Sophia Antipolis, France; ² TECNALIA, San Sebastián, Spain; ³ METABUILD, Berlin, Germany; ⁴ CEI, Milano, Italy; ⁵ SUNSTYLE, Paris, France; ⁶ SOLTECH, Genk, Belgium; ⁷ ONYX SOLAR, Avila, Spain; ⁸ IBS, Tartu, Estonia

4BV.4.6 Integrated Solar Roofing: Ceramic Tiles back with Style

Alicia Buceta¹, Jaime Polo¹, Daniel Sánchez², Roberto Díaz³, María Martínez², Eugenia Zugasti¹, Jaione Bengoechea¹

¹ FUNDACION CENER, Sarriguren, Spain; ² ISFOC, Puertollano, Spain; ³ NOTIO, Toledo, Spain

4BV.4.7 Outdoor Performance Assessment of Aluminum-based PV-activated Façade Elements in Comparison to Glass-backsheet Photovoltaic Modules

Kevin Meyer¹, Stefan Bordihn¹, Wiebke Wirtz¹, Iris Kunze¹, Jonas Bollermann¹, Michael Siebert¹, Christof Basener¹, Fynn Klopp², Danny Lorenz², Henning Schulte-Huxel¹

¹ ISFH, Emmerthal, Germany; ² MN Metall, Neustadt (Holstein), Germany

4BV.4.8 Significance of Product Diversity in Building-Integrated Photovoltaic (BIPV) Modules and Associated Manufacturing Challenges

Thomas Friesen¹

¹ Megasol Energie, Deitingen, Switzerland

4BV.4.9 Wind-Driven Rain Tightness of Building-Integrated Photovoltaic Systems: Experimental Investigations and Design Recommendations

Tom Melkert¹, Hedda Victoria Kielland¹, Gabriele Lobaccaro¹, Tao Gao¹, Bjørn Petter Jelle¹

¹ NTNU, Trondheim, Norway

4BV.4.10 Semi-Transparent Line-Pattern Photovoltaics for BIPV Windows

Elias Peraticos¹, Vasiliki Paraskeva¹, Sumeet Santosh Mujumdar¹, Matthew Norton¹, Omur Bugra Gunduz², Ipek Gursel Dino², Francesco De Nicola³, Nuno Rodrigues⁴, Sascha Sadewasser⁴, Pedro Anacleto⁴, George E. Georgiou¹, Maria Hadjipanayi¹

¹ University of Cyprus, Lefkosa, Cyprus; ² METU, Ankara, Türkiye; ³ ISM-CNR, Roma, Italy;

⁴ International Iberian Nanotechnology Laboratory, Braga, Portugal

4BV.4.11 Study on Improvement of Power Generation for a Semi-transparent Photovoltaic Module Equally Arranged Linear Bifacial Solar Cells

Kazuhiko Umeda¹, Nobusato Kobayashi¹, Akira Yamaguchi², Sadaaki Miyajima¹

¹ TAISEI, Tokyo, Japan; ² TAISEI, Tokyo, Japan

4BV.4.12 High-Resolution Urban Microclimate and Solar Potential Modeling: a Case Study of Strijp-S, Eindhoven

Guang Hu¹, Roel Loonen¹, Angèle Reinders¹

¹ Eindhoven University of Technology, Eindhoven, The Netherlands

4BV.4.13 A Multi-Criteria Decision Framework for Early-Stage Feasibility Assessment of Building-Integrated Photovoltaics in India

Shantanu Roy¹, Saptak Ghosh², Madhusree Bhattacharjee¹

¹ CSTEP, Noida, India; ² CSTEP, Bengaluru, India

4BV.4.14 Experimental Assessment of Power Optimizers in Small-String Vertical Façade BIPV

Junyoung Lee¹, Dongsu Kim¹, Ruda Lee¹, Gyeong Yun¹, Jongho Yoon¹

¹ Hanbat National University, Daejeon, South Korea

4BV.4.15 A Design-driven Framework for Photovoltaic Integration in the Urban Built Environment

Lucia Montoni¹, Yingxin Feng², Guang Hu³, Roel Loonen², Angele Reinders⁴, Antonella Trombadore¹

¹ University of Florence, Florence, Italy; ² Eindhoven University of Technology, Eindhoven, The Netherlands; ³ Eindhoven University of Technology, Eindhoven, The Netherlands; ⁴ Eindhoven University of Technology, Eindhoven, The Netherlands



- 4BV.4.16 From Modeling to Operation: Experimental Validation of Different Control Strategies for BAPV-T Ventilation**
Iñaki Cornago¹, Aritz Legarrea¹, Jaione Bengoechea¹, Mikel Ezquer¹
¹ FUNDACION CENER, Sarriena, Spain
- 4BV.4.17 CALECHE: Performance Prediction of Photovoltaic Installations for Heritage Buildings Demonstrations**
Ya-Brigitte Assoa¹, Laure-Emmanuelle Perret², Keith Boxer³, Marco Larcher⁴, Dario Bottino⁴, Nina Hunter⁵, Virginie Renzi¹, Stephanie Petit⁶, Etienne Wurtz¹, Rickard Nygren³, Barbara Vogt³, Daniela Palomba⁷
¹ CEA / INES, Le Bourget-du-Lac, France; ² LMNT Consultancy, Neuchâtel, Switzerland; ³ White Arkitekter, Gothenburg, Sweden; ⁴ EURAC Research, Bolzano, Italy; ⁵ Munster Technological University, Cork, Ireland; ⁶ DOWEL Innovation, Valbonne Sophia Antipolis, France; ⁷ University of Napoli Federico II, Naples, Italy
- 4BV.4.18 Colour-Accurate, Angle-Resolved Visualisation of BIPV Installations**
Janina Willmann¹, Helen Rose Wilson¹, Bruno Bueno¹
¹ Fraunhofer ISE, Freiburg, Germany
- 4BV.4.19 Yield Optimization of Building-Integrated Photovoltaics: Integration of Realistic Shading Behavior Using a Digital Twin**
Fabian Gruber¹, Maximilian Engel¹, Dennis Huschenhöfer¹, Heiko Wirth¹
¹ ZSW, Stuttgart, Germany
- 4BV.4.20 Overloads in Building Electrical Installations caused by Plug-and-Play Photovoltaic Systems**
David Joss¹, Christof Bucher¹, Matthias Burri²
¹ Berne University of Applied Science, Burgdorf, Switzerland; ² Bern University of Applied Sciences, Burgdorf, Switzerland
- 4BV.4.21 Performance-Color Trade-Off in Photonic-Glass-Based Colored PV Modules for BIPV Applications**
Parisa Sharif¹, Ilknur Ozbayrak², Sahin Coskun³, Husnu Emrah Unalan², Alban Bek², Talat Ozden¹
¹ ODTU-GUNAM, Ankara, Türkiye; ² METU, Ankara, Türkiye; ³ ESOĞU, Eskisehir, Türkiye
- 4BV.4.22 Performance Assessment of two Solar PV Power Plants at Cuenca University Campus**
Aaron Ortiz-Pena¹, Mahamadou Abdou-Tankari², Andrés Honrubia-Escribano¹, Emilio Gómez-Lázaro¹
¹ University of Castilla-La Mancha, Albacete, Spain; ² UPEC, Creteil, France
- 4BV.4.23 Performance Loss Rates of a Vertical cBIPV Test Facade after 3.5 Years of Operation**
Nanna Lysgaard Andersen¹, Yuli Ding¹, Markus Babin¹, Sune Thorsteinsson¹
¹ DTU, Roskilde, Denmark
- 4BV.4.24 Lightweight BIPV Façade Modules: Innovation and Performance Approach**
Fabio Parolini¹, Leire Herrero², Francisco J. Cano², Giovanni Bellenda¹, Dominika Chudy¹, Jamal Abdul Ngoyaro¹, Claudio Pirota³, Stefano Magaddino³, Francesco Frontini¹
¹ SUPSI, Mendrisio, Switzerland; ² Tecnalia, San Sebastián, Spain; ³ PIZ, Cosio Valtellino, Italy

- 4BV.4.25 Structural Durability and Performance Overview of PV Noise Barrier Projects in Lithuania**
Paulius Laurikėnas¹, Julius Denafas¹, Povilas Lukinskas¹, Pascal Romer², Andreas Beinert²
¹ SoliTek R&D, Vilnius, Lithuania; ² Fraunhofer ISE, Freiburg, Germany
- 4BV.4.26 Abstract of Exploring Energy Efficiency Procurement Strategy (ESCO Model) @ Saudi Aramco NJBP Plant**
Riyadh M. AL-Zahrani¹
¹ Saudi Aramco, Thuwal, Saudi Arabia
- 4BV.4.27 Fire Safety Assessment and Design Consideration for PV System**
Sung Ju Tark¹, A-Rong Kim¹, Hoon Ki Hong¹, Sungyeop Lim¹, Soo Won Chae¹, Young-Su Kim¹
¹ Research Institute of Industrial Science and Technology, Pohang-si, South Korea
- 4BV.4.28 Mock-Up Test Analysis and Reliability Verification of Steel-Plate BIPV Modules**
A-Rong Kim¹, Young-Su Kim¹, Hoon Ki Hong¹, Sungyeop Lim¹, Soo Won Chae¹, Sung Ju Tark¹
¹ Research Institute of Industrial Science and Technology, Pohang-si, South Korea
- 4BV.4.29 Energy Resilience Performance Analysis of the Buildings during Blackouts in the Nordic with and without the Integration of Photovoltaic and Battery**
Hassam ur Rehman¹, Rakesh Ramesh¹, Jari Laarni¹, Tuisku Salonen¹
¹ VTT Technical Research Centre of Finland, Espoo, Finland
- 4BV.4.30 Physics-informed Neural Networks (PINN) for Robust Energy Yield Forecasting of BIPV System**
Soowon Chae¹, A-Rong Kim¹, Young-Su Kim¹, Hoon Ki Hong¹, Sungyeop Lim¹, Sung Ju Tark¹
¹ Research Institute of Industrial Science and Technology, Pohang-si, South Korea

VISUAL PRESENTATIONS 1BV.5

17:00 - 18:30 Silicon Material Science and Technology | Manufacturing of Silicon Cells

Chairpersons: Martin P. Bellmann (*i*)
SINTEF, Trondheim, Norway
Damian Brunner (*i*)
RENA Technologies, Gütenbach, Germany
Pierre Verlinden (*i*)
AMROCK, McLaren Vale, Australia

1BV.5.1 Process-Engineered Nano-Silicon Particles from End-of-Life Photovoltaic Waste with Controlled Metal Impurities for High-Performance Lithium-Ion Batteries

Ju Hee Son¹, Jin-Seok Lee¹
¹ KIER, Daejeon, South Korea



- 1BV.5.2 Wafer Thermal Treatment: a Way to Improve Bulk Quality of Wafer made from Recycled Silicon from PV Module**
Mickael Albaric¹, Etienne Pihan¹, Nicolas Enjalbert¹, Saliha Edouard¹
¹ CEA / INES, Le Bourget-du-Lac, France
- 1BV.5.3 Electron Irradiation-Induced Degradation of SHJ Cells for the Low Earth Orbit Constellation Application**
Fanying Meng¹, Yue Yuan¹, Qiang Shi¹, Zhengxin Liu¹
¹ CAS, Shanghai, China
- 1BV.5.4 Defect Characterisation and Lifetime Stability in Gallium-Doped Crystalline Silicon for Stable High-Efficiency Solar Cells**
Marija Demicoli¹, Aaron Piculo Perez¹, Nurhayat Yıldırım², Bülent Arıkan³, Melisa Korkmaz Arslan³, Adela Veronica Gonzalez Perez¹, Ece Çamkara², Meriç Çalışkan Arslan², Raşit Turan³, Luciano Mule' Stagno¹
¹ University of Malta, Marsaxlokk, Malta; ² KalyonPV Research and Development Center, Ankara, Türkiye; ³ Middle East Technical University, Center for Solar Energy Research and Applications (ODTU-GUNAM) and Middle East Technical University, Ankara, Türkiye
- 1BV.5.5 Czochralski Crystal Puller for PV Ingot Production Including Machine Learning Driven Process Automation**
Frank Mosel¹, Michael Haydn¹, Christoph Grammig¹, Peter Richert¹, Olli Anttila², Oyvind Nielsen²
¹ PVA Crystal Growing Systems, Wettenberg, Germany; ² CZ-Tech, Tarnasen, Norway
- 1BV.5.6 A Metal- and Ceramic-Impurity Controlled Silicon Material Recovery Process from Photovoltaic Waste and Its Conversion to Silicon Nitride**
Jin-Seok Lee¹, Seong-Pyo Lee¹, Gi-Hwan Kang¹
¹ KIER, Daejeon, South Korea
- 1BV.5.7 A Theoretical-Experimental Model for High-Temperature Nitrogen Diffusion and Defect Suppression in Monocrystalline Silicon Wafers**
Veronica Gonzalez¹, Marija Demicoli¹, Luciano Mule' Stagno¹
¹ University of Malta, Marsaxlokk, Malta
- 1BV.5.8 Reducing Kerf Loss in Industrial Wafering: Impact of Tungsten Diamond Wire on Yield and Cost**
Çağrı Taha Delikanlı¹, Gamze Çekerek¹, Özlem Coskun¹, Kaan Görgisen¹, Yasemen Deniz¹, Runahi Altintas¹, Meriç Çalışkan Arslan¹
¹ KalyonPV, Ankara, Türkiye
- 1BV.5.9 Investigating the Role of Hydrogen in UV-induced Degradation and Recovery in p-type c-Si Structures**
Aeron Johns¹, Muhummad Umair Khan¹, Alison Ciesla¹, Lahiruni Ranasinghe¹, Chandany Sen¹, Bram Hoex¹
¹ UNSW, Sydney, Australia
- 1BV.5.25 Triangular Front Contacts on Heterojunction Solar Cells: Performance and Fabrication**
Jonas Valentijn¹, Rebecca Saive¹
¹ University of Twente, Enschede, The Netherlands

- 1BV.5.26 Silane- and Phosphine-free PVD Process Technologies for Industrial TOPCon Solar Cells**
Eric Schneiderlöchner¹, Volker Linß¹, Tina Dietsch¹, Uwe Graupner¹, Sebastian Gatz¹, Henning Nagel², Winfried Wolke², Pierre Saint-Cast², Sebastian Mack²
¹ VON ARDENNE, Dresden, Germany; ² Fraunhofer ISE, Freiburg, Germany
- 1BV.5.27 Process Optimization of Boron Diffusion via In-situ Central Gas Injection System to Eliminate B2O3 Byproducts and Enhance Cell Efficiency**
Cheng-Wen Kuo¹, Ta-Ming Kuan¹, Yung-Chih Li¹, Chun-Wei Lee¹, Wei-Lo Chueh¹, Li-Guo Wu¹, Cheng-Yeh Yu¹
¹ TSEC Corporation, Hsinchu, Taiwan
- 1BV.5.28 Achieving Module Ready Silver-lean TOPCon Cells with Copper Electroplating**
Jonas Eckert¹, René Haberstroh¹, Christian Schmiga¹, Damian Brunner², Mathias Kamp², Dirk Eberlein¹, Sven Kluska¹
¹ Fraunhofer ISE, Freiburg, Germany; ² RENA Technologies, Freiburg, Germany
- 1BV.5.29 Modeling the Influence of Bipolar Waveform Modulation on SiH₄-H₂ Plasmas for Amorphous Silicon Deposition**
Tim Gehring¹, Mateusz Wiosna², Mohammad Afaque Hossain¹, Daniel Loch¹, Michalina Perron², Wojciech Gajewski²
¹ TRUMPF Hüttinger, Freiburg, Germany; ² TRUMPF Hüttinger, Zielonka, Poland
- 1BV.5.30 Industrial-Compatible Selective Patterning of poly-Si/SiO_x Passivating Contacts Using Screen-Printed Etch-Resist Masking**
Eni Muka¹, Seda Kılıçkaya Ünver¹, Yiğit Mert Kaplan¹, Gökhan Altın¹, Agageldi Muhammetgulyev², Ayca Berfin Aydogdu², Hisham Nasser¹, Raşit Turan¹
¹ ODTÜ-GÜNAM, Ankara, Türkiye; ² CW Energy Research and Development Center, Antalya, Türkiye
- 1BV.5.31 Laser Scribing of Semitransparent Amorphous Silicon Cells for Thin-Film Module Interconnection**
Fernando Anguiano¹, David Canteli², David Munoz-Martin², Gustavo Alvarez-Suarez³, Gerard Masmitja³, Pau Estarlich³, Cristobal Voz³, Gilberto Gomez Rosas¹, Miguel Morales², Carlos Molpeceres²
¹ University of Guadalajara, Guadalajara, Mexico; ² UPM, Madrid, Spain; ³ UPC, Barcelona, Spain
- 1BV.5.32 Selective Poly-Si Patterning via 532nm Picosecond Laser and Alkaline Etching**
Shojaa Abusakha¹, Bülent Arıkan¹, Yiğit Mert Kaplan¹, Gökhan Altın¹, Hisham Nasser¹, Raşit Turan¹
¹ ODTÜ-GÜNAM, Ankara, Türkiye
- 1BV.5.33 Seed Layer for Ni/Cu Plated Metallization of Wet Etch Opened TOPCon Solar Cells: Parameters Optimization and Nickel Silicide Formation**
Roberto Boccardi¹, Gisele Alves dos Reis Benatto¹, Clara Bolette Brendstrup Møller¹, Irene Tosi², Peter Torben Tang², Io Mizushima³, Rasmus Schmidt Davidsen⁴, Peter Behrendsdorff Poulsen¹, Sune Thorsteinsson¹
¹ DTU, Roskilde, Denmark; ² IPU, Virum, Denmark; ³ Elplatek, Espergærde, Denmark; ⁴ Aarhus University, Aarhus, Denmark



1BV.5.34 Evaluating Curing Mechanisms in Copper Based Low-Temperature Metallization Pastes for Solar Cells

Oumaima Mhirs¹, M. Noah Wengenmeyr¹, Jonas Bartsch¹

¹ Fraunhofer ISE, Freiburg, Germany

1BV.5.35 Busbarless TOPCon Solar Cell Design with Finger-Bypass Connections and Ribbon Composition Optimization

Mert Kahraman¹, Halil Eldemir¹

¹ Kalyon Solar Technologies Production, Ankara, Türkiye

Wednesday, 16. September 2026

VISUAL PRESENTATIONS 4CV.1

13:30 - 15:00 Design, Engineering and Installation of PV Systems; BoS

Chairpersons: Kari Lappalainen
Tampere University, Finland

Sara Bouguerra
imo-imomec, Diepenbeek, Belgium

4CV.1.1 Impact of Albedo Parameterization on Bifacial Gain Estimation: A Comparative Study on a Utility-Scale PV Plant in Sicily

Ida Bruno¹, Camilla Lops¹, Mariano Pierantozzi¹, Sergio Montelpare¹

¹ University "G. D'Annunzio" of Chieti-Pescara, Pescara, Italy

4CV.1.2 Simplified Methodology for Estimating the Shading Effect in Rooftop PV Potential in the Framework of a Web Platform for Energy Communities in Catalonia

Marina Calcagnotto¹, Jordi Pascual¹, Joana Ortiz¹, Jaume Salom¹

¹ IREC, Sant Adrià de Besòs, Spain

4CV.1.3 From Steady-State to Transient: Implications of Subhourly Temperature Modelling in PVsyst

Auriane Canese¹, Luca Antognini¹, André Mermoud¹, Michele Oliosi¹, Robin Vincent¹, Bruno Wittmer¹

¹ PVsyst, Satigny, Switzerland

4CV.1.4 Modeling Solar PV Glare and Its Implications for Aviation Operations at Marmul Airport, Oman

Mazin Al Shidhani¹, Waleed Al Washahi¹

¹ Petroleum Development Oman, Muscat, Oman

4CV.1.5 Proposal for Structural Serviceability Criteria for Single-Axis PV Tracker

Arianna di Mauro¹, Max Dinkelaker¹, Alf Oschatz¹

¹ sbp sonne, Stuttgart, Germany

4CV.1.6 First Standard for Plugin-PV and Further Development in Germany

Udo Siegfriedt¹, Ralf Haselhuhn¹

¹ Deutsche Gesellschaft für Sonnenenergie LV Berlin Brandenburg, Berlin, Germany

4CV.1.7 New Guideline for Critical Glare along German Highways and its Implication for Mitigation Measures

Anne Forstinger¹, Marvin Listl¹, Giorgio Bardizza², Magnus Herz¹

¹ TÜV Rheinland, Cologne, Germany; ² TÜV Rheinland, Milan, Italy

4CV.1.8 Smart Tracker Control: a new Autonomous Architecture Enabling Safer, Faster and More Resilient Solar Tracker

Giuseppe Demofonti¹, Andrea Monni¹, Matteo Frapparelli¹, Giammarco Andriulli¹

¹ Valmont Solar - Convert Italia, Rome, Italy



4CV.1.9 PV Balancer, the Ultimate Solution for High Performance Solar Modules Systems with and without Shade

Nicolaas J.J. Dekker¹, Simona Villa², Menno N. van den Donker³, Michiel Roelofs⁴

¹ TNO, Petten, The Netherlands; ² TNO, Eindhoven, The Netherlands; ³ Durin, Weert, The Netherlands; ⁴ Taylor Technologies, Eindhoven, The Netherlands

4CV.1.10 Inverter loading: A Regional Analysis

Rodrigo Amaro e Silva¹, Carolina Crespo²

¹ University of Lisbon, Faculty of Sciences, Instituto Dom Luiz, Lisboa, Portugal; ² University of Lisbon, Lisboa, Portugal

4CV.1.11 Solarfarmer Proven Accuracy for Bankable Energy Assessments

Luca Vignoni¹, Nathalia Ferrari²

¹ DNV, Barcelona, Spain; ² DNV, Porto Alegre, Brazil

4CV.1.12 Comprehensive Performance Assessment of Bifacial Photovoltaic Modules Considering Ground Albedo and Installation Conditions

Dongsu Kim¹, Junyoung Lee¹, Wonseok Choi¹, Hyunjoong Kim¹, Jongho Yoon¹

¹ Hanbat National University, Daejeon, South Korea

VISUAL PRESENTATIONS 2CV.2

15:15 - 16:45 New Materials, Devices and Conversion Concepts | New Modelling and Characterisation Techniques

Chairpersons: Elisa Antolín
UPM, Madrid, Spain
Theresa Magorian Friedlmeier
ZSW, Stuttgart, Germany

2CV.2.1 Selective Laser Ablation of Copper Nitride Thin Films for Photovoltaic Applications

David Canteli¹, Andrés de Diego², Susana Fernández³, Orlando Guarneros⁴, Cristina Munoz-Garcia², Jose Javier Gandia³, Carlos Molpeceres²

¹ Technical University of Madridsidad Politécnica de Madrid, Madrid, Spain; ² Technical University of Madrid, Madrid, Spain; ³ CIEMAT, Madrid, Spain; ⁴ Autonomous University of San Luis Potosí, San Luis Potosí, Mexico

2CV.2.2 Wide-Bandgap p-Type BaCu₄S₃ Thin Films via Sputtering-Sulfurization

Younes Lablali¹, Olivier Donzel-Gargand², Jonathan J. Staaf Scragg², Mohammed Makha¹

¹ Mohammed VI Polytechnic University, Ben Guerir, Morocco; ² Uppsala University, Uppsala, Sweden

2CV.2.3 Student Awards Finalist Presentation: Van Der Waals Assembled Schottky-Junction Solar Cells Based on Substitutionally Doped p-Type MoS₂

Jorge Rodríguez-Muro¹, Elvira Cánovas¹, Inés Durán¹, Rafailia Rountou¹, Der-Yuh Lin², Elisa Antolín¹, Simon A. Svatek¹

¹ UPM, Madrid, Spain; ² National Changhua University of Education, Changhua, Taiwan

2CV.2.4 Synthesis of Zinc Oxide Quantum Dots as Downshifting Materials for Enhanced Photovoltaic Performance

Nazim Aslam¹, Valentina Diolaiti¹, Leonardo Sollazzo¹, Donato Vincenzi¹

¹ University of Ferrara, Ferrara, Italy

2CV.2.5 Hyperuniform Nanopatterning by Polymer-blend Lithography for Light-trapping in Solar Cells

Simon Ryckaert¹, Sylvain Finot², Jeronimo Buencuerpo³, Inès Revol⁴, Stéphane Collin¹

¹ C2N, Palaiseau, France; ² IPVF, Palaiseau, France; ³ IMN-CSIC, Madrid, Spain; ⁴ LAAS, Toulouse, France

2CV.2.6 Plasmonic Enhancement of Perovskite Absorber Layers Using Stable Metal Nanoparticles

Mohammad Istiaque Hossain¹, Alaa Elsafi¹, Brahim Aissa¹

¹ QEERI, Doha, Qatar

2CV.2.7 Resonant Nanostructures for Colored Photovoltaics

Tom Veeken¹, Cathalijne Hupkens¹, Evert Bende², Albert Polman¹

¹ AMOLF, Amsterdam, The Netherlands; ² Solarix, Weesp, The Netherlands

2CV.2.8 III-V Growth on Patterned Graphene for Transferable Thin-Films

Naomie Messudom¹, Carlos Macias¹, Antonella Cavanna¹, Ali Madouri¹, Gilles Patriarche¹, Nathaniel Findling¹, Stefano Pirota¹, Jean-Baptiste Rodriguez², Laurent Travers¹, Nathalie Bardou¹, Stéphane Collin¹, Jean-Christophe Harmand¹, Amaury Delamarre¹

¹ CNRS, Palaiseau, France; ² CNRS, Montpellier, France

2CV.2.9 Laser Patterning of MoO_x-Based DMD Electrodes for Photovoltaic Applications: Thresholds and Process Windows

Daniele Arduino¹, David Canteli², David Munoz-Martin², Umer Aziz³, Ana Luz Muñoz-Rosas³, Luciano Scaltrito¹, Sergio Ferrero¹, Andrea Ancillao¹, Julià Lopez-Vidrier³, Joan Bertomeu³, Miguel Morales², Carlos Molpeceres²

¹ Polytechnic University of Turin, Turin, Italy; ² UPM, Madrid, Spain; ³ University of Barcelona, Barcelona, Spain

2CV.2.11 Simulation and Analysis of Gallium Nitride-based Multijunction Photovoltaics

Sherif Michael¹, Casey Kileen²

¹ Naval Postgraduate School, Monterey, United States of America; ² United States Naval Academy, Annapolis, United States of America

2CV.2.25 Dual-Chopping Spectral Responsivity System for Advanced Photovoltaic Device Calibration

Blago Mihaylov¹, Harald Müllejjans¹, Ewan D. Dunlop¹

¹ European Commission, Ispra, Italy

2CV.2.26 Interpretable Physics-informed Bayesian Optimization in Photovoltaic Materials Acceleration Platforms

Joseph Chakar¹, James Connolly², Stefania Cacovich³, Jean-Paul Kleider², Jean-François Guillemoles³, Jean-Baptiste Puel⁴, Philip Schulz³

¹ IPVF, Palaiseau, France; ² CentraleSupélec (GeePs), Gif-sur-Yvette, France; ³ CNRS, Palaiseau, France; ⁴ EDF, Palaiseau, France



- 2CV.2.27 Varied Intensity I-V Measurement of the Emerging PV under Indoor Lighting**
Yean-San (Mickey) Long¹, Yung-Tsung Liu¹, San-Yu Ting¹, Min-An Tsai¹, Cho-Fan Hsieh¹
¹ ITRI, Hsinchu, Taiwan
- 2CV.2.28 First-Principles Investigation on the Influence of Molecular Orientation, Defects, and Doping on the Optical Properties of MAPbI₃**
Engin Torun¹, Paul Procel Moya¹, Luana Mazzarella¹, Olindo Isabella¹, Ferdinand Grozema¹, Rudi Santbergen¹
¹ Delft University of Technology, Delft, The Netherlands
- 2CV.2.29 Materials Chemical Composition Impacts on the Band Alignments: the Case of the 3D/2D Perovskite Interfaces**
Philippe Baranek¹
¹ EDF R&D, Palaiseau, France
- 2CV.2.30 Understanding the Role of Haze in Indoor Perovskite Solar Cells**
Eugenia Zugasti¹, Alicia Buceta¹, Cristina Pinto¹, Iñaki Cornago¹, Asier Murillo¹, Jaione Bengoechea¹, Antonio Urbina²
¹ CENER, Sarriena, Spain; ² UPNA, Pamplona, Spain
- 2CV.2.31 Advanced Synchrotron X-Ray and Neutron Techniques to Reveal Early-Stage Degradation Mechanisms in PV Devices**
Hugo Lajoie¹, Tristan Gageot¹, Romain Couderc¹, Pierre Everaere², Thu Nhi Tran Caliste², Edward Mitchell², Thomas Saerbeck³, Mark Robert Johnson³, Ioannis (John) A. Tsanakas¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² ESRF, Grenoble, France; ³ ILL, Grenoble, France
- 2CV.2.33 Spatial and Spectral Analysis of Short-Term Changes in Perovskite Photoluminescence Signal via Hyperspectral Imaging**
Ivar Loland Råheim¹, Åsmund Cornelius Hamre¹, Espen Olsen¹
¹ NMBU, Ås, Norway
- 2CV.2.34 Quantifying the Mobile Ion Density and Mobility in Perovskite Solar Cells with Impedance Spectroscopy**
Fransien Elhorst¹, Yieon Park¹, Patricia Martin Fernandez¹, Javier Sebastián Alonso², Henk Bolink², Jan Anton Koster¹
¹ University of Groningen, Groningen, The Netherlands; ² University of Valencia, Valencia, Spain
- 2CV.2.36 Improving Surface Photovoltage Measurements in Photovoltaic Materials by Synchronized Modulation KPFM**
Zeinab Eftekhari¹, Ariane Ufer², Ursula Wurstbauer², Rebecca Saive¹
¹ University of Twente, Enschede, The Netherlands; ² University of Münster, Münster, Germany
- 2CV.2.37 Multisource LED Solar Simulation for Accurate and Wavelength-Resolved Photovoltaic Characterization**
Reza Khodabakhsh¹
¹ G2V Optics, Edmonton, Canada

- 2CV.2.38 Mapping Carrier Dynamics: Combining Time-Resolved Photoluminescence and Spatial Imaging for Advanced Semiconductor Research**
Emilio Gutierrez-Partida¹, Eugeny Ermilov¹, Volker Buschmann¹, Christian Oelsner¹, Felix Koberling¹, Jürgen Breitlow¹, Rainer Erdmann¹
¹ PicoQuant, Berlin, Germany

VISUAL PRESENTATIONS 2CV.3

17:00 - 18:30 Perovskite-based Tandem and Multijunction Devices | Perovskites

Chairpersons: Perrine Carroy
CEA, Le Bourget-du-Lac, France
Nikoleta Kyranaki
Hasselt University, Genk, Belgium
Sjoerd Veenstra
TNO Energy Transition, Eindhoven, The Netherlands

- 2CV.3.1 All-Perovskite Tandem Solar Cells**
Dewei Zhao¹
¹ Sichuan University, Chengdu, China
- 2CV.3.3 Comparative Studies of III-V/Si and Perovskite/Si Tandem Solar Cells for Solar-powered Vehicle Applications**
Masafumi Yamaguchi¹, Tatsuya Takamoto², Takashi Mabuchi³, Seira Yamaguchi³, Kenichi Okumura³, Ryo Ozaki¹, Nobuaki Kojima¹, Yoshio Ohshita¹
¹ Toyota Technological Institute, Nagoya, Japan; ² University of Miyazaki, Miyazaki, Japan; ³ Toyota Motor Corporation, Toyota, Japan
- 2CV.3.4 Two-Step Crystallization Modulation of Wide-Bandgap Perovskite Films on Commercially Compatible Crystalline Silicon for High-Efficiency Perovskite-Silicon Tandem Solar Cells**
Lin Wu¹, Jiawei Zhang¹, Jiawen Li¹, Haowen Luo¹, Yifeng Zhang¹, Yuchao Hu¹
¹ Tongwei Solar, Chengdu, China
- 2CV.3.5 High Volume Manufacturing of Perovskite Cell Stacks using Linear Evaporators**
Jens Baumann¹, Frank Löffler¹, Bruno Heimke¹, Martin Fischer¹
¹ VON ARDENNE, Dresden, Germany
- 2CV.3.6 Enhancing the Electrical Properties of nc-Si:H / NiOx Interfaces in Perovskite-Silicon Tandem Cells using Aluminum doped Nickel Oxide Deposited by ALD**
Yann Pinal¹, Chandralina Patra², Damien Coutancier¹, Solène Béchu³, Muriel Bouttemy³, Jose Alvarez⁴, Erik Johnson², Nathanaelle Schneider¹
¹ IPVF, Palaiseau, France; ² LPICM, Palaiseau, France; ³ ILV-UVSQ, Versailles, France; ⁴ GEPS, Gif sur Yvette, France



- 2CV.3.7 Perovskite Coating Process Control: from Laboratory Diagnostics to Industrial Scale Metrology Systems**
Jens Baumann¹, Jona Kurpiers², Christian Camus³, Löffler Frank¹, Heimke Bruno¹
¹ VON ARDENNE, Dresden, Germany; ² HZB, Berlin, Germany; ³ LayTec, Berlin, Germany
- 2CV.3.8 Methylammonium Free Perovskite Top Cell via 2-step Hybrid Method for Perovskite/Si Tandem Application**
Anna De Girolamo Del Mauro¹, Manuela Ferrara¹, Gennaro V. Sannino¹, Maria Federica Caso¹, Marco Della Noce¹, Eugenia Bobeico¹, Pietro Scognamiglio¹, Iurie Usatii¹, Paola Delli Veneri¹, Lucia V. Mercaldo¹
¹ ENEA, Portici, Italy
- 2CV.3.9 Scalable Low Damage PVD Methods for TCOs for Perovskite Solar Cells**
Martin Dimer¹, Barbara Gebhardt¹, Boris Rivkin², Vishnupriya Rajukumar Hegden², Yana Vaynzof², Oliver Haustein¹, Holger Pröhl¹
¹ VON ARDENNE, Dresden, Germany; ² IFW, Dresden, Germany
- 2CV.3.10 A Curated, AI-Extracted Database for Accelerating the Development of Perovskite-Silicon Tandem Solar Cells**
Mohammad Moaddeli¹, Branoosh Afshari¹, Negin Nezamloo², Mansour Kanani¹, Mohammadreza Aghaei³
¹ Shiraz University, Shiraz, Iran; ² Imam Khomeini International University, Qazvin, Iran; ³ Norwegian University of Science and Technology, Aalesund, Norway
- 2CV.3.11 Back-Contact 2-Terminal Perovskite-Silicon Tandem Solar Cells and Modules by Metal Wrap-Through Technology**
Melvin ten Kate¹, Yu Wu¹, Eric Kossen¹, Nicolas Guillevin¹, Eelko Hoek¹, Martijn Ronchetti¹, Victor Rosca¹, Johan Bosman², Anne Biezemans², Marcel Simor², Giulia Lucarelli², Valerio Zardetto², Bart Geerligs¹
¹ TNO, Petten, The Netherlands; ² TNO, Eindhoven, The Netherlands
- 2CV.3.12 Fast Reverse Bias Characterization of Perovskite-Silicon Tandem Solar Cells**
Ivanol Jaurece Djeukeu¹, Jonas Horn², Michael Meixner², Enno Wagner³, Stefan W. Glunz⁴, Klaus Rampseck²
¹ halm elektronik / Albert-Ludwigs-University Freiburg, Frankfurt am Main/Freiburg, Germany; ² halm elektronik, Frankfurt am Main, Germany; ³ Frankfurt University of Applied Sciences, Frankfurt am Main, Germany; ⁴ Fraunhofer ISE/Albert-Ludwigs-University Freiburg, Freiburg, Germany
- 2CV.3.13 Scalable Perovskite/Silicon Tandems for Mass Production – Critical Cell Processes and Module Design**
Jiawei Zhang¹, Lin Wu¹, Jiawen Li¹, Haowen Luo¹, Yuchao Hu¹, Yifeng Zhang¹, Wei Long¹
¹ Tongwei Solar, Chengdu, China
- 2CV.3.14 Laser Processes for Perovskite and Organic Solar Cells and Modules for Large Substrates with Multi-Wavelength at Film Side and Glass Side Processing**
Stefan Bergfeld¹, Tsvetelina Merdzhanova²
¹ Aachen University of Applied Science, Jülich, Germany; ² FZJ, Jülich, Germany

- 2CV.3.15 Upscaling of the Perovskite Top Cell for 2T Perovskite-CIGS Tandem Cells**
Denise Kreugel¹, Radha Krishnan Kothandaraman¹, Corné Frijters¹, Sinclair Ryley Ratnasingham¹, Marcel Simor¹, Drishya Rajan Pillai¹, Chandu Mohan¹, Johannes Lambooi¹, Hero 't Mannetje¹, Damilola Adeleye², Guillermo Farias Basulto², Reiner Klenk², Christian A. Kaufmann², Kousumi Mukherjee³, Mariadriana Creatore³, Veronique Gevaerts¹, Valerio Zardetto¹
¹ TNO, Eindhoven, The Netherlands; ² HZB, Berlin, Germany; ³ Eindhoven University of Technology, Eindhoven, The Netherlands
- 2CV.3.16 Energy Yield Modelling of Tandem Monofacial and Bifacial Modules in the IEC 61853-4 Standard Climates**
James Blakesley¹, Emily O'Connor¹, Lavanya Malarkannan¹, George Koutsourakis¹
¹ National Physical Laboratory, Teddington, United Kingdom
- 2CV.3.17 Influence of Dimethyl Sulfoxide Additives on Inkjet-Printed Perovskite-Silicon Tandem Solar Cells**
Parisa Aktepe¹, Leon Brenner¹, Raphael Efinger¹, Roman Keding¹
¹ Fraunhofer ISE, Freiburg, Germany
- 2CV.3.18 Passivation-Induced Interfacial Reconstruction Probed by Cross-sectional TEM in 2T Perovskite/Silicon Tandem Solar Cells**
Chandralina Patra¹, Anna Capitaine¹, Van-Son Nguyen¹, Junkang Wang², Kassioé Dembélé², Pavel Bulkin², Jean Rousset³, Pere Roca i Cabarrocas², Erik V. Johnson²
¹ IPVF, Palaiseau, France; ² LPICM - CNRS, Palaiseau, France; ³ EDF R&D, Palaiseau, France
- 2CV.3.19 The Difference Between Stabilized Power Point and Swept Power Point with Various JV Sweep Parameters**
Sercan Aslan¹, Sercan Aslan², Amir Afshord Zarean¹, Samah Akel¹, Thomas Kirchartz¹, Thomas Kirchartz³, Uwe Rau¹, Uwe Rau², Kaining Ding¹, Kaining Ding²
¹ FZJ, Jülich, Germany; ² Aachen University, Aachen, Germany; ³ University of Duisburg-Essen, Duisburg, Germany
- 2CV.3.20 Unravelling Perovskite Degradation Mechanisms on Textured Silicon for Tandem Photovoltaics**
Mingrui He¹, Hongjae Shim¹, Xiaojing Hao¹
¹ UNSW, Sydney, Australia
- 2CV.3.21 Laser Annealing-Assisted Perovskite Thin Film Preparation and Tandem Device Fabrication**
Jianbo Liu¹, Meng Zhang², Chunlan Zhou³, Ke Xin⁴, Yue Ma⁵, Yuelong Huang⁵
¹ Huzhou Phoenixlar, Huzhou, China; ² University of New South Wales, Sydney, Australia; ³ Chinese Academy of Sciences, Beijing, China; ⁴ Huzhou Phoenixlar, Huzhou, China; ⁵ Huzhou Phoenixlar, Huzhou, China



- 2CV.3.22 Ambient-air Processed Slot-die Coated 2T Perovskite-Silicon Tandem Solar Cells with Green Solvent Formulations and Non-Fullerene Transport Layers**
Radha Krishnan Kothandaraman¹, Denise Kreugel¹, Felipe Vinocour Pacheco¹, Sinclair Ryley Ratnasingham¹, Marcel Simor¹, Manvika Singh¹, Corné Frijters¹, Johannes Lambooij¹, Giulia Lucarelli¹, Ilker Dogan¹, Bart (L.J.) Geerligs², Valerio Zardetto¹
¹ TNO, Eindhoven, The Netherlands; ² TNO, Petten, The Netherlands
- 2CV.3.23 Development of Inverted Perovskite Solar Cells for Perovskite-Silicon Tandem Applications and Their Evaluation via Hyperspectral Photoluminescence Imaging**
Saemi Takahashi¹, Toshimitsu Mochizuki¹, Hitoshi Sai², Takuya Matsui², Katsuto Tanahashi¹
¹ AIST, Koriyama, Japan; ² AIST, Tsukuba, Japan
- 2CV.3.24 Challenges of Acetate Precursor for Cobalt Oxide Transport Layer in Perovskite Solar Cells**
Nikita Chaudhary¹, Kaushik Ghosh¹
¹ Institute of Nanoscience and Technology, Mohali, India
- 2CV.3.25 Additive Engineering of SnPb-Based Narrow Band Gap Perovskite Solar Cells Using Functional Molecule**
Vishal Singh¹, Masatoshi Yanagida², Prabhakar Singh¹, Yasuhiro Shirai², Dhruba B. Khadka²
¹ IIT (BHU) Varanasi, Varanasi, India; ² NIMS, Tsukuba, Japan
- 2CV.3.26 Developing Sub-micron Pyramidal Texturing Approach on Large Area for Next-Generation Perovskite/Silicon Tandem Cells**
İrem Nur Manaz¹
¹ ODTÜ-GÜNAM, Ankara, Türkiye
- 2CV.3.27 Multiphysics Design and Optimization of Dual-Source Closed-Space Deposition for Scalable Perovskite-Silicon Tandem Manufacturing**
Vignesh Murali¹, Marc van der Velden¹, Peter Diepens¹
¹ Smit Thermal Solutions, Eindhoven, The Netherlands
- 2CV.3.37 Crystallization Control using Molecular Additives for High-Efficiency, Large-Area Perovskite Modules**
Zi-Fan He¹, Amit Kumar Harit¹, Anurag Krishna¹
¹ IMEC, Genk, Belgium
- 2CV.3.38 Interplay of Cross-Reading, Pressure and Co-evaporation Speed on Triple-Source FA-Based Perovskite Films and Devices**
Reinder K. Boekhorst¹, Lara M. van der Poll¹, Jin Yan¹, Aidan le Roux¹, Daan Bakker¹, Judah Robson¹, Arno H.M. Smets¹, Tom J. Savenije¹, Luana Mazzarella¹
¹ TU Delft, Delft, The Netherlands
- 2CV.3.39 Dual Vapor-Phase Treatment Driven Subsurface Reorganization for 3D Passivation Networks towards Ultralow Interfacial Energy Loss in Perovskite Photovoltaics**
Xianzhao Wang¹, Han He¹, Ying Zhao¹, Xiaodan Zhang¹
¹ Nankai University, Tianjin, China

- 2CV.3.40 Stability under Illumination of FAPbBr₃ Perovskite Cells and Modules: Effects of Device Upscaling and Different Operating Conditions**
Noah Tormena¹, Andrea Quagliotto¹, Alessandro Caria¹, Matteo Buffolo¹, Carlo De Santi¹, Andrea Cester¹, Gaudenzio Meneghesso¹, Enrico Zanoni¹, Jessica Barichello², Fabio Matteocci², Aldo Di Carlo², Nicola Trivellini¹, Matteo Meneghini¹
¹ University of Padova, Padova, Italy; ² University of Rome, Rome, Italy
- 2CV.3.41 Metal-Organic Framework-Assisted Buried Interface Engineering for Stabilization of Perovskite-Based Solar Cells**
Nicolas Pernès¹, Thomas Gomes¹, Yifan Xu², Farid Nouar², Stéphane Cros¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² ESPCI, Paris, France
- 2CV.3.42 Tin-Lead Perovskite Solar Cells with Outstanding Stability**
Andrea Arreola Vargas¹, Qianshan Feng¹, David Garcia Romero¹, Maria Antonietta Loi¹
¹ University of Groningen, Groningen, The Netherlands
- 2CV.3.43 Understanding the Electronic Consequences of Geometry: Nanotexturing in Perovskite Solar Cells**
Klaus Jäger¹, Dilara Abdel², Jacob Relle¹, Thomas Kirchartz³, Patrick Jaap², Jürgen Fuhrmann², Sven Burger⁴, Christiane Becker¹, Patricio Farrell²
¹ HZB, Berlin, Germany; ² Weierstrass Institute for Applied Analysis and Stochastics (WIAS), Berlin, Germany; ³ FZJ, Jülich, Germany; ⁴ Zuse Institute Berlin, Berlin, Germany
- 2CV.3.44 Anti-Soiling Electrodes in Extreme Operating Conditions**
Mohammad Istiaque Hossain¹, Brahim Aissa¹
¹ QEERI, Doha, Qatar
- 2CV.3.45 Achieving High Open-Circuit Voltage in Wide-Bandgap Bromide Perovskite Solar Cells through Hole Transport Material Engineering**
Mohammad Istiaque Hossain¹, Brahim Aissa¹
¹ QEERI, Doha, Qatar
- 2CV.3.46 2D Perovskite Formation at the EDAl₂-passivated Surface of a Triple-cation Triple-halide Perovskite Resulting in High Efficiencies**
Johannes Löhr¹, Hannah Genath², Robby Peibst¹, Jan Schmidt¹
¹ ISFH, Emmerthal, Germany; ² Leibniz University, Hannover, Germany
- 2CV.3.47 Durability of Mixed-Halide Aziridinium Perovskite Thin films under Environmental Stress**
Witchaya Arpavate¹, Young Un Jin¹, Lars Leander Schaberg², Marianela Escobar-Castillo¹, Niels Benson², Doru C. Lupascu¹
¹ University of Duisburg-Essen, Essen, Germany; ² University of Duisburg-Essen, Duisburg, Germany
- 2CV.3.48 Roll-to-Roll Slot-Die Coating of Flexible n-i-p Perovskite Devices**
Giulia Lucarelli¹, Felipe Vinocour Pacheco¹, Drishya Rajan Pillai¹, Harrie Gorter¹, Thomas Exlager¹, Chandu Mohan¹, Johannes Lambooij², Ilker Dogan¹, Sjoerd Veenstra¹
¹ TNO, Eindhoven, The Netherlands; ² TNO, Eindhoven, United States of America



- 2CV.3.49 Mechanisms of Crystallization in Sequentially Evaporated Tin-Lead Perovskite**
Niels van Silfhout¹, Lara van der Poll¹, Reinder Boekhoff¹, Luana Mazzarella¹, Tom Savenije¹, Arno Smets¹
¹ Delft University of Technology, Delft, The Netherlands
- 2CV.3.50 Insights into the Degradation of Hybrid Lead Halide Perovskite Thin Films and Solar Cell Devices During Outdoor Exposure**
Maria Hadjipanayi¹, Vasiliki Paraskeva², Aliko Souzou², Modestos Athanasiou², Aranzazu Aguirre³, Anurag Krishna³, Tamara Merckx³, Alexandros Themistokleous², Sophia Hayes², Grigorios Itskos², Sumeet Mujumdar², Elias Peraticos², Tom Aernouts³
¹ University of Cyprus, Nicosia, Cyprus; ² University of Cyprus, Nicosia, Cyprus; ³ IMEC, Genk, Belgium
- 2CV.3.51 Impact of Water Ingress and Damp Heat on POE-Encapsulated Perovskite Solar Cells**
Arslan Ali¹, Marko Jošt¹, Kristijan Brecl¹, Marko Topič¹, Marko Jankovec¹
¹ University of Ljubljana, Ljubljana, Slovenia
- 2CV.3.52 Functional PEAI-Based Salts for Interface Passivation in Inverted Perovskite Solar Cells**
Sude Çebi¹, Gül Simge Özdemir¹, Cem Maden¹, Figen Varlıoğlu Yaylalı¹, Mustafa Yaşa¹, Gökem Günbaş¹, Selçuk Yerci¹
¹ ODTÜ-GÜNAM, Ankara, Türkiye
- 2CV.3.53 Thermally Evaporated Self-Assembled Monolayers for Fully Evaporated Perovskite Solar Cells**
Niels Uythoven¹, Huagui Lai¹, Rui-Tung Kuo², Ioanna Vareli¹, Frank Nüesch¹, Tzu-Ying Lin², Fan Fu¹
¹ Empa, Dübendorf, Switzerland; ² National Tsing Hua University, Hsinchu, Taiwan
- 2CV.3.54 A Layer-by-Layer Investigation of the Sensitivity to Processing Atmosphere on Characteristics of Slot Die-Coated Perovskite Solar Cells**
Tina Wahl¹, Jonas Hanisch¹, Stefanie Spiering¹, Oliver Salomon¹, Erik Ahlswede¹, Eva-Maria Hammer¹
¹ ZSW, Stuttgart, Germany
- 2CV.3.55 Polymerized SAMs for Improved Charge Extraction and Improved Fabrication Process Robustness in Perovskite Single Junction and Silicon/Perovskite Tandem Solar Cells**
Sandra Glocker¹, Wolfram Hempel¹, Erik Ahlswede¹, Michael Powalla¹
¹ ZSW, Stuttgart, Germany
- 2CV.3.56 Hyperspectral Photoluminescence Imaging for Process Optimisation of DMF-free, Slot-die Coated, Vacuum-quenched Perovskite Solar Cells**
Toshimitsu Mochizuki¹, Shota Araki¹, Hidetaka Takato¹, Katsuto Tanahashi¹
¹ AIST, Koriyama, Japan
- 2CV.3.57 Near-field Effects on Cathodoluminescence Outcoupling in Perovskite Thin Films**
Robin Schot¹, Imme Schuringa², Álvaro Rodríguez Echarri¹, Lars Sonneveld¹, Tom Veeken¹, Yang Lu³, Samuel Stranks³, Albert Polman¹, Bruno Ehrler¹, Saskia Fiedler¹
¹ AMOLF, Amsterdam, The Netherlands; ² AMOLF, Amsterdam, The Netherlands; ³ University of Cambridge, Cambridge, United Kingdom

- 2CV.3.58 Passivation Strategies of Methylammonium Free Tin-Lead Perovskites**
Michela Cecconi¹, Antonio Abate¹, Giuseppe Nasti², Paola Delli Veneri³, Lucia V. Mercaldo²
¹ University of Naples Federico II, Naples, Italy; ² ENEA, Portici, Italy; ³ ENEA, Portici, Italy
- 2CV.3.59 Experimental and DFT Studies on the Kesterite-CZTS Nanoparticles as Hole Transport Material for Perovskite Solar Cells**
Mehr Un Nisa¹, Giorgio Tseberlidis¹, Simona Olga Binetti¹, Adriana Pecoraro², Michael Zambrano², Ana Belén Muñoz García², Michele Pavone²
¹ University of Milano-Bicocca, Milan, Italy; ² University of Naples Federico II, Naples, Italy
- 2CV.3.60 Data-Driven Optimization of HTL-free Graded Heterojunction Solar Cells through Numerical Simulations and Machine Learning**
Savita Kashyap¹, Sanjeev Kumar¹, Arun Kumar Singh¹
¹ Punjab Engineering College, Chandigarh, India
- 2CV.3.61 Engineering Compositional Homogeneity and Stability in High Efficiency FA-Cs Perovskite Solar Cells**
Muhammed P.U. Haris¹, Kou Jia², Chaorong Guo², Peng Huang², Amir Al-Ahmed¹
¹ KFUPM, Dhahran, Saudi Arabia; ² Southwest Jiaotong University, Chengdu, China
- 2CV.3.62 Improving Film Quality of Hybrid-Processed Wide-Bandgap Perovskites via Organic Infiltration and Crystallization Control**
Jin Ho Yang¹, Yeonwoo Park¹, Jae Ho Yun¹
¹ KENTECH, Naju-si, South Korea
- 2CV.3.63 Amorphous π -Conjugated Passivator Facilitates Widening Process Window for Reliable Perovskite Solar Modules**
Hyun Seo Kim¹, Eui Hyuk Jung¹
¹ KENTECH, Naju, South Korea
- 2CV.3.64 Solid-State Photosynthesis of Tunable Halide Perovskite Interfaces**
Shi Wei Yuan¹, F. Thorimbert², Erik C. Garnett²
¹ AMOLF, Amstelveen, The Netherlands; ² AMOLF, Amsterdam, The Netherlands
- 2CV.3.65 LaXO₃ Rare Earth Perovskite Nanostructures for Energy Conversion**
Badr Dirrouch¹, Mohammed Regragui¹, Mohamed Youssef Messous², M. Abdelfdil¹, Lahoucine Atourki³
¹ Mohammed V University, Rabat, Morocco; ² CNESTEN, Rabat, Morocco; ³ Mohammed V University, Rabat, Morocco



Thursday, 17. September 2026

VISUAL PRESENTATIONS 4DV.1

08:30 - 10:00 Agri-PV | Other PV Applications (Floating, Infrastructure, etc.); CPV; PV in Space | Hybrid Systems and Storage; Direct Uses of PV Generated Electricity

Chairpersons: Roland M. E. Valckenborg
TNO, Eindhoven, The Netherlands
Angele Reinders
Eindhoven University of Technology, Eindhoven, The Netherlands
Tsvetelina Merdzhanova
Forschungszentrum Jülich, Jülich, Germany

4DV.1.2 Sustainable Agrivoltaics: Utilizing Down-Conversion Dyes to Harmonize Solar Energy and Crop Growth

Fabio Silva¹, Arthur Maufort¹, Anna Karamysheva¹, Frédéric Peilleron¹, Kristof Proost¹

¹ IP FAB, Mechelen, Belgium

4DV.1.4 Image-based Phenology Monitoring to Optimize Agrivoltaic System Design and Tracker Operation in Vineyards

Dennis Kniel¹, Tamara Bretzel¹, Hannes Engler², Sergio Vélez Martín³, Matthew Berwind¹

¹ Fraunhofer ISE, Freiburg, Germany; ² Staatliches Weinbauinstitut Freiburg, Freiburg, Germany; ³ University of Burgos, Burgos, Spain

4DV.1.6 A Simulation-Driven Multicriteria Framework for Agri-PV Configuration Optimization

Nada ElRhazouani¹, Said Elhamaoui², Khadija El Ainaoui², Paula Sanchez-Friera³, Achraf Sounni², Abdellatif Ghennioui², Ahmed Chebak¹, Khalid Radouane¹

¹ UM6P, Ben Guerir, Morocco; ² Green Energy Park, Ben Guerir, Morocco; ³ Solkeys, Gijón, Spain

4DV.1.7 Voltiris Greenhouse Concentrator: Practical Concentration Ratios and Array Performance

Antonius R. (Teun) Burgers¹, Lauriane Gugnot², Jonas Roch², Seymour Lubbers³, Bas van Aken⁴

¹ TNO Energy Transition, Petten, The Netherlands; ² Voltiris, Epalinges, Switzerland; ³ TNO Digital Built Environment, Delft, The Netherlands; ⁴ TTNO Energy Transition, Petten, The Netherlands

4DV.1.8 From Concept to Field: an Overhead Agrivoltaic System with Adaptive Tracking for Olive Groves

Iñaki Cornago¹, Aritz Legarrea¹, Gregorio Olivares¹, Ana María Gracia Amillo¹, Gillen Abrego², Eusebio Gainza², Ildelfonso Muñoz¹

¹ FUNDACION CENER, Sarriguren, Spain; ² ALLOTARRA, Allo, Spain

4DV.1.9 Design, Implementation and Early Performance of Crop-Compatible Agri-PV Systems with Spectral Management

Ramona Davoudnezhad¹, Selin Cansu Gölboyulu¹, Merve Tan¹, Ümran Dilmaç¹, Ömer Yalçın², Duygu Kuzyaka², Ali Erçin Ersundu³, Miray Çelikbilek Ersundu³, Colin Osborne⁴, Holly Croft⁴, Zeynep Dilan Deniz⁵, Talat Özden², Selçuk Yerci², Meriç Çalışkan Arslan¹

¹ Kalyon PV Solar Technology Factory, Research and Development Center, Ankara, Türkiye;

² METU, Ankara, Türkiye; ³ Yıldız Technical University, İstanbul, Türkiye; ⁴ University of Sheffield, Sheffield, United Kingdom; ⁵ Tat Gıda Sanayi, Bursa, Türkiye

4DV.1.10 Tracing Rays from Leaves to Sky: Validation of an Irradiance Modelling Framework for Agrivoltaic Orchards

Odysseas Alexandros Katsikogiannis¹, Ebe Coomans¹, Olindo Isabella¹, Rudi Santbergen¹, Hesam Ziar¹

¹ TU Delft, Delft, The Netherlands

4DV.1.11 A High Resolution, Forecast-Enhanced Digital Twin for Agrivoltaic Trackers: Implementation and Orchard Trials

Bilal Abdul-Qayyoom Khalid¹, Maddalena Bruno¹, Tamara Bretzel¹, Leonhard Gföllner¹, Matthew Berwind¹

¹ Fraunhofer ISE, Freiburg, Germany

4DV.1.12 First Parametric Studies for the Optimization of PV Electrical Performance in Crop Agrivoltaics

Corentin Coutellier¹, Ya Brigitte Assoa¹, Christophe Ménézo², Rémi Vézy³, Didier Combes⁴

¹ CEA, Le Bourget du Lac, France; ² University of Savoie Mont Blanc, Le Bourget du Lac, France; ³ CIRAD, Montpellier, France; ⁴ INRAE, Lusignan, France

4DV.1.13 Peatland-PV - First Research in Germany

Carl Pump¹, Hanna Martens¹, Cordula Gutekunst¹, Monika Hohlbein¹

¹ University of Greifswald, Greifswald, Germany

4DV.1.14 Effectively Communicating of the Environmental Impacts of Agri-PV Systems: why Life Cycle Assessment and Parameterized Models are Great Tools

Alejandra Cue Gonzalez¹, Pierre Jouannais², Mathilde Marchand-Lasserre¹

¹ Mines Paris, Valbonne, France; ² University of Montpellier, Montpellier, France

4DV.1.15 From Competition to Integration: Soybean-based Agrivoltaics as a new Land-use Paradigm in Brazil

Bruno Jacomel Vieira¹, Alex Manito¹, Marcelo Pinho Almeida¹, Rafael Braghieri Menillo², George Lambais², Mauricio Cherubin², Roberto Zilles¹

¹ USP, São Paulo, Brazil; ² USP, Piracicaba, Brazil

4DV.1.16 Life Cycle Assessment of Agri-Photovoltaics in Combination with Energy Storage Systems Model-Based Analysis of the Environmental Footprint of Agrivoltaic and Ground-Mounted Photovoltaic Systems with Energy Storage and Hydrogen Utilization in Thuringia

Leon Bruno Hoffmann¹, Kerstin Wydra²

¹ SolarInput, Erfurt, Germany; ² University of Applied Sciences Erfurt, Erfurt, Germany

4DV.1.31 Implementation and Optimisation of Floating PV in Dutch Offshore Wind Farms

Laurens Huisman¹, Annanta Kaul¹, Sara Golroodbari¹, Wilfried van Sark¹

¹ Utrecht University, Utrecht, The Netherlands



- 4DV.1.32 Systemic Barriers to Scaling Floating Photovoltaics in Europe: an Expert-based Assessment of Technical Maturity and Deployment Constraints**
Sara Mirbagheri Golroodbari¹, Nabih Cherradi²
¹ UU, Utrecht, The Netherlands; ² EmpowerSun, Pully, Switzerland
- 4DV.1.34 PV2Float: Comparative Thermal and Performance Analysis of Three Floating PV Demonstrators and a Land Reference**
Monica Nicola¹, Matthew Berwind¹
¹ Fraunhofer ISE, Freiburg, Germany
- 4DV.1.35 Development of a 1.12 kW Photovoltaic-Integrated Electric Vehicle Prototype and Its Evaluation as a Community Bus**
Hidenori Mizuno¹, Katsuto Tanahashi¹, Takashi Oozeki¹
¹ AIST, Koriyama, Japan
- 4DV.1.36 Reliability Evaluation and Accelerated Environmental Stress Testing (CASS & HF10) of Solar Inverters for Offshore and Coastal Environments**
Hsiu-Ming Chang¹, San-Yu Ting¹, Syh-Hong Chen¹, Ren-Jie Guo¹, Min-An Tsai¹, Cho-Fan Hsieh¹
¹ ITRI, Hsinchu, Taiwan
- 4DV.1.37 Transparent Solar Pond Prototype: Preliminary Stratification Tests Using Water and a Salt Gradient**
Sedong Kim¹
¹ Korea Institute of Industrial Technology, Chungcheongnam-do, South Korea
- 4DV.1.38 Optimal Design and Demonstration for Application of Bi-facial PV Modules on Floating PV**
Hyunsik Jo¹, Jieun Lee¹, Sunghyun Lee¹, Donggun Yang¹, Changsub Won², Youngshin Lim²
¹ Korea Water Resources, Daejeon-Si, South Korea; ² MIRAE, Seoul-Si, South Korea
- 4DV.1.39 Methodology for Small-Scale Tests on Floating Photovoltaic Systems Subjected to Waves**
Jesus Florido Ortega¹, Maria Clavero Gilabert¹, Edgar Gerardo Mendoza Baldwin²
¹ University of Granada, Granada, Spain; ² National Autonomous University of Mexico, Mexico City, Mexico
- 4DV.1.40 Performance Evaluation and Degradation Assessment of Perovskite Solar Cells for LEO Space Missions**
Abdullah Alsubaihi¹, Ahmad Albakri¹, Meteb Ali¹, Lina K. Alshehri², Lanah N. Alqhtani³, Donia R. Albarrak⁴
¹ King Abdulaziz City for Science and Technology, Riyadh, Saudi Arabia; ² King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia; ³ Princess Nourah bint Abdulrahman University, Riyadh, Saudi Arabia; ⁴ Prince Sattam bin Abdulaziz University, Al-Kharj, Saudi Arabia
- 4DV.1.42 Vehicle-Mounted Photovoltaic Systems: Empirical Data Acquisition in Malta**
Vlad Costea¹, Brian Bartolo¹, Carmel Azzopardi¹, Austeja Mockeviciute-Azzopardi¹, Brian Azzopardi¹
¹ FiR.mt, Birkirkara, Malta
- 4DV.1.43 Floating Photovoltaic Systems and Water Surface Coverage: A Simulation of Technical, Environmental, and Economic Assumptions for Bourget Lake**
Hosam Mahmod¹, Christophe Ménézo²
¹ University Savoie Mont Blanc, Chambéry, France; ² LOCIE, Le Bourget-du-Lac, France
- 4DV.1.44 Impact of Installation Site and Plant Configuration on the Energy Yield of Floating PV Systems and the Thermal Loading of Grid-connected PV Inverters**
Sara Bouguerra¹, Richard De Jong², Jens Moschner³, Arnaud Morlier⁴, Michael Daenen¹, Patrizio Manganiello¹
¹ UHasselt, Diepenbeek, Belgium; ² imec, Leuven, Belgium; ³ KU Leuven, Leuven, Belgium; ⁴ imec, Diepenbeek, Belgium
- 4DV.1.45 Lithium-Gallium Co-Doped Silicon Heterojunction Solar Cells for Irradiation-Induced Defects Mitigation**
Charles Seron¹, Nicolas Enjalbert¹, Samuel Harrison¹, Hélène Lignier¹, Sébastien Dubois¹
¹ CEA / INES, Le Bourget-du-Lac, France
- 4DV.1.46 Vehicle-Integrated Photovoltaics (VIPV) for Commercial Trucks on European Roads: A Full-Year Field Performance of PV-Battery Supported Low-Voltage Systems**
Ramakrishnan Kalyanasundaram¹, Rudolf Derks¹
¹ IM Efficiency, Helmond, The Netherlands
- 4DV.1.47 Renewable Energy Hybrid Systems at the GERD Reservoir for Ethiopia's Sustainable Electricity Supply**
Belayneh Mulat Tilahun¹, Vartan Ahrens Kayayan¹
¹ University of Gävle, Gävle, Sweden
- 4DV.1.48 Economic Analysis and Technical Feasibility of Transfer System-Based DC Cable Floating Installation for a 2MW Floating Solar Power Plant**
Jinhee Hyun¹, Byeongwan Bhang¹, YeongBeom Kang¹, HyunGu Lee¹
¹ Yunjune Engineering, Seoul, South Korea
- 4DV.1.60 Enhancing Stability in Photovoltaic Direct-Coupled Green Hydrogen Systems**
Jieun Lee¹, Hyunsik Jo¹, Sung Hyun Lee¹, Donggeon Yang¹
¹ K-water, Yuseong-gu, South Korea
- 4DV.1.61 Titanium Based HIPIMS Films for CdTe Photovoltaic-Photoelectrochemical Integration**
Daniel A. L. Loch¹, Anna Kindvall², Ivan Rimmaudo², Anna Oniszcuk³, Robert Arndt², Tim Gehring¹, Uwe Heydenreich¹
¹ TRUMPF Hüttinger, Freiburg, Germany; ² CTF Solar, Dresden, Germany; ³ TRUMPF Huettinger, Warsaw, Poland
- 4DV.1.63 Impact of PV Power Profiles on Lithium-Ion Battery Aging in Hybrid PV-Battery Systems**
Nassima Ait Said ouhammou¹
¹ Cadi Ayyad University, Marrakech, Morocco
- 4DV.1.64 System Design Changes in Grid-Connected PV Plants with Battery Energy Storage**
Djaber Berrian¹, Gaurang Chhapia¹, Johannes Linder¹
¹ BELECTRIC Holding, Kolitzheim, Germany



4DV.1.65 Storage Solutions for PV Curtailment: A Life-Cycle Costing Approach
Elvan Burcu Kosma¹, Olga Kanz¹, Oleksandr Astakhov¹, Tsvetelina Merdzhanova¹, Sergey Shcherbachenko¹, Gerhard Mütter², Petra Zapp¹
¹ FZJ, Jülich, Germany; ² Gerhard Mütter e.U., Waldneukirchen, Austria

4DV.1.66 Beyond Grid Constraints: Integrating Energy Storage Directly into Photovoltaic Modules
Oleksandr Astakhov¹, Uwe Rau¹, Egbert Figgemeier¹, Peter Strasser², Christoph Brabec¹, Tsvetelina Merdzhanova¹
¹ FZJ, Jülich, Germany; ² Technical University of Berlin, Berlin, Germany

VISUAL PRESENTATIONS 5DV.2

10:30 - 12:00 Sustainability of PV

Chairpersons: Wolfram Palitzsch
LuxChemtech, Freiberg, Germany
Malte Vogt
Delft University of Technology, The Netherlands
Silvana Ovaitt (i)
National Laboratory of the Rockies, Golden, United States of America

5DV.2.1 Design-Resolved Cabling Material Demand, Copper-Aluminium Substitution, and Criticality Impacts in Utility-Scale Photovoltaic Systems
Nithin Vakeri Perunthottathil¹, Mohammad Abdelbaky¹, David Peck¹, Olindo Isabella¹, Malte Ruben Vogt¹
¹ TU Delft, Delft, The Netherlands

5DV.2.2 A Single-Step Silver Recovery Process from Photovoltaic Waste via Direct Electrodeposition
Alejandra Vázquez-Adán¹, Eduardo Diez¹, Salvador Cotillas¹, Luis Jaime Caballero², Nerea Dasilva-Villanueva², David Fuertes Marrón², Carlos del Cañizo², Araceli Rodríguez¹
¹ Complutense University of Madrid, Madrid, Spain; ² UPM, Madrid, Spain

5DV.2.3 Efficient Recycling of Solar PV: Multi-faceted Strategy
Romain Duwald¹, Agathe Vaché¹, Youcef Karar¹, Joshua Vauloup¹, Lison Marthey², Fabrice Coustier³, Emmanuel Billy¹
¹ CEA, Grenoble, France; ² CSEM, Neuchâtel, Switzerland; ³ CEA / INES, Le Bourget-du-Lac, France

5DV.2.4 Closing the Loop of Module Recycling, Integration of Recovered Glass and Backsheet into new Modules
Xavier Mackré-Delannoy¹, Fabrice Coustier¹, Roland Riva¹, Philippe Thony¹, Jérémie Aimé¹
¹ CEA / INES, Le Bourget du Lac, France

5DV.2.5 Improving Particle Separation and Recovery of Valuable Materials from End-of-life Solar Panels
Chengsun He¹, Yuting Zhuo¹, Yansong Shen¹
¹ UNSW, Sydney, Australia

5DV.2.6 From Rapid Growth to Preparedness: Charting PV End-of-life Flows in the Nordics
Atse Louwen¹, Mattias Lindh¹, Michiel van Noord², Cecilia Wästerlid²
¹ RISE, Umeå, Sweden; ² RISE, Stockholm, Sweden

5DV.2.7 Upcycling of Silicon Recovered from End-of-Life Photovoltaic Modules into Functional Energy Materials
Katsumichi Hanzawa¹, Shinya Kato², Kengo Yamanaka², Tomoharu Tokunaga¹, Taisuke Doi³, Ryoji Katsube¹, Yasuyoshi Kurokawa¹, Takashi Itoh¹, Noritaka Usami¹
¹ Nagoya University, Nagoya, Japan; ² Nagoya Institute of Technology, Nagoya, Japan; ³ NPC, Matsuyama, Japan

5DV.2.8 Evaluating the Possible Utilization Strategies for End-of-Life PV-modules Regarding the Increasing demand for Cullet in the European Glass Industry
Lukas Spindler¹, Dominic Walter², Petra Böhm², Andreas Rosin³, Andreas Rosin³, Harald Zimmermann¹, Peter Probst³
¹ TAZ Spiegelau, Spiegelau, Germany; ² HVG, Offenbach, Germany; ³ University of Bayreuth, Bayreuth, Germany

5DV.2.9 Choosing the Right Encapsulant for the Environment, LCA based Comparison of Perovskite Solar Cell Encapsulation
Simon Jech¹, Li Shen², Sara Golroodbari³, Annukka Santasalo-Aarnio¹
¹ Aalto University, Espoo, Finland; ² Utrecht University, Utrecht, The Netherlands; ³ Utrecht University, Utrecht, The Netherlands

5DV.2.10 Operationalizing the Digital Product Passport for Photovoltaics: Platform Development and Early Industry Validation
Ässia Boukhatmi¹, Rafael Burkhalter¹, Stefan Groesser¹
¹ Bern University of Applied Sciences, Biel/Bienne, Switzerland

5DV.2.11 AI & Robotics for the Reuse of Used PV Modules
Rita Ebner¹, Bernhard Kubicek¹, Nicole Brosch¹, Laurin Ginner¹, Simon Prüller², Simon Schuppenlehner², Markus Ikeda³, Johann Mitteramskogler³, Daniel Forstner⁴, Thomas Nigl⁵, Ferozan Azizi⁵, Therese Bouvier-Schwarz⁵, Barbara Brune⁶, Polina Malyhina⁶, Xaver Paul Stadlbauer⁶
¹ AIT, Vienna, Austria; ² 2ndCycle, Amstetten, Austria; ³ Profactor, Steyr-Gleink, Austria; ⁴ METRAN Rohstoff-Handel, Amstetten, Austria; ⁵ Montanuniversität Leoben, Leoben, Austria; ⁶ TÜV Austria Data Intelligence, Vienna, Austria

5DV.2.12 Understanding the Current State and Needs of PV Modules EOL: Survey for PV Recyclers and Repair/Reuse Companies
Alberto Pico¹, Cara Libby², Nicolás Marx³, Martin Wilke⁴
¹ EPRI, Santiago de Compostela, Spain; ² EPRI, Charlotte, United States of America; ³ EPRI, Barcelona, Spain; ⁴ Buhck Re.Energy, Hamburg, Germany

5DV.2.13 Utilising Continuous Wave Lasers to Separate Solar Panels for Recycling
Olivia Bowen¹, Matthew Murphy¹, Zibo Zhou¹, Rong Deng¹, Michael Nielsen¹
¹ University of New South Wales, Sydney, Australia



- 5DV.2.14 Recyclability and Circular Design Assessment of Mass-Customized Building-Integrated Photovoltaic Modules**
Gernot Oreski¹, Petra Christoeff², Cristina Polacchi³
¹ Polymer Competence Center Leoben, Leoben, Austria; ² Polymer Competence Center Leoben, Leoben, Austria; ³ EURAC Research, Bolzano, Italy
- 5DV.2.15 Responsible Procurement in Solar**
Stacey McKinney¹, Sarah Albert²
¹ Nextpower, Fremont, United States of America; ² Nextpower, Madrid, Spain
- 5DV.2.16 Verification of Carbon Reduction and Economic Effects via On-site Processing of End-of-Life PV Panels using a Mobile Recycling System**
Sang-Hun Lee¹, Cheong-Min Noh¹, Kwang-Min Seo¹, Yeon-Ju Kim¹
¹ Won Kwang S&T, Seo-gu, South Korea
- 5DV.2.17 Demonstration of High Purity and Scaling-free Reclamation of TOPCon Solar Cell Production Rinse Water**
Jascha Reich¹, Kaya Schlössler¹, Peter Brailovsky², Tobias Dannenberg³, Martin Zimmer², Sebastian Nold², Sven-Uwe Geißen¹
¹ TU Berlin, Berlin, Germany; ² Fraunhofer ISE, Freiburg, Germany; ³ RENA Technologies, Gütenbach, Germany
- 5DV.2.19 Scalable Nanosecond-pulsed Laser Ablation for Solar Panels Recycling**
Remi Aninat¹, Maarten van der Vleuten¹, Quentin Mottet¹, Quan Keijzers¹, Mirjam Theelen¹
¹ TNO, Eindhoven, The Netherlands
- 5DV.2.21 Multidimensional Aspects of Photovoltaic Module Repair with a Focus on Backsheet Failures**
Sonja Feldbacher¹, Anika Gassner², Gabriele Eder², Yuliya Voronko², Simon Prüller³, Gernot Becker⁴, Markus Feichtner⁵, Gernot Oreski¹
¹ PCCL, Leoben, Austria; ² OFI, Vienna, Austria; ³ 2nd cycle, Amstetten, Austria; ⁴ ATB-Becker, Absam, Austria; ⁵ Sonnenkraft, St. Veit/Glan, Austria
- 5DV.2.22 Net-Zero Assessment of Diverse Building Types Powered with PV System under Time-Varying Emissions**
Mohamad Koubar¹, Sin-Yi Li¹, Santiago Valencia Gonzalez², Xingxing Zhang², Farshid Shadram¹, Joakim Munkhammar¹
¹ Uppsala University, Uppsala, Sweden; ² Dalarna University, Falun, Sweden
- 5DV.2.23 Creation of a Reuse-oriented Testing and Repair Protocol for End-of-life Photovoltaic Modules within FORESi, an EU-funded Horizon Project**
Marie Mignot¹, Jérémy Sarantou¹, Marielle Perrin¹, Sébastien Mawet², Albert Aliu², Sophie Deprez², Ints Viksna³, Juris Launznis³, Agnese Kore³, Martins Viksna³, Thomas Peccavet⁴
¹ Hespul, Lyon, France; ² Recma, Seraing, Belgium; ³ LTC, Riga, Latvia; ⁴ Mondragon Assembly, Orange, France
- 5DV.2.24 BIMPV Project – Retrospective BIM Approach to the Life Cycle-oriented Integration of BIPV Systems in the Building Envelope**
Rene Peché¹, Thorsten Pitschke¹, Victor Aigbeghian¹, Markus Schönheits²
¹ bifa Umweltinstitut, Augsburg, Germany; ² bifa Environmental Institute, Augsburg, Germany

- 5DV.2.25 Scalable Recycling of Fully Encapsulated Perovskite Mini-modules**
Balazs Imre¹, Mykhailo Sytnyk¹, Zhenni Wu¹, Yanxue Wang¹, Christian Göllner¹, Maria Hadjipanayi², Vasiliki Paraskeva², Sumeet Santosh Mujumdar², Stéphanie Narbey³, Cécile Kalk³, Ian Marius Peters¹
¹ FZJ, Jülich, Germany; ² University of Cyprus, Nicosia, Cyprus; ³ Solaronix, Aubonne, Switzerland
- 5DV.2.26 Failure Rate of PV Modules and their Collection Numbers for Recycling**
E. Busra Kucuk¹, Remi Aninat², Kahya Engler³, Mirjam J. Theelen², Jan M. Kroon¹, Martin Späth¹
¹ TNO, Petten, The Netherlands; ² TNO, Eindhoven, The Netherlands; ³ TNO, Rijswijk, The Netherlands
- 5DV.2.27 Bottom-up Ecodesign and Circularity for Photovoltaic Modules: Solidarity-based Supply-chain Mapping and a Lightweight Multi-Criteria Framework from the GFF Reindustrialisation Case**
Daniele Bricca¹, Pietro Rista²
¹ Sapienza University of Rome, Rome, Italy; ² Free University of Bolzano, Bolzano, Italy
- 5DV.2.28 Characterization of Photovoltaic Module Waste to Optimize the Recycling Processes of Polymer Components**
Robert Heidrich¹, Michael Wendt¹, Stefanie Wahl¹, Susanne Richter¹
¹ Fraunhofer CSP, Halle (Saale), Germany
- 5DV.2.29 Ecodesign Guidelines for Tin-based Perovskite PV Modules**
Matthias Hämmer¹, Kerstin Baumann¹, Victor Aigbeghian¹, Béatrice Drevet², Markus Schönheits¹
¹ bifa Umweltinstitut, Augsburg, Germany; ² CEA LITEN, Le Bourget du Lac, France
- 5DV.2.30 From Disposal to Circularity: A Comparative Framework for PV Module End-of-Life Management Including Testing-Based Second Life and Final Recycling**
Javier Ramírez-Cantero¹, Marinna Pivatto², Guillermo Garcia¹, Lais Vidotto², Sabrina Elbert², Mónica Calero¹, Ricardo Ruther²
¹ University of Granada, Granada, Spain; ² UFSC, Florianopolis, Brazil
- 5DV.2.31 Environmental Risk Assessment of Hazardous Substance Release Potential and Toxicity of Flexible Lead- and Tin-Based Perovskite PV Modules**
Matthias Hämmer¹, Victor Aigbeghian¹, Kerstin Baumann¹, Markus Schönheits¹
¹ bifa Umweltinstitut, Augsburg, Germany
- 5DV.2.32 Life Cycle Assessment and Local Marine Impacts of an Offshore Floating Photovoltaics Concept: Is It Worth the Effort?**
Maximilian Breyer¹, Heiko Keller¹, Guido Reinhardt¹
¹ IFEU, Heidelberg, Germany
- 5DV.2.33 How Photovoltaic Systems Change: the Importance of the Inventory Life Cycle Data**
Elisabetta Brivio¹, Andrea Danelli¹, Sofia Spagnolo¹, Pierpaolo Girardi¹
¹ RSE, Milano, Italy



- 5DV.2.35 Barriers, Opportunities and Economic Viability of Reuse of PV Modules**
Cristina Leyre Pinto¹, Ana María Gracia¹, Paola Federica Albizzati², Gillian Foster², Enrica Leccisi³, Mattia Gianvincenzi³, Concetta Lodato³, Jaione Bengoechea¹
¹ FUNDACION CENER, Sarriguren-Navarra, Spain; ² Joint Research Centre, Directorate S, Seville, Spain; ³ Joint Research Centre, Directorate D, Ispra, Italy
- 5DV.2.36 SOLARIS – Building together a Roadmap for PV Resource Efficiency and Sustainability**
Karl-Anders Weiß¹, Estelle Gervais¹, Sina Herceg¹, Elsen Aydin², Alexis Barrou³, Yijiang Xu⁴, Claire Agraffel⁵, José María Medianero Martín⁶, Tayfun Hiz², Alessandro Virtuani⁷
¹ Fraunhofer ISE, Freiburg, Germany; ² ODTÜ-GÜNAM, Ankara, Türkiye; ³ CSEM, Neuchâtel, Switzerland; ⁴ SINTEF, Trondheim, Norway; ⁵ CEA, Le Bourget du Lac, France; ⁶ IDENER AI, Seville, Spain; ⁷ CSEM, Neuchâtel, Switzerland
- 5DV.2.37 Formerly Recycled Pellworm Island Modules: A 3rd Life Opportunity**
Karsten Wambach¹, Tom Reiling², Malte Fislake², Radovan Kopecek³, Rudolf Harney³, Malte Wesenberg⁴, Anna-Katharina Schnatmann⁴
¹ Wambach-Consulting, Petersdorf, Germany; ² Reiling PV-Recycling, Münster, Germany; ³ ISC Konstanz, Konstanz, Germany; ⁴ ITES, Bielefeld, Germany
- 5DV.2.39 Challenges and Practical Strategies for Photovoltaic Module Reuse and Recycling: A Multi-Stakeholder Field Study**
Marinna Pivatto¹, Marius Peters², Ricardo Rüther¹
¹ UFSC, Florianópolis, Brazil; ² HI-ERN, Erlangen, Germany
- 5DV.2.40 Ultrasonic-Induced Delamination of Photovoltaic Modules: Thermo-Mechanical Validation and Harmonic Analysis of a Multilayer Model**
Mateus Zanelli¹, Marc Budinger¹, Boubakr Rahmani¹
¹ Institut Clement Ader, Toulouse, France
- 5DV.2.41 End-of-Life Handover for PV Modules: Traceability Requirements for Reuse and Recycling**
Xue Ma¹, Ralph Wahnschafft²
¹ University of Geneva, Geneva, Switzerland; ² Global Forum on Human Settlements, Berlin, Germany
- 5DV.2.42 Design of an Automated Hot-knife Thermal Delamination Tool for Alternative PV Encapsulant Recyclability Assessment**
Julia Stade¹, Leonie Neiser¹, Benedikt Baums¹, Michel Gutbrod¹, Kristina Maliutina¹, Ulf Blieske²
¹ TH Köln, Köln, Germany; ² TH Köln, Cologne, Germany
- 5DV.2.43 How Floating Solar Reshapes the Lake Microclimate and Surface Energy Balance?**
Anuththara Gunawardana¹, Pim Leber¹, Srinidhi Gadde¹, Nico Helmsing², Lisette de Senerpont Domis¹, M.S. Salama¹
¹ University of Twente, Enschede, The Netherlands; ² Netherlands Institute of Ecology, Wageningen, The Netherlands

- 5DV.2.44 Quantifying the Hidden Impact of Fused Quartz Crucibles in Solar PV Manufacturing**
Bethany Willis¹, Gabriela Kazimiera Warden², Kyle Richard Affleck¹, Ruy Sebastian Bonilla³, Marisa Di Sabatino², Neil S. Beattie¹
¹ Northumbria University, Newcastle, United Kingdom; ² NTNU, Trondheim, Norway; ³ University of Oxford, Oxford, United Kingdom
- 5DV.2.45 PFAS, Antimony and Lead in Photovoltaic Modules**
Menno N. van den Donker¹, Gerard de Leede¹
¹ Solarge International, Weert, The Netherlands

VISUAL PRESENTATIONS 5DV.3

- 13:30 - 15:00 Grid Integration and Flexibility Enablers | Scenarios for Renewables, Policy, Resilience, Global Challenges | Costs, Economics, Finance and Markets | Societal Challenges; Citizens' Participation, Awareness**
- Chairpersons: Philippe Malbranche
Solar Action, Le Bourget-du-Lac, France
Izumi Kaizuka
RTS Corporation, Tokyo, Japan
Ana Belen Cristóbal
UPM, Madrid, Spain
Elham Shirazi (i)
University of Twente, Enschede, The Netherlands

- 5DV.3.1 Technoeconomic Analysis of Demand-side Management (DSM) Strategies for Cyprus**
Demetris Marangis¹, Andreas Livera¹, Niclas Rhein², Rabea Sandherr², George E. Georgiou¹
¹ University of Cyprus, Aglantzia, Cyprus; ² Energynautics, Darmstadt, Germany
- 5DV.3.2 PV and Energy Storage Capacity needed to Replace other Electricity Sources in Finland**
Evgenia Okhotnikova¹, Kari Lappalainen¹
¹ Tampere University, Tampere, Finland
- 5DV.3.3 Design and Implementation of a Low-Cost Solar-Powered Smart Microgrid System for Rural Electrification in Burundi**
Remy Niyibimpa¹
¹ Independent Researcher, Bujumbura, Burundi
- 5DV.3.5 E-Mobility Infrastructure Planning, Observability, and Management Toolset for Smart Cities**
Andreas Livera¹, Demetris Marangis¹, Georgios Tziolis¹, George E. Georgiou¹
¹ University of Cyprus, Nicosia, Cyprus
- 5DV.3.7 Novel Ramp-Rate-Based Energy Storage System Power Smoothing Method for Photovoltaic Power Plants**
Micke Talvi¹, Kari Lappalainen¹
¹ Tampere University, Tampere, Finland



- 5DV.3.8 Ontology-based Framework for Fault Detection, Performance Assessment and Energy Management in PV Energy Communities**
Laura Palomino¹, Ana Belén Cristóbal¹, Luis Miguel Carrasco¹, Luis Narvarte¹
¹ UPM, Madrid, Spain
- 5DV.3.9 Renewable Energy Penetration and Flexibility Costs in European Power Systems: a Cross-Country Analysis using Imbalance Prices**
Santiago Valencia Gonzalez¹, Johan Heier¹, Rehman Zafar¹, Mohamad Koubar²
¹ Dalarna University, Borlänge, Sweden; ² Uppsala University, Uppsala, Sweden
- 5DV.3.25 Risk-Oriented Spatial Suitability Modelling for Utility-Scale PV Deployment in Emerging Markets: A Case Study in Colombia**
Sebastian Acosta¹, Luis Rangel²
¹ ICREA SAS, Bogotá, Colombia; ² ICREA SAS, Bogotá, Colombia
- 5DV.3.26 How to Win the PV Race in the Perovskites- Results from an Open Survey**
Philipp Kratzert¹, Balizioan Puzant², Christian Breyer³, Chris Case⁴, Thomas Dalibor⁵, Claire Morin⁶, Delfina Munoz⁷, Ralf Preu⁸, Pere Roca⁹, Charles Roux⁷
¹ Holyvolt, München, Germany; ² VDMA, Frankfurt, Germany; ³ LUT, Lappeenranta, Finland; ⁴ Oxford PV, Oxford, United Kingdom; ⁵ Avancis, München, Germany; ⁶ Solar Power Europe, Brussel, Belgium; ⁷ CEA, Grenoble, France; ⁸ Fraunhofer ISE, Freiburg, Germany; ⁹ IPVF, Ile de France, France
- 5DV.3.27 Zero Energy Buildings in the Nordics – What Is the Role of PV?**
Magda Szarek¹, Sami Jouttijarvi¹, Kati Miettunen¹
¹ University of Turku, Turku, Finland
- 5DV.3.28 Results of a Survey on Integrated Perovskite PV Applications**
Angele Reinders¹, Antonin Faes², Christophe Ballif³
¹ Eindhoven University of Technology, Eindhoven, The Netherlands; ² CSEM, Neuchatel, Switzerland; ³ EPFL, Neuchatel, Switzerland
- 5DV.3.29 Deriving a Single Reduction Factor for Large-Scale Rooftop Photovoltaic Potential Assessment**
Alex Tro-Cabrera¹, Estitxu Villamor², Rosa Lago Aurrekoetxea¹, Leire Sainz García¹, Itziar Martínez de Alegría¹
¹ UPV/EHU, Bilbao, Spain; ² UPV/EHU, Vitoria-Gasteiz, Spain
- 5DV.3.31 Reindustrializing Europe: the Role of Industrial Policy in Reviving PV Module Manufacturing**
Sandra Gallmetzer¹, Lukas Koester¹, Luis Fialho¹
¹ EURAC Research, Bolzano, Italy
- 5DV.3.32 Urban Rooftop Solar PV Potential: Static and Dynamic Cadaster Approaches**
Dunia Bachour¹, Daniel Perez-Astudillo¹, Abdulwahab Ziaullah¹
¹ QEERI, Doha, Qatar
- 5DV.3.33 Informing Policy to Achieve Reductions in Air Conditioning Loads Through Energy Efficiency and Onsite PV Supply in Middle-Income Households in KSA**
Abeer Alshehri¹, AbuBakr Bahaj¹, Patrick James¹
¹ University of Southampton, Southampton, United Kingdom

- 5DV.3.34 Historical and Future Development of the PV Specific Yield Indicator and the Contribution of PV to Renewable Energy Production in the Netherlands**
Wilfried G.J.H.M. van Sark¹, Anton Driesse², Pierre Gerrissen³, Lex Schiebaan⁴, Anton Boonstra⁵
¹ Utrecht University, Utrecht, The Netherlands; ² PV Performance Labs, Freiburg, Germany; ³ SolarCare, Breda, The Netherlands; ⁴ Sundata, Utrecht, The Netherlands; ⁵ Boonstra, Groningen, The Netherlands
- 5DV.3.35 BIPV Market Status: Cross-country Analysis of Methodologies for Data Collection and Market Monitoring**
Juan Ignacio Martinez¹, Philippe Macé², Véronique Delisle³, Claudio Del Pero⁴, Francesca Tili⁵, Nuria Martín Chivelet⁶, Paolo Corti⁷
¹ Becquerel Institute, San Sebastian, Spain; ² Becquerel Institute, Brussels, Belgium; ³ Natural Resources Canada, Montreal, Canada; ⁴ Polytechnic University of Milan, Milan, Italy; ⁵ GSE, Rome, Italy; ⁶ CIEMAT, Madrid, Spain; ⁷ SUPSI, Mendrisio, Spain
- 5DV.3.36 A Grid-Based Spatial Forecasting Framework for Photovoltaic Deployment Using Multi-Factor Geospatial Data**
ChangYeol Yun¹, Myeongchan Oh¹, Changki Kim¹, Yongil Kim²
¹ KIER, Daejeon, South Korea; ² Seoul National University, Seoul, South Korea
- 5DV.3.37 Beyond Potential: Hourly PV Production and Demand Matching for Building-Integrated Solar PV in Europe – a Case-Study Analysis using High-Resolution Time-Series Data**
Ana Maria Gracia Amillo¹, Georgia Kakoulaki², Diego Pavanella², Robert Kenny²
¹ Fundacion CENER, Sarriena, Spain; ² European Commission JRC, Ispra, Italy
- 5DV.3.38 Maximising Solar PV Deployment in European Buildings: Understanding Potential and Addressing Barriers in the Implementation of the EPBD**
Thomas Garabetian¹, Duygu Celik², Johannes Stierstorfer², Alexandra Michaelson², Cristian Pozza³, Francesco Babich³, Akshit Gupta³, Gioberti Raul Morantes Quintana³, Laura Maturi³, Gabriella Gonella³, Ulrich Oberegger Filippi³, Daniele Antonucci³, Pawel Wargocki⁴, Mariya Petrova Bivolarova⁴, Andrei Vladimir Litiu⁵, Nicolandrea Calabrese⁶, Giovanni Murano⁶, Francesca Caffari⁶, Jerzy Kwiatkowski⁷, Aleksandra Dudek⁷, Olivier Greslout⁸, Dominique Caccavell⁸
¹ SolarPower Europe, Brussels, Belgium; ² WIP Renewable Energies, Munich, Germany; ³ EURAC, Bolzano, Italy; ⁴ DTU, Copenhagen, Denmark; ⁵ EPB Center, Rotterdam, The Netherlands; ⁶ ENEA, Rome, Italy; ⁷ NAPE, Warsaw, Poland; ⁸ CSTB, Marne-la-Vallée, France
- 5DV.3.39 New Digital Tool Linking European Solar/Storage Market and Policy Data in a Single Platform**
Leah Le Pénuizic¹, Christophe Lits¹
¹ SolarPower Europe, Brussels, Belgium
- 5DV.3.40 PV Policy Changes and How They Could Impact Technology Uptake: Costa Rican Case Study**
Victor Vega-Garita¹, Oscar Núñez-Mata²
¹ University of Costa Rica, Cartago, Costa Rica; ² University of Costa Rica, San Jose, Costa Rica



- 5DV.3.41 Measuring the Impact of Obstacles When Setting Up Renewable Energy Communities**
Kiane Alves e Silva¹, Laura Palomino¹, Luis Miguel Carrasco¹, Ana Belen Cristóbal¹
¹ UPM, Madrid, Spain
- 5DV.3.56 Evaluation of Location Factors for Photovoltaic Module Factories**
Max Mittag¹, Sebastian Nold¹, Christian Reichel¹, Holger Neuhaus¹
¹ Fraunhofer ISE, Freiburg, Germany
- 5DV.3.57 A Sustainable Path for Solar in EU: Modeling Photovoltaic Glass Recycling Costs and Impacts**
Umer Shahzad¹, Ian Marius Peters¹
¹ FZJ, Erlangen, Germany
- 5DV.3.58 Current Level and Development of Solar Photovoltaic Electricity Market Value in Finland**
Sami Jouttijärvi¹, Kati Miettunen¹
¹ University of Turku, Turku, Finland
- 5DV.3.59 Urban Energy Resilience in the Built Environment: a Socio-Technical Framework for Hazard-Contingent PV–Storage Integration**
Parisa Hosseini¹
¹ The University of Texas at San Antonio, San Antonio, United States of America
- 5DV.3.60 Revenue Distribution in Hybrid Plants: Comparing Hourly and 15-minute Day-ahead Outcomes for PV+BESS**
Elina Bosch¹, Philippe Macé¹, Caroline Plaza², Gaëtan Masson¹
¹ Becquerel Institute, Brussels, Belgium; ² Becquerel Institute France, Perpignan, France
- 5DV.3.61 Optimal Operation of Grid-Connected PV Using Multi-Energy Storage Systems**
Sarvar Hussain Nengroo¹
¹ KFUPM, Dharan, Saudi Arabia
- 5DV.3.62 Techno-Economic Comparison of Perovskite/Silicon Tandem versus Silicon Single Junction Modules in Rooftop and Utility-Scale Applications**
Tri Luong Phung¹, Alejandra Galarza¹, Jean-Baptiste Puel¹, Jean-Baptiste Rousset¹, Mehdi Sahli², Florian Hilt¹, Thomas Guillemot¹, Pierre Philippe Grand³, Lars Oberbeck⁴
¹ IPVF, Palaiseau, France; ² VOLTEC SOLAR, Dinsheim-sur-Bruche, France; ³ EDF R&D, Palaiseau, France; ⁴ TotalEnergies OneTech, Paris La Défense Cedex, France
- 5DV.3.63 Adopting Circularity Critical to Fulfil India's Feedstock for Solar Energy Targets**
Jaideep Malaviya¹
¹ MSEC, Pune, India
- 5DV.3.76 Analysis of Peatland-PV: an Insight into the Perspective of Photovoltaic Project Planning**
Carl Pump¹, Carola Kiene¹, Volker Beckmann¹
¹ University of Greifswald, Greifswald, Germany

- 5DV.3.77 Identifying Factors for Social Acceptance of Photovoltaic Systems on Rewetted Peatlands**
Carola Kiene¹, Carl Pump¹, Volker Beckmann¹
¹ University of Greifswald, Greifswald, Germany
- 5DV.3.78 Promoting Innovation Excellence in Transformation of Coal Regions to Climate-Neutral, Thriving Economies**
Rita Mergner¹, Rainer Janssen¹
¹ WIP Renewable Energies, Munich, Germany
- 5DV.3.81 Generating Equity, Nurturing Diversity, Energising Resilience for Power Against Energy Poverty**
Rita Mergner¹
¹ WIP Renewable Energy, Munich, Germany
- 5DV.3.82 Understanding Agrivoltaic Systems from a Cooperative Perspective: A Case Study in Türkiye**
Betül Ergun¹, Bilge Senturk², Cisel Ekiz Gokmen¹
¹ Mugla Sıtkı Kocman University, Mugla, Türkiye; ² ODTÜ-GÜNAM, Ankara, Türkiye
- 5DV.3.83 Assessing the Value of Digital Feedback Tools in Energy-efficient Housing: Evidence from two ProLight Demonstrations**
Elina Bosch¹, Philippe Macé¹, Caroline Plaza², Gaëtan Masson¹
¹ Becquerel Institute, Brussels, Belgium; ² Becquerel Institute France, Perpignan, France
- 5DV.3.84 Justice Perspectives on Solar Energy - Swedish Case Studies**
Malin Unger¹, Michiel van Noord¹, Maria Håkansson¹, Karl de Fine Licht²
¹ RISE Research Institutes of Sweden, Stockholm, Sweden; ² Chalmers University of Technology, Göteborg, Sweden

VISUAL PRESENTATIONS 4DV.4

15:15 - 16:45 Advances in PV Performance and O&M: Bridging Research with Field Practices

Chairpersons: Alessandro Virtuani
CSEM, Neuchâtel, Switzerland
Gisele A. dos Reis Benatto
DTU, Roskilde, Denmark
Marie Syre Wiig
Institute for Energy Technology, Kjeller, Norway

- 4DV.4.1 Probabilistic Estimation of Unknown Tracker Angles for Sub-hourly Loss Quantification**
Thore Müller¹, Franco Clandestino¹, Kostiantyn Pogorelov¹
¹ PVRADAR Labs, Ebersberg, Germany
- 4DV.4.2 De-Icing-Box for Photovoltaic Systems**
Adrian Jäggi¹, Matthias Burri¹, Christof Bucher¹
¹ Bern University of Applied Science, Burgdorf, Switzerland
- 4DV.4.4 The Cost of Waiting: Modelling Metocean-Driven O&M Delays in Offshore Floating Photovoltaic Systems**
Manu Centeno-Telleria¹, Ane Elizetxea¹, Yerai Pena¹, Mingxin Li², Markel Penalba¹
¹ Mondragon University, Arrasate, Spain; ² Tokyo University, Tokyo, Japan



- 4DV.4.6 Experimental Assessment of Soiling Losses in Agrivoltaic Systems: Insights from Field Data in Denmark and Spain**
 Álvaro Fernández Solas¹, Nicholas Riedel-Lyngskær², Natalie Hanrieder¹, Stefan Wilbert¹, Carmen Alonso García³, Rolando Cabrera Dalés³, Estefanía Sánchez Vizcaino⁴
¹ DLR, Almería, Spain; ² European Energy, Søborg, Denmark; ³ CIEMAT, Madrid, Spain; ⁴ Cortijo El Cura Eco-Bodega, Laujar de Andarax, Spain
- 4DV.4.7 Robustness of the Photovoltaic Output Models with Varying Levels of Filtering**
 Väinö Anttalainen¹, Lauri Karttunen¹, Sami Jouttijärvi¹, Anders V. Lindfors², Juha A. Karhu², Hugo Huerta³, Samuli Ranta³, Kati Miettunen¹
¹ University of Turku, Turku, Finland; ² Finnish Meteorological Institute, Helsinki, Finland; ³ Turku University of Applied Sciences, Turku, Finland
- 4DV.4.8 Large-Scale Degradation Analysis of PV Modules on Operational Sites using DC Timeseries**
 Houria Cheikh Ahmed¹, Andreas Wabbes¹, Quentin Van Nieuwenhoven¹, Cheikhna Talebmoustaph¹
¹ ENGIE LABORELEC, Linkebeek, Belgium
- 4DV.4.9 From Fault Prediction to Action: a Conversational LLM-based Tool for PV Asset Management**
 Yasaman Ahmadi¹, Lukas Koester¹, Sandra Gallmetzer¹, Luís Fialho¹
¹ EURAC Research, Bolzano, Italy
- 4DV.4.10 Long-term Field Analysis of Fine Dust Impact on a 100 kW PV Plant with new and Reused Modules**
 Jeong-eun Jeon¹, Ji-Hyun Yoo¹, Gyeong-Jun Min¹, Jae-Hyeok Hur¹, Seok-Jae Lee¹, Su-Mi Yang²
¹ Far East University, Eumseong-gun, CB, South Korea; ² Far East University, Eumseong-gun, South Korea
- 4DV.4.11 Structure-Locked Shadow Overlay GAN PV for Data Augmentation in Thermography**
 JungMin Moon¹, Ju-Hee Kim¹, Yonghyun Kim¹, Changheon Kim¹
¹ Korea Photonics Technology Institute, Gwangju, South Korea
- 4DV.4.12 Learning Vector Quantization and K-Means Clustering based Ensemble Model for Line-to-Line Fault Detection and Classification in PV Arrays**
 Peyman Ghaedi¹, Aref Eskandari², Mohammadreza Aghaei³
¹ AUT, Tehran, Norway; ² IUST, Tehran, Norway; ³ NTNU, Ålesund, Norway
- 4DV.4.13 Anomaly Detection and Diagnostics for PV Systems Based on Image Segmentation of Power Residuals and on Bayesian Networks**
 Corentin Tissier¹, Baptiste Schubnel¹, Jelena Simeunovic¹, Pierre-Jean Alet¹
¹ CSEM, Neuchâtel, Switzerland
- 4DV.4.14 Estimation of PV System Degradation using Data from Clipping Periods**
 Mari B. Øgaard¹, Marie Syre Wiig¹, Vilde S. Nysted¹, Nathan Roosloot¹, Josefine Selj¹
¹ IFE, Kjeller, Norway

- 4DV.4.15 Physics-Informed Graph-Based Modelling to Support Performance Monitoring and Degradation Analysis of PV Systems**
 Srijani Mukherjee¹, Liliane Bou Nassif², Hervé Colin¹, Stephanie Giroux-Julien³, Hervé Pabiau², Denys Dutykh⁴, Laurent Vuillon⁵, Ioannis (John) A. Tsanakas¹
¹ CEA / INES, Le Bourget-du-Lac, France; ² INSA, Lyon, France; ³ CNRS, Lyon, France; ⁴ Khalifa University, Abu Dhabi, United Arab Emirates; ⁵ Savoie Mont Blanc University, Chambéry, France
- 4DV.4.16 The Ineffectiveness of Cooling Systems on PV Efficiency Across Climate Zones: A Climate Variability-Focused Statistical Analysis**
 Mohamed Elnbhani Ismail¹
¹ Sudan University of Science and Technology, Khartoum, Sudan
- 4DV.4.17 Beyond the State of the Art: A Metadata Analysis and Result Comparison of Model and Lighthouse Photovoltaic Projects in Austria**
 Alexander Erber¹, Marcus Rennhofer¹, Christoph Mayr¹
¹ AIT, Vienna, Austria
- 4DV.4.18 Unlock your hidden Solar Losses with SUPER (Solar Utilization, Performance and Reliability benchmarking tool)**
 Daniel Fregosi¹, Wayne Li¹, Alberto Pico²
¹ EPRI, Charlotte, United States of America; ² EPRI, Santiago de Compostela, Spain
- 4DV.4.19 High-Resolution, Automated On-Rack Photovoltaic Module Imaging Using a Multi-Camera Array**
 Matthew T. Sivewright¹, E. Ernest Van Dyk¹, Frederik J. Vorster¹
¹ Nelson Mandela University, Port Elizabeth, South Africa
- 4DV.4.20 Comparative Analysis for Solar Single Axis Tracker Fault Detection on DC Power Timeseries**
 Cheikhna Talebmoustaph¹, Andreas Wabbes¹, Aquin Magnus¹, Quentin Van Nieuwenhoven¹
¹ Engie Laborelec, Linkebeek, Belgium
- 4DV.4.21 Convolutional Variational Auto-encoder-based Classifier for PV Panel-Level Anomaly Detection**
 Walid M'Zough¹, Yousra Sidqi¹, Benoit Delinchant²
¹ Lucerne University of Applied Sciences and Arts, Horw, Switzerland; ² G2ELab, Grenoble, France
- 4DV.4.22 Using Large Language Models to Convert Fault Logbooks into a Labeled Dataset**
 Mûcahid Candan¹, David Melgar¹
¹ Fraunhofer ISE, Freiburg, Germany
- 4DV.4.23 Dust Impact on a 14.17 kW Rooftop PV System in Oman: Field Validation and Economic Analysis**
 Mazin Al Shidhani¹, Waleed Al Washahi¹
¹ Petroleum Development Oman, Muscat, Oman
- 4DV.4.24 The Influence of Angle of Incidence on Soiling Losses in Photovoltaic Modules under Arid Conditions**
 Rolando Cabrera-Dalés¹, Aránzazu Fernández-García², Stefan Wilbert³, Manuel Pérez-García⁴, María del Carmen Alonso-García⁵
¹ CIEMAT, Tabernas, Spain; ² CIEMAT, Almería, Spain; ³ DLR, Almería, Spain; ⁴ CIESOL-University of Almería, Almería, Spain; ⁵ CIEMAT, Madrid, Spain



- 4DV.4.25 Assessing Small-Scale Photovoltaic System Performance Using Field Irradiance Data and Utility Billing Records**
 Brian Bartolo¹, Brian Azzopardi², Carmel Azzopardi², Austeja Mockeviciute-Azzopardi²
¹ The Foundation for Innovation and Research - Malta, Birkirkara, Malta; ² The Foundation for Innovation and Research, Birkirkara, Malta
- 4DV.4.26 Photovoltaic Anomaly Diagnosis using a Classification Model Based on the Maximum Power Point of I-V Curves**
 Woogyun Shin¹, Youngchul Ju¹, Hyemi Hwang¹, Jinseok Lee¹, Sukwhan Ko¹
¹ KIER, Yuseong-gu, South Korea
- 4DV.4.27 Comparative Analysis of Cleaning Schemes for Bifacial PV Modules in a Single-axis Tracking System**
 Rodrigo P. Maruyama¹, Bruno J. Vieira¹, Givaldo dos Reis¹, Renzo Vargas¹, Alex Renan A. Manito¹, Marcelo P. Almeida¹, Adnei Melges de Andrade¹, Roberto Zilles¹
¹ USP, São Paulo, Brazil
- 4DV.4.28 Ground-based Inspection-robot for Autonomous Daylight Photoluminescence Inspection**
 Lukas Koester¹, Irfan Haider¹, Luis Fialho¹
¹ Eurac Research, Bolzano, Italy
- 4DV.4.29 A new Indexing Algorithm for Photovoltaic Data**
 Zhu Wang¹, Bo Qiu², Xingxing Wu¹
¹ Sany Group, Zhuzhou, China; ² China Mobile, Guangzhou, China
- 4DV.4.31 Identification of Burnout Failure Conditions in Rapid Shutdown Devices for Photovoltaic Systems**
 Tensei Akinaga¹, Toshiyuki Hamada¹, Ikuo Nanno², Norio Ishikura³, Masayuki Fujii⁴, Shinichiro Oke⁵
¹ Osaka Electro-Communication University, Neyagawa, Japan; ² St. Andrew's University, Izumi, Japan; ³ National Institute of Technology, Yonago, Japan; ⁴ National Institute of Technology, Imabari, Japan; ⁵ National Institute of Technology, Tsuyama, Japan
- 4DV.4.32 Modeling and Mapping of Soiling Losses in Morocco for Different Photovoltaic System Configurations**
 Mounir Abraim¹, Fatima Zahra Ouchani¹, Abdellatif Ghennioui¹, Leonardo Micheli²
¹ Green Energy Park, BenGuerir, Morocco; ² Sapienza University of Rome, Rome, Italy
- 4DV.4.33 Data-Driven Power-Loss Modelling of Photovoltaic Cells Using Physically Based Syntetic EL-IV Data**
 Rodrigo del Prado Santamaría¹, Aysha Mahmood¹, Luca Oneto², Antonio Sgorbissa², Gisele Alves dos Reis Benatto¹, Thøger Kari¹, Mahmoud Dhimish¹, Peter B. Poulsen¹, Sergiu V. Spataru¹
¹ DTU, Roskilde, Denmark; ² University of Genoa, Genova, Italy
- 4DV.4.34 Intense Mid-level Wind Speeds and Flat Tracker Tilts during Rear Glass Breakages on Non-Large-Format Bifacial PV Modules on Trackers**
 Kee Soon (Darryl) Wang¹
¹ DNV Singapore, Singapore, Singapore

- 4DV.4.35 Benchmarking PV Simulation Software Against Operational Data: A 100 MW Bifacial TOPCon Case Study in Brazil**
 Joel Pontes¹, Leticia Vasconcelos¹, Lucas Colares¹, Luiz Reis¹, Lucio Paiva¹, Luis Guilherme Castro¹, Rodrigo Santos¹
¹ Casa dos Ventos, Fortaleza, Brazil
- 4DV.4.36 Enhancing Insurability: Preventive Strategies and Security Solutions to Combat Copper Theft**
 Oliver Strecke¹, Malia Cobb¹
¹ viamon, Kaiserslautern, Germany
- 4DV.4.37 Benchmarking of Image Normalization Techniques in dEL and dPL Images for Field PV Module Inspections**
 Kabir Paul Sulca Buitrón¹, Rodrigo del Prado Santamaría², Julian Anaya Calvo¹, Sergiu Viorel Spataru², Oscar Martínez Sacristan¹
¹ University of Valladolid, Valladolid, Spain; ² DTU, Roskilde, Denmark
- 4DV.4.38 A Multiple String Current-Modulated Switching Device for Daylight Electroluminescence Imaging of Photovoltaic Modules**
 Kabir Paul Sulca Buitrón¹, Cristian Terrados Lopez², Julian Anaya Calvo¹, Victor Alonso Gomez¹, Oscar Martinez Sacristan¹
¹ University of Valladolid, Valladolid, Spain; ² University of Burgos, Burgos, Spain
- 4DV.4.39 Reliability of Ideality Factor Determination from Electroluminescence Quantification According to IEC TS 63109:2022**
 Gorka Torre¹, Jose Domingo Santos Rodriguez¹, Joseba Ormaetxea¹, Eneko Setien¹, Aritz Villodas¹, Alberto Del Pozo¹, Ainhoa Pereda¹, Eneko Ortega², Ricardo Alonso¹
¹ TECNALIA, Derio, Spain; ² UPV/EHU, Leioa, Spain
- 4DV.4.40 Predictive Maintenance: a Must use Technology**
 Pau Mercade Ruiz¹, Gerardo Guerra¹, Gaetana Anamiati¹, Lars Landberg²
¹ GreenPowerMonitor a DNV company, Barcelona, Spain; ² DNV Denmark, Hellerup, Denmark
- 4DV.4.41 Open Source Hardware for Mobile String Power Acquisition of Solar Parks**
 Stefan Grünsteidl¹
¹ GRN.Solar, Grafing, Germany
- 4DV.4.42 A Simple Statistical Modelling Approach for Evaluating Diverse PV Module Performance under Nordic Environments**
 Huilan Zheng¹, Maryna Waszak², An Ngoc Lam², Astrid Marthinsen¹, Alexander G. Ulyashin¹, Xiang Ma¹
¹ SINTEF Industry, Oslo, Norway; ² SINTEF Digital, Oslo, Norway
- 4DV.4.43 Performance Analysis and Design Implications of Bifacial PV Systems in an Industrial Complex**
 Jinho Choi¹, Wonwook Oh²
¹ Chungbuk Technopark Next Energy Center, Jincheon-gun, South Korea; ² Chungbuk Technopark, Jincheon-gun, South Korea



- 4DV.4.44 Comparative Study of Machine Learning Algorithms for Fault Diagnosis in PV Systems Specifically under low Irradiance Conditions**
 Norio Ishikura¹, Kaima Yamada¹, Toshiyuki Hamada², Ikuo Nanno³, Shinichiro Oke⁴, Masayuki Fujii⁵
¹ National Institute of Technology, Yonago College, Yonago, Japan; ² Osaka Electro-Communication University, Osaka, Japan; ³ Yamaguchi Gakugei University and Yamaguchi College of Arts, Osaka, Japan; ⁴ National Institute of Technology, Tsuyama College, Tsuyama, Japan; ⁵ National Institute of Technology, Oshima College, Suo-osima, Japan
- 4DV.4.45 Effect of PV Module Azimuth Angle on Revenue of PV Systems in Different Locations in Europe**
 Heidi Kalliojärvi¹, Kari Lappalainen¹
¹ Tampere University, Tampere, Finland
- 4DV.4.46 Development of Failure Diagnosis Algorithms for PV Plants and Analysis in Over 6GW**
 Jorge Solórzano del Moral¹, Monica Quiroz², Alberto Valcarcel²
¹ Qualifying PhotoVoltaics, Madrid, Spain; ² Qualifying Photovoltaics, Madrid, Spain
- 4DV.4.47 Window-Based Learning for PV Plant's Shading Diagnose**
 Milad Riyahi¹, Manuel Castillo Cagigal¹, Jorge Solórzano del Moral¹, Álvaro Gutiérrez Martín²
¹ QPV, Madrid, Spain; ² UPM, Madrid, Spain
- 4DV.4.48 Optimizing Row-by-row PV Tracker Angles to Maximize Performance and Module Lifetime**
 Brooke Stanislawski¹, Olga Doronina¹, Andrew Glaws¹, Martin Springer¹, Ben Knueven¹, Devon Sigler¹, Ethan Young¹
¹ NLR, Golden, United States of America
- 4DV.4.49 Feedback on a One-Year Operation of a Rooftop PV System Using Second-Life Modules**
 Hervé Colin¹, Ioannis (John) Tsanakas¹, Jérémie Aimé¹, Jean-Patrice Rakotoniaina¹, Lionel Sicot¹, Luc Federzoni²
¹ CEA / INES, Le Bourget-du-Lac, France; ² SOLREED, Bourgoin, France
- 4DV.4.50 Improving Power Generation Prediction Accuracy of Bifacial PV Systems by Considering Rear Reflectance Characteristics in Canal Environments**
 Euihwan Ryu¹, Kyu-Jin Kim¹, Deoksung Kim¹, Seungjoon Lee¹
¹ KCL Korea Conformity Laboratories, Cheongju-si, South Korea
- 4DV.4.51 Electro-Thermal Response of Commercial Flexible PV Modules under Partial Shading and Oblique Irradiance**
 Jikai Wang¹, Kingsley Oluah², Herbert Zondag², Silvia Nedea², Angele Reinders²
¹ Eindhoven University of Technology, Eindhoven, The Netherlands; ² Eindhoven University of Technology, Eindhoven, The Netherlands

