SiliconPV 2024

14th International Conference on Crystalline Silicon Photovoltaics

npworkshop

Chambéry 2024

bifi PV 2024 workshop

April 15 – 19, 2024

Chámbery, France

PROGRAM

To get the latest version of the scientific program on your cell phone please scan the QR-code or enter the URL: https://www.siliconpv.com/program/program-overview

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Conference Information

Welcome to SiliconPV 2024!

The 14th edition of SiliconPV takes place from April 15-19, 2024 and is hosted by CEA-INES, France.

Like in recent years, SiliconPV continues its fruitful cooperation with the nPV and bifiPV workshops.

SiliconPV Conference from April 15-17, 2024

The conference itself covers a spectrum of captivating subjects around crystalline silicon for photovoltaic application, reaffirming its status as the leading technology for solar electricity generation!

nPV Workshop from April 17-18, 2024

Scheduled immediately after the SiliconPV conference and overlapping for a day, the workshop provides a comprehensive overview of emerging trends, innovations and developments in n-type technology. The nPV Workshop is hosted by CEA, France, and is seamlessly linked to the SiliconPV conference

bifiPV Workshop from April 18-19, 2024

In addition, this time the bifiPV Workshop on Thursday and Friday will also take place during the Silicon week in France, offering a convenient and efficient means to participate in all three events.

Thank you all for joining us in this immersive experience in April in Chambéry, France!

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Committees

SiliconPV Conference Chair

Sébastien Dubois (CEA INES, France)

SiliconPV Conference Executive Committee

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Wilfried Favre (CEA INES)

bifiPV Workshop Chair

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Chairperson's message

Dear SiliconPV Friends,

The silicon solar community is living an exciting time.

The performances of single-junction silicon cells and modules are still remarkably improving, despite efficiencies that have never been so close from the theoretical limit. The past few months, new records were broken for heterojunction and TOPCon devices, with innovative approaches identified for going even further! This flurry of outstanding results is even truer for perovskite on silicon tandem, with efficiencies now approaching 34%.

Furthermore, the growth of the modules production capacities is maintaining its extraordinary dynamic. The solar manufacturing industry should be soon deployed at the terawatt level and significantly contribute to the global warming mitigation. Promising initiatives for new gigafactories are flourishing worldwide.

This future terawatt-scale deployment raises new challenges in terms of manufacturing but above all, crucial and fascinating challenges for making solar a sustainable industrial sector.

All of these aspects, from new concepts for single-junction and tandem to sustainable industrial devices, from silicon materials to premium and reliable modules, from advanced manufacturing to energy yield and cost considerations, will be at the heart of the next SiliconPV conference in Chambéry in April 2024.

Chambéry's area, located in the French Alps between lakes and mountains, inspired some of the greatest French poets and philosophers, and has always been committed to the development of solar energy. We hope that this venue for SiliconPV will also inspire great exchanges, fruitful discussions, new ideas, while favoring international cooperation, in order to contribute to significant progresses for a sunny future! We are looking forward to discovering your latest results.

This year, beyond SiliconPV, two other major solar events will take place the same week, the nPV (with an overlapping day with SiliconPV) and BifiPV workshops.

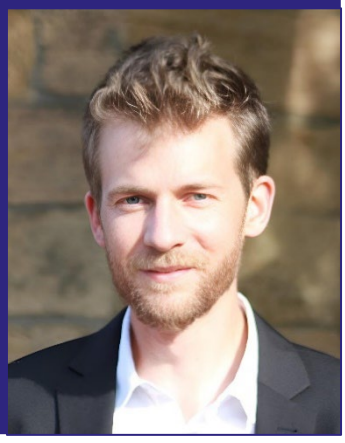
An exciting solar week in an exciting time for solar!

Looking forward to seeing you in Chambéry for the SiliconPV 2024 conference!

Sébastien Dubois,

CEA INES, France

SiliconPV 2024 Conference Chair



Sceintific Topics

1. Sustainability, Life Cycle Assessments and Circularity

- Life-cycle assessments - Eco-designs for cells and modules
- Critical materials management (e.g. Ag, In, Bi, Pb) and possible routes for TW/y PV manufacturing

2. Silicon Materials

- Silicon feedstock
- Silicon crystallization, wafering and direct-wafer production
- Defects in silicon, Defect engineering

3. Emerging Technologies for Silicon Cells, including Tandem

- Advanced light management, ultra-thin devices and new applications (e.g. space)
- Novel passivating contacts and transparent materials, new metallization approaches
- Si-based multijunction cells in combination with perovskites, III-V and alternative materials
- High and record efficiency devices
- Cell characterizations and simulations

4. Advanced Manufacturing, Challenges for Industrial Devices

- Digitalization, data processing and machine learning in PV
- Process integration, low-cost manufacturing & new manufacturing tools
- Advances in industrial solar cells (e.g. PERC, SHJ, TOPCon, IBC): wet processes, light management, junction formation, surface passivation, metallization

5. Module Technologies

- Interconnection, module processing and materials for TW scale manufacturing
- Solutions & challenges for X-IPV (eg: buildings, vehicles, etc.)
- Module characterizations and simulations

6. Energy Yield, Reliability & Cost

- Cells and Modules reliability and degradation mechanisms
- Energy yield
- Cost studies - Bankability

Conference program

Sunday, 14 April 2024

17:30 - 19:30	Welcome Reception Le Manège - Foyer	

Monday, 15 April 2024

08:30 - 08:45	**Opening Session SiliconPV 2024**	
08:45 - 10:00	**Highlight Session**	
	08:45 - 09:00 Industrial Scale Perovskite Silicon Tandem Module with 24.4 % Module Efficiency	ID 38 Torsten Rößler Fraunhofer ISE
	09:00 - 09:15 Ohmic shunt imaging in tandem cells	ID 13 Joël Wyttenbach CEA-INES
	09:15 - 09:30 Technological evolution of the LECO process and working principle on TOPCon cells	ID 128 Eve Krassowski CE Cell Engineering GmbH
	09:30 - 09:45 Contact issues in In-free SHJ cells with a-SnO2 TCO layers	ID 67 Hitoshi Sai AIST
	09:45 - 10:00 Industrial-Scale Deposition of Nanocrystalline Silicon Oxide for 26.4%-Efficient Silicon Heterojunction Solar Cells with Copper Electrodes	ID 100 Kun Gao Soochow University
10:00 - 10:30	**Coffee Break**	
10:30 - 11:00	**Invited Talk: Silicon Materials** The last defects - industrial Czochralski-grown silicon wafers approaching the Auger limit Daniel Macdonald, *ANU*	
11:00 - 12:15	**Session 2. Silicon materials: new feedstock, recycling, crystallisation, defects**	
	11:00 - 11:15 Production of high purity silicon from wafer sawing waste recycling	ID 28 Yohan Fourreau ROSI SAS

	11:15 - 11:30 Cristobalite Formation in Fused Quartz Crucibles for Czochralski Silicon Production in Different Conditions	ID 39 Gabriela Kazimiera Warden Norwegian University
	11:30 - 11:45 Extent of LeTID in Industrial Gallium-doped Czochralski-Silicon with Melt Recharging	ID 46 Joshua Kamphues University of Konstanz
	11:45 - 12:00 Data Analysis of Industrial Czochralski Process: Investigation of Ingots with Structure Loss	ID 113 Rania Hendawi Norwegian University of Science and Technology
	12:00 - 12:15 Recombination Activity of Iron-Gallium and Chromium-Gallium Pairs in Silicon	ID 61 AnYao Liu Australian Nationional University
12:15 - 13:15	**Lunch**	
13:15 - 14:45	**Poster Session I**	
	Investigation of Contact Properties and Device Performance for Bifacial, Double side-textured Silicon Solar Cells with Polysilicon based Passivating Contacts	ID 7 John Derek Arcebal Solar Energy Research Insititute of Singapore, University of Singapore
	Real-Condition Stability Achievement: Si/Perovskite Tandem Cells Challenging Laboratory Analysis	ID 11 Adrien Rivalland CEA-INES
	Added value of bifacial modules in dynamic agripv systems	ID 12 Herve Colin CEA-INES
	In situ and time-resolved X-ray imaging of structural defects and crystal distortion during the solidification of silicon	ID 18 Nathalie Mangelinck-Noël IM2NP
	Silicon Based Photocathode for Solar-driven Water Spitting	ID 19 André DELTENRE IM2NP
	Inline measurement of light beam induced current (LBIC) under high-injection conditions	ID 22 Marko Turek Fraunhofer CSP
	Interconnected Photovoltaic Systems: Predictive Modelling for Granular System Performance and Impact on Grid	ID 23 Edris Khorani School of Engineering, University of Warwick

Toward Lean Fabrication of TOPCon c-Si Solar Cells based on Plasma Deposited Boron Diffusion Source and Poly-Si(n) Passivating Contact	ID 32 Julien Hurni EPFL PV-LAB
Forming Localised Direct Metal-Silicon Contacts Through Controlled Pinhole Formation in Si/Al2O3/HfO2 stacks	ID 33 Anup Yadav School of Engineering, University of Warwic
Polyimide Knotless Screen for High Efficiency Heterojunction Solar Cells Mass Production	ID 36 Bianca Passarella 3SUN Srl
Recycling of Photovoltaic Modules - a Strategy for Silicon and Metal Contact Recovery	ID 37 Nerea Dasilva-Villanueva Instituto de Energía Solar
Nickel oxidized by firing on poly-Si as recombination layer and as hole-selective contact in perovskite/silicon tandem solar cells	ID 54 Jan Krügener Leibniz University
Unveiling the mechanism of attaining high fill factor in silicon solar cells	ID 55 Hao Lin SUN YAT-SEN University
Evaluating 30-Year Degradation of a Grid-Connected PV System in Nordic European Climate	ID 57 André Augusto Dalarna University
Revealing the electron transport mechanisms in MoOx-based electron transport layer stack for application in simplified IBC-SHJ solar cells	ID 64 Katarina Kovačević TU Delft
Analyzing HB Evolution during Dark Annealing in Silicon wafer: Comparing Resistivity and H2 Concentration	ID 68 Nicole Aßmann University of Oslo
Insights into the Thermal and Cross-Linking Behaviors of POE Encapsulation Material for PV Applications	ID 71 Umran Dilmac Kalyon Solar Technologies
Understanding the Correlation between Defects in Silicon and Solar Cell Efficiency	ID 74 Luciano Mule` Stagno University of Malta
Low-Cost Wafer Annealing for Homogeneous High Efficiency Silicon Heterojunction Solar Cells	ID 77 Adrien Danel CEA
Relation Between Top-Cell Bandgap and Silicon Bottom-Cell Thickness in Double-Junction 2-Terminal Silicon-Based Tandem Solar Cells	ID 85 Hesan Ziar TU Delft

Plated Ni/Cu/Ag contacts for sustainable metallization of TOPCoRE solar cells	ID 88 Sven Kluska Fraunhofer ISE
Understanding and Minimizing Perimeter Losses of Perovskite-Silicon Tandem Solar Cells - a Simulation Study	ID 93 Andreas Fell Fraunhofer ISE
Reaction Kinetics and Interface Properties of Aluminum Oxide Layers Deposited by High-Throughput PE-ALD	ID 102 Jonas D. Huyeng Fraunhofer ISE
Optimizations of Poly-Si/SiOx Passivated Contacts for Crystalline Silicon Bottom Cells Applications	ID 103 Julci Ditsougou CEA INES
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Towards Silver-free TOPCon Solar Cells with Screen Printed Nickel Contacts	ID 111 Veysel Unsur ODTU-GUNAM
Deep-Learning Based Depth-Tracking of Stacking Faults in Epitaxially Grown Silicon Wafers	ID 112 Theresa Trötschler Fraunhofer ISE
Enhancing thermal stability of SiOx/poly-Si passivated contacts: Investigating the impact of firing peak temperature	ID 118 Yerin Lee Korea University
Charged-Up Solar Cells: The Role of Interface Electric Fields in Silicon Photovoltaic Technology	ID 120 Sebastia Bonilla University of Oxford
Development of p-type Polycrystalline Silicon Carbide for TOPCon Solar Cells	ID 122 Arghavan Salimi ODTÜ-GÜNAM
Passivation Ability of Graphene Oxide for Interface Engineering of Efficient Hybrid/Si Solar Cells	ID 123 Ruchi Kumari Sharma CSIR
The calculation energy of the light soaking effect in silicon solar cell	ID 133 MyeongSeob Sim Korea University
Patterning by selective etching of poly-silicon using a high etch rate single sided gaseous process	ID 138 Laurent Clochard NINES PV
In-free nanocrystalline silicon recombination junction for two-terminal perovskite / silicon heterojunction tandem solar cells	ID 145 Delfina Munoz CEA
Development and characterization of N2O-plasma oxide layers for high-temperature passivating contacts	ID 146 Audrey Morisset EPFL PV-Lab

	Silicon 5.0 - The future of digitalization and automation for the Photovoltaic Supply Chain	ID 147 Valdiney Domingos de Oliveira Reliance Industries Ltd
	Solstice Project - New Momentum In Solving The Indium And Silver Consumption Issues For A Sustainable Terawatt-scale Industrialization Of High Efficiency Solar Cells	ID 148 Frederic Jay CEA-Liten/INES
	Ultra-Fast and non-destructive measurement of textured surface with a CWS sensor	ID 150 Florence Naudin CEA-Liten/INES
14:45 - 15:00	**Short Break**	
15:00 - 16:15	**Session 3. Hydrogen-induced instability issues in cells and modules**	
	15:00 - 15:15 Hydrogen in Silicon Solar Cells: From its Origin to its Detrimental Effect and How to Control it	ID 53 Benjamin Hammann University of Freiburg
	15:15 - 15:30 Long-term Lifetime Instabilities in n-type FZ- and Cz-Silicon Wafers under Illumination at Elevated Temperature	ID 127 Melanie Mehler University of Konstanz
	15:30 - 15:45 Long-term Stability of TOPCon Solar Cell Precursor Structures based on Ga-doped Cz-Si	ID 94 Joshua Kamphues University of Konstanz
	15:45 - 16:00 Why is Gallium-Doped Silicon (Sometimes) Stable? Kinetics of Light and Elevated Temperature Induced Degradation	ID 25 Fabian Thome Fraunhofer ISE
	16:00 - 16:15 Evaluating Energy Yield Loss Due to Light- and Elevated Temperature-Induced Degradation in Crystalline Silicon Solar Modules and Systems	ID 59 Joseph Karas Electric Power Research Insitute
16:15 - 16:45	**Coffee Break**	
16:45 - 18:00	**Session 4. Module reliability**	
	16:45 - 17:00 Characterization of Rear-side Potential-induced Degradation in Bifacial p-PERC Solar Modules	ID 114 Solhee Lee Korea University

17:00 - 17:15 Polymer-influenced Formation of Potential-induced Degradation in PV Modules	ID 20 Claudia Buerhop Lutz Forschungszentrum Jülich
17:15 - 17:30 Mitigation of Moisture-Induced Degradation of SHJ Modules by Modifying ITO and Capping Layers of SHJ Solar Cells	ID 34 Lucie Pirot-Berson CEA INES
17:30 - 17:45 Optimized Soldering for the Transition of Industrial Si Solar Cells and Modules from PERC to TOPCon or SHJ	ID 40 Angela De Rose Fraunhofer ISE
17:45 - 18:00 Photovoltaic Module Delamination Explained By Mechanics Of Materials	ID 14 Vincent Meslier CEA INES

Tuesday, 16 April 2024

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	08:30 - 08:45 TOPCoRE Solar Cells: Proof of Concept with Local p-TOPCon Front Contact and Simulation Based Performance Evaluation	ID 31 Armin Richter Fraunhofer ISE
	08:45 - 09:00 Simulation of TOPCoRE Solar Cells: Impact of Boron Doping Parameters of p+ Localized under Front Side Metal Contacts on Cell Performance	ID 42 Eni Muka ODTÜ GÜNAM
	09:00 - 09:15 Self Assembled Monolayer Templating for Passivated Contacts	ID 107 Bill Nemeth NREL
	09:15 - 09:30 Local P+ Passivating Contacts Enabled by Local Direct FlexTrail Printing of Boron Ink and Wet-Chemical Etching	ID 72 Hisham Nasser ODTU-GUNAM
	09:30 - 09:45 Adapting Solar Cells with Polysilicon Passivated Contacts to Radiation-Rich Environments	ID 49 Nicolas Enjalbert CEA - INES
	09:45 - 10:00 Novel c-Si solar cell architectures exceeding conversion efficiency well above 27%	ID 76 Olindo Isabella TU Delft
10:00 - 10:30	**Coffee Break**	
10:30 - 11:00	**Invited Talk: Tandem** Transparent Conductive Oxides for Silicon- and Perovskite-Silicon Tandem Solar Cells Monica Morales-Masis, *University of Twente*	
11:00 - 12:15	**Session 6. Tandem cells and modules**	
	11:00 - 11:15 Bandgap Pairing in Three-Terminal Tandem Solar Cells: From Limiting Efficiency to Voltage-Matched Device Performance	ID 43 Philipp Wagner Helmholtz- Zentrum Berlin
	11:15 - 11:30 Development of Silicon Tunnel Junctions for Perovskite/Silicon Tandem Devices	ID 51 Mario Hanser Fraunhofer ISE
	11:30 - 11:45 Influence of Interface Recombination Layers on the Ageing Behaviour of Pk/c-Si Tandem Solar Cells	ID 78 Thibaut Desrues CEA/INES

	11:45 - 12:00 Bayesian Optimization with Experience for Fast Development of Monolithic Tandem Solar Cells: Simulation Case Study	ID 63 Selçuk Yerci ODTÜ-GÜNAM
	12:00 - 12:15 Characterization of Electrically Conductive Adhesives to Enable Perovskite-Silicon Tandem Solar Cell Interconnection	ID 101 Leonhard Böck Fraunhofer ISE
12:15 - 13:00	**Lunch**	
13:00 - 14:30	**Poster Session II**	
	Investigation of the Impact of the Wafer Resistivities on Double Side Passivated Contact Silicon Solar Cells	ID 6 Gabby de Luna Solar Energy Research Institute of Signapore, University of Signapore
	Demonstration of Solution-Processed TiOx High Potential as Electron-Selective Passivating Contact for Silicon Solar Cell	ID 9 Naser Beyraghi Middle East Technical University- GUNAM
	Reliability and Energy Yield: the Case of 2T Tandem Solar Cells in Reverse Bias.	ID 15 Diego Di Girolamo 3SUN
	Accuracy of PVSyst simulations in the reproduction of the yield performance of multicrystalline, monocrsytalline and monocasting modules in outdoor conditions	ID 16 Ismael Guerrero Arias Institut de Energia Solar
	Optimization of RF Sputtered ICO(:H) Thin Films Fabricated at Room Temperature for SHJ Solar Cell Applications	ID 26 Engin Özkol Photovoltaic Materials and Devices Group
	Recovery of Silicon Kerf through Oxidative Cleaning and Drying Processes	ID 29 Marion Chevallier ROSI SAS
	In situ Monitoring of Industrial-Scale Chemical Vapor Deposition using Residual Gas Analysis	ID 30 Munse Kim Korea Institute of Energy Research
	Understanding the defect-induced recombination current density in silicon heterojunction solar cells under device operating conditions	ID 35 Ashutosh Pandey Indian Institute of Technology
	Improving the accuracy of PV yield calculation by exploitation of real weather data	ID 41 Andreas Schneider University of Applied Sciences Gelsenkirchen

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Charge Carrier Transport Mechanisms for APCVD (n) Poly-Si Fired Passivating Contacts	ID 56 Tobias Okker University of Konstanz
Forecasting photovoltaic module remaining life using accelerated aging testing and modelling on aged modules	ID 60 Julien Dupuis EDF R&D
Using Partial Illumination to Perform Quasi-Fermi Level Splitting Measurements of Silicon Solar Cells	ID 62 Mason Mahaffey Arizona State University
Evaluation of cells cracks impact on PV module's performance	ID 65 Christine Abdel Nour EDF
Are All Bifacial High-Efficiency c-Si Technologies Equally Sensitive to Potential-Induced Degradation?	ID 69 Olatz Arriaga Arruti CSEM S.A.
Identifying and repairing defects which form under photoexcited muon spin spectroscopy lifetime measurements	ID 70 Anup Yadav School of Engineering, University of Warwick
Modifying the Slip Behavior of Front Side Metallization Pastes by Adding a Second Immiscible Fluid	ID 81 Max Ailinger KIT
Thermomechanical Assessment of Stress Around Silicon Cells Wires or Ribbons for Space Environment	ID 82 Louis Perrotin CEA-Liten INES
Process Development of Ex Situ BBr3 Diffusion for P+ Passivating Contacts on Textured Silicon Surface	ID 84 Yiğit Mert Kaplan ODTÜ-GÜNAM
Sulfonic-based organic superacid as a passivating and electron-selective material for n-type c-Si	ID 87 Milad Ghasemi ODTÜ-GÜNAM
Cutting Indium Usage by 60% in SHJ Modules Maintaining High Efficiency Without Adding Process Steps	ID 90 Sebastian Pingel Fraunhofer ISE
Prospects and Limitations in Characterization of Ultrathin Layers in Perovskite/TOPCon Tandem Cells with Angle-Resolved Photoelectron Spectroscopy Utilizing Advanced Data Evaluation Methods	ID 95 Stefan Lange Fraunhofer CSP

Demonstrating Interface Engineering with Nano-Ag Crystallite for Enhanced Recombination Layer in Perovskite/Silicon Tandem Solar Cells	ID 108 Dongjin Choi Korea University
In Situ Observation of Interfacial Morphology of Symmetric Σ9 Grain Boundaries during Directional Solidification of Si	ID 115 Lu-Chung Chuang Institute for Material Research
Low Temperature Issues in a-Si:H/c-Si Silicon Heterojunction Solar Cells with Ideal Hole Transport across the a-Si:H/c-Si Barrier	ID 116 Moustafa Ghannam Kuwait University
Influence of the silicon material compositional properties on the electronic quality of electron-irradiated Ga-doped wafers for space solar cells	ID 119 Océane Guillot CEA
Impact of AlOx Capping Layer Thickness for Edge Passivation of TOPCon² Shingle Solar Cell	ID 124 Thibaut Desrues Univ. Grenoble Alpes
DC sputtered ZnO:Al thin films with low contact resistance for photovoltaic applications	ID 125 Abhishek Kumar CSIR National Physical Laboratory
Titanium Silicide: A Promising Candidate of Recombination Layer for Perovskite/TOPCon Tandem Solar Cells	ID 129 Dowon Pyun University Korea
Enhancing the energy yield of vertical bifacial photovoltaic modules through reflectors	ID 139 Jan Amaru Palomino Töfflinger Pontificia Universidad Católica del Perú
Implied J-V curves recorded at elevated temperatures using light controlled heating	ID 141 Gergely Havasi Semilab Co
Enhancing Electric Vehicle Autonomy with Solar Energy: A Case Study of the 'Takai Urban' in Northern Chile	ID 142 Fernando Castro Centro Desarollo Energetico
Plasma synthesis of silicon nanocrystals: the key to the production of p-type nc-SiOx:H films for transparent selective passivating contacts	ID 149 Pere Roca i Cabarrocas IPVF
Maximum Power Point Tracking Using Adaptive Neuro-Fuzzy Inference Systems for the Photovoltaic Modules	ID 151 Mamadsho Ilolov Center of Innovative Development of Science and New Technologies
Pushing Heterojunction Technology Further: Novel Metallization Processes and Architectures	ID 152 Marco Galiazzo Applied Materials

14:30 - 14:45	**Short Break**	
14:45 - 16:15	**Session 7. Advances in bulk and surface characterization**	
	14:45 - 15:00 Electrically detected magnetic resonance characterization of the defects in polysilicon passivated contact-based silicon solar cells	ID 135 Chirag Mule NREL
	15:00 - 15:15 Characterisation of Solar Cell Passivating Contacts using Time-of-Flight Elastic Recoil Detection Analysis	ID 130 Matthew Wright University of Oxford
	15:15 - 15:30 Differences in Current Transport in Symmetric and Solar Cell poly-Si/SiOx Passivating Contact Structures Under Illumination	ID 136 Dirk Steyn National Renewable Energy Laboratory
	15:30 - 15:45 Mapping of Amorphous Silicon Layer Thickness of Heterojunction Precursors using Inline Multispectral Imaging	ID 86 Saravana Kumar Fraunhofer ISE
	15:45 - 16:00 In-line Imaging Tool for Interdigitated Back-contact Silicon Heterojunction Solar Cells	ID 137 Martin Ledinsky Institute of Physics
	16:00 - 16:15 Implied J-V curves recorded at elevated temperatures using light controlled heating	ID 141 Gergely Havasi Semilab Co
16:15 - 16:45	**Coffee Break**	
16:45 - 18:15	**Session 8. Minimizing critical materials for contacting cells and modules**	
	16:45 - 17:00 Evaluating the performance and reliability of screen-printable fire-through copper paste on PERC solar cells	ID 89 Pauls Stradins NREL
	17:00 - 17:15 RF-sputtered Ti-based dielectric layers as Al-diffusion barrier for passivating contacts	ID 44 Benjamin Gapp University of Konstanz
	17:15 - 17:30 Characterizing the degradation of copper-covered, n-type polysilicon-based contacts annealed at moderate temperatures	ID 83 Reyu Sakakibara EPFL
	17:30 - 17:45 Investigation of PECVD SixCy as Barrier Layer against Aluminum in Solar Cells with poly-Si/SiOx Passivating Contacts	ID 45 David Bäurle University of Konstanz

	17:45 - 18:00 TOPCon solar cells with Al-free Ag and Cu metallization	ID 126 Pirmin Preis ISC Konstanz
	18:00 - 18:15 Indium reduction above 70% in SHJ solar cells: Study of the module stability	ID 80 Adeline Lanterne CEA-INES
19:00 - 22:00	Conference Dinner	

Wednesday, 17 April 2024

08:30 - 08:45	**Opening Session nPV Workshop**	
08:45 - 10:15	**Session 9: TOPCon solar cells**	
	08:45 - 09:00 Passivation Effect of Tunnel Oxide Grown by Ozone-gas Oxidation (OGO) for N-type Polysilicon Passivated Contact Application	ID 21 Lei Yang Zhejiang University
	09:00 - 09:15 Oxygen-Alloyed Poly-Si Passivating Contacts with i-Voc Exceeding 745mV for n-type and 720mV for p-type via PECVD	ID 91 Yingwen Zhao TU Delft
	09:15 - 09:30 Hydrogenation Characteristics of n- and p-type Poly-Si Passivating Contacts on Textured Surface Morphology	ID 73 Anna Damm Fraunhofer ISE
	09:30 - 09:45 Understanding Hydrogen Passivation Mechanism in poly-Si Passivating Contacts via SixNy composition: Insights from Effusion Studies	ID 134 Pauls Stradins NREL
	09:45 - 10:00 Towards Upscaling of Plasma-Assisted N2O Oxidation (PANO) in Tube PECVD Reactor for i-TOPCon Solar Cells	ID 66 Jana-Isabelle Polzin Fraunhofer ISE
	10:00 - 10:15 Patterning by selective etching of poly-silicon using a high etch rate single sided gaseous process	ID 138 Laurent Clochard NINES PHOTOVOLTAICS
10:15 - 10:45	**Coffee Break**	
10:45 - 11:15	**Invited Talk: Industry** State of the art, technological roadmap of KalyonPV R&D Center Nesrin Töre Sen, *KalyonPV*	
11:15 - 12:15	**Session 10. PV manufacturing and sustainability**	
	11:15 - 11:30 Effect of Reshoring the PV Supply Chain in the EU on the Carbon Footprint of c-Si PV module manufacturing	ID 110 Pamela Molina Fraunhofer ISE
	11:30 - 11:45 Passivated-contact solar cell applying LECO technology exceeding 25.5% power conversion efficiency	ID 105 Ansgar Mette Hanwha Q Cells GmbH

	11:45 - 12:00 Effective Reduction of the Carbon Footprint of Photovoltaic Silicon Module via a Parametric Life Cycle Analysis	ID 140 Nouha Gazbour CEA INES
	12:00 - 12:15 TOPCon solar cell fabrication on cast-mono wafers and the influence of the hydrogenation process	ID 75 Lazhar Rachdi International Solar Energy Research Center Konstanz e.V.
12:15 - 13:15	**Lunch**	
13:15 - 15:00	**Session 11. Heterojunction solar cells and modules**	
	13:15 - 13:30 The high-efficiency SHJ Solar Cells at Low Illuminations	ID 17 Jakub Holovský Czech Technical University Prague
	13:30 - 13:45 Physics-Informed Machine Learning for TCO-Layer Thickness Prediction and Process Analysis from Multi-Spectral Images	ID 106 Alexandra Wörnhör Fraunhofer ISE
	13:45 - 14:00 Influence of deposition conditions on passivation quality of nanoscale ALD-grown hafnium oxide layers	ID 10 Sophie Pain School of Engineering, University of Warwick
	14:00 - 14:15 Al-doped Zinc Oxide based Electron-Selective Contacts for Crystalline Silicon Solar Cells	ID 50 Xinbo Yang Soochow University
	14:15 - 14:30 Universal interface treatment for dopant-free materials applied to silicon heterojunction solar cells	ID 92 Liqi Cao TU Delft
	14:30 - 14:45 Can TCO thickness reduction in SHJ solar cells be done in a robust way?	ID 117 Can Han Sun Yat-sen University
	14:45 - 15:00 How to combine SHJ cell-edge passivation and module reliability?	ID 58 Samuel Harrison CEA-INES
15:00 - 15:30	**Closing Session (Award + SiliconPV 2025 Annoucement)**	
15:30 - 15:45	**Coffee Break**	
15:45 - 19:30	Lab Tour + Drinks	

Thursday, 18 April 2024

08:30 - 08:45	**Opening Session bifiPV**		
08:45 - 10:15	**Session 12: Providing tools and approaches for next generation PV technologies**		
	08:45 - 09:10 Manufacturing the difference for new n-PV Era : An updated overview on high quality Si-Ingot to high efficiency Solar Cell/module for a sustainable PV industry	ID 153 Anis Jouini ECM Greentech	
	09:10 - 09:25 Perovskite system and solar technology roadmap	ID 154 Lee Jong Hun Jusung	
	09:25 - 09:40 GW Scale Solutions for TOPCon & SHJ Cell Manufacturing	ID 155 Damian Brunner RENA	
	09:40 - 09:55 Renewed Metrology Solutions for Modern n-Type Solar Cell Production	ID 164 Ferenc Korsos Semilab	
	09:55 - 10:10 Physical Vapor Deposition for TOPCon and Si-PVSK-Tandem Solar Cell Manufacturing	ID 189 Eric Schneiderlöchner Von Ardenne	
10:15 - 10:45	**Coffee Break**		
10:45 - 12:15	**Session 13: Challenges for value chain & raw materials to produce PV components**		
	10:45 - 11:10 Building a Sustainable Supply Chain for Global PV Manufacturing	ID 156 Teresa Barnes NREL	
	11:10 - 11:25 Coming soon	ID 166 Giuliano Vescovi Nexwafe	
	11:25 - 11:40 PROTAVIC® ACE 10720 (622850) : an innovative and affordable Electrically Conductive Adhesive (ECA) for the Photovoltaics industry	ID 157 Vincent Charlot Protavic	
	11:40 - 11:55 RayBo® Film An innovative solution to HJT module	ID 165 José Carlos Raso Cybrid	
12:15 - 13:30	**Lunch**		

13:30 - 15:00	**Session 14: Challenges for PV components manufacturing**	
	13:30 - 13:45 Tongwei N type passivated contact cell, from R&D to mass production	ID 158 Meng Xiajie Tongwei
	13:45 - 14:00 Over 27% Efficiency Silicon Heterojunction Back Contacted Cell for Mass Production	ID 159 Xixiang Xu Longi
	14:00 - 14:15 Technical Improvements and Innovations of the Industrial TOPCon Solar Cell and Module Manufacturing	ID 160 Jie Mao Jinko
	14:15 - 14:30 Coming soon	ID 161 Cosimo Gerardi 3SUN / ENEL
	14:30 - 14:45 FuturaSun: recent development and update on the activities	ID 194 Erik Eikelboom Futurasun
15:00 - 15:30	**Coffee Break**	
15:30 - 16:45	**Session 15: nPV + BifiPV round table**	
16:45 - 17:15	**nPV closing session**	

Friday, 19 April 2024

08:30 - 10:00	**Session 16: Highlights bifiPV from forecast to bankability**		
	08:30 - 08:52 Tapping Solar Pv Energy Potential From Eu Transport Infrastructure	ID 192 Nigel Taylor JRC
	08:52 - 09:07 Illuminating Tomorrow: Modelling Bifacial PV Performance for the Next Generation of PV Power Plants	ID 185 Leonhard Gfullner Fraunhofer ISE
	09:07 - 09:22 Development of an Energy Rating for Bifacial PV Modules	ID 186 Malte Ruben Vogt TU Delft
	09:22 - 09:45 The Global Solar Pv Manufacturing Landscape In 2024: Technology Trends, Bankability Of Suppliers & Investments Into Global Diversification	ID 187 Finlay Colville PVcell Tech
	09:45 - 10:07 Overview On Bifacial System Technologies	ID 188 Shravan Kumar Chunduri Taiyang News
10:00 - 10:30	**Coffee Break**	
10:30 - 12:00	**Session 17: Circular and reliable bifiPV**	
	10:30 - 10:45 OPTISOL : an intense test program to evaluate BIFI module's reliability	ID 167 Stephane Gresset Certisolis
	10:45 - 11:00 Bifacial photovoltaic module packaging durability: Using sequential stress testing to detect degradation beyond early-stage failure	ID 168 Sona Ulicna NREL
	11:00 - 11:15 A truly circular economy for the photovoltaic industry and beyond	ID 169 Yun Luo Rosi
	11:15 - 11:30 Drivers And Challenges For A Second-life PV	ID 193 Daniela Ariolli BayWa r.e.
	11:30 - 11:45 Coming soon	ID 195 Luc Federzoni Solreed

	11:45 - 12:00 Glass-glass PV modules mechanical delamination by diamond wire sawing	ID 170 Roland Riva CEA-INES
12:00 - 13:15	**Lunch**	
13:15 - 14:30	**Session 18: Challenges for bifacial O&M and AI**	
	13:15 - 13:30 Evaluation of the duration of albedo measurement campaigns	ID 173 Nicolas Chouleur Everoze
	13:30 - 13:45 Combined effect of soiling, cleaning and albedo enhancer materials on bifacial PV performance	ID 174 Franco Clandestino PVradar
	13:45 - 14:00 When PV meets AI: use cases and guidelines for success	ID 172 Pierre-Jean Alet CSEM
	14:00 - 14:15 Analyzing Bifacial AgriPV Systems in Temperate Climates with Advanced Mathematical Modelling for Irradiance Estimation	ID 175 Yazan Musleh University of Southhampton
	14:15 - 14:30 Outdoor performance of different bifacial technologies: The Atacama Desert experience	ID 171 Felipe Valencia Atamostec
14:30 - 15:00	**Coffee Break**	
15:00 - 16:15	**Session 19: bifiPV meets agriculture**	
	15:00 - 15:15 Dynamic Agrivoltaics: an agronomic tool to protect crops from the effects of climate change	ID 176 Damien Fumey SunAgri
	15:15 - 15:30 Agrivoltaic Electricity Production: Comparison Between Monofacial And Bifacial Modules	ID 177 Christine Abdel Nour Symbiosist
	15:30 - 15:45 Symbiosyst: Creating new synergies between solar energy and agriculture	ID 178 David Moser EDF
	15:45 - 16:00 Vertical Bifacial Agri-PV: PV and agriculture synergy	ID 179 Anna Morales Vilches Next2Sun

	16:00 - 16:15 Transforming Agriculture with Photovoltaic Technology: PV4Plants for Enhancing Climate, Water, and Light Spectrum Control for Safer, Healthier, and Improved Crop Production	ID 180 Meric Caliskan Arslan Kalyon PV
16:15 - 16:30	**bifiPV closing session**	

Social Events

Welcome Reception

Our Welcome Reception will take place on Sunday, April 14, 2024 from 17:30 to 19:30. Good vibes and informal settings will mark a wonderful start into the SIliconPV Week.

Day: Sunday, April 14, 2024
Time: 17:30 - 19:30 (CEST)
Place: Centre de Congrès Le Manège
Address: 331 Rue de la République, Chambéry

Conference Dinner

On the second conference day, our participants are welcome to enjoy the Conference Dinner in relaxed atmosphere with a variety of selcted dishes to meet all tastes.

Day: Tuesday, April 16, 2024
Time: 19:00 - 24:00 (CEST)
Location: le Corsaire
Address: 20 Av. des Ducs de Savoie, 73000 Chambéry

Technical Tour

Take a Tour!

We are happy to invite you to the following locations on the grounds of INES as part of the Technical Tour Program:

- Grid Control Lab unit
- silicon cell labfab
- Solar Cells unit
- PV module and system unit
- INCAS unit

Day: Wednesday, April 17, 2024

Time: 15:45 - 19:00 (CEST)

Registration fee: 25,- EUR

Deadline for registration: March 20.

Participants attending the tour will meet in front of the registration desk to be assigned to small groups.

Grid Control Lab unit not only enables realistic and flexible grid recreation for energy management purposes, but also the design, development and testing of components. In particular, the static converters that will be common in the power grids of the future. The multi-megaWatt platform has an experimental 20 kVac HTA loop, which can be either isolated or connected to the public distribution grid. It includes four transformers dedicated to experiments, two of which are adjustable on the low-voltage side. Some areas are dedicated for testing innovative medium voltage DC distribution networks up to 3kVdc. Particular emphasis has been placed on the flexibility and modularity of this new platform in order to meet our partners' expectations as quickly as possible, and this at a representative power scale.

Grid Control Lab Unit //© G.BOUKERCHE, CEA

The silicon cell labfab is representative of an industrial cell production line. It is used to complete the necessary proof-of-concept testing on new cell technologies, ensuring optimal transfer to our manufacturing partners.

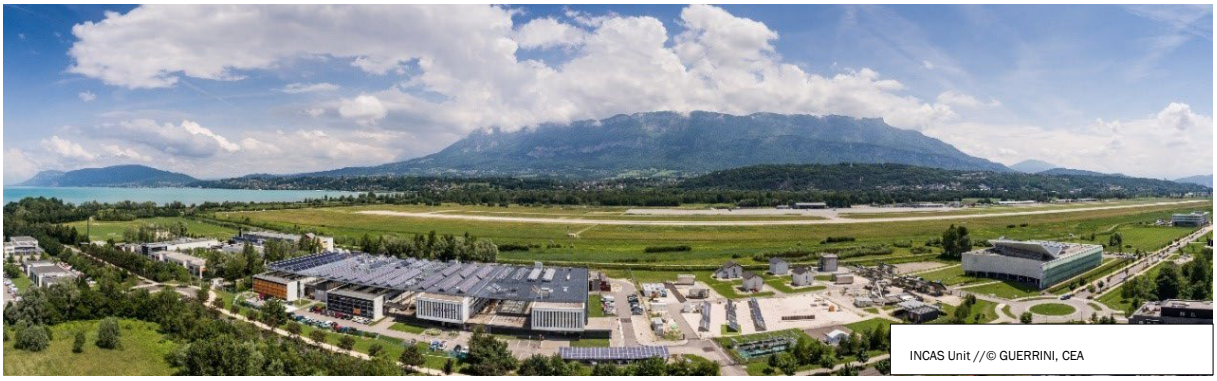
The Solar Cells unit supports on the one hand researches on passivated contacts technologies (TOPCon, heterojunction and their evolutions) for advanced and sustainable crystalline silicon solar cells. On the other hand, a part of the unit is fully dedicated to the development of perovskite devices, especially for their implementation in perovskite on silicon tandem cells, a technology that is rapidly gaining attraction at CEA and in other research organizations worldwide.

The PV module and system unit develops processes and materials for the packaging of heterojunction, TOPCon and tandem cells in high-performance photovoltaic modules. The unit possesses extensive know-how not only in development, but also in modeling and predicting performance, energy yield. It also develops innovative integrated photovoltaic modules and systems for building, vehicle, infrastructure, agricultural and floating applications using a circular economic approach. Deployment of silicon based modules in various space applications is investigated by the research teams. Development of novel processes for high-value PV module recycling, and demonstrating the repair and re-use PV panel are also major part of the activities. The unit couples PV modules with systems that collect and convert the energy produced into electricity and that enable its safe, efficient management.

INCAS unit is a set of experimental tools designed to improve knowledge of highly energy-efficient buildings, preparing the building of the future and anticipating new regulations.

Drinks after the Lab Tour

At the end of the tour please join us for an informal get-together.



INCAS Unit //© GUERRINI, CEA

Programm overview

Program Overview

*as of 22 February, subject to change

CEST	Sunday April 14, 2024	Monday April 15, 2024	Tuesday April 16, 2024	Wednesday April 17, 2024	Thursday April 18, 2024	Friday April 19, 2024
		SiliconPV Conference				
				nPV Workshop		
					bifiPV Workshop	
7:45	Welcome Reception	Registration	Registration	Registration	Registration	Registration
8:30		Opening Session SiliconPV		Opening Session nPV	Opening Session bifiPV	
8:45						
9:00		Highlight Session	Session 5. New concepts for polysilicon-based passivated contacts	Session 9: TOPCon solar cells	Session 12: Providing tools and approaches for next generation PV technologies	Session 16: Highlights bifiPV from forecast to bankability
9:20						
9:45						
10:00		Coffee Break	Coffee Break			Coffee Break
10:15				Coffee Break	Coffee Break	
10:30		Invited Talk: Silicon Materials	Invited Talk: Tandem			Session 17: Circular and reliable bifiPV
10:45				Invited Talk: Industry	Session 13: Challenges for value chain & raw materials to produce PV components	
11:00		Session 2. Silicon materials: new feedstock, recycling, crystallisation, defects	Session 6. Tandem cells and modules	Session 10. PV manufacturing and sustainability		
11:15						
11:30						
11:45						
12:00						Lunch
12:15		Lunch	Lunch	Lunch	Lunch	
12:30						
12:45						
13:00			Poster Session II			
13:15		Poster Session I		Session 11. Heterojunction solar cells and modules	Session 14: Challenges for PV components manufacturing	Session 18: Challenges for bifacial O&M and AI
13:30						
13:45						
14:00						
14:15			Short Break			Coffee Break
14:30		Short Break				
14:45				Closing Session (award + SiliconPV 2025 annoucement)	Coffee Break	
15:00		Session 3. Hydrogen-induced instability issues in cells and modules	Session 7. Advances in bulk and surface characterization			Session 19: bifiPV meets agriculture
15:15				Coffee Break		
15:30					Session 15: nPV + BifiPV round table	
15:45				Lab Tour		
16:00						bifiPV Closing Session
16:15		Coffee Break	Coffee Break			
16:30						
16:45		Session 4. Module reliability	Session 8. Minimizing critical materials for contacting cells and modules		nPV Closing Session	
17:00						
17:15						
17:30						
17:45	Welcome Reception					
18:00				Drinks after the Lab Tour		
18:15						
18:30						
18:45						
19:00			Conference Dinner			
19:15						