CPV-11

11th International Conference on
Concentrator Photovoltaic Systems

PROGRAM

April 13 – 15, 2015

Aix-les-Bains, France

www.cpv-11.org

Program Overview

	Sunday, April 12, 2015	Monday, April 13, 2015	Tuesday, April 14, 2015	Wednesday, April 15, 2015	Thursday, April 16, 2015
08:00 —					
08:15 —		Registration			
08:45 —			Characterization of Modules and System Components	Field Performance, Grid Integration and Energy Prediction	
09:00 —		Welcome			Technical Tour
09:30 —		Opening Session			
10:15 —		Coffee Break	Coffee Break	Coffee Break	
10:35 —		Invited Lecture	Invited Lecture	Invited Lecture	
11:00 —		Advanced CPV Cells and Materials	Characterization and Simulation of CPV Cells	Poster Session III	
12:00 —					
12:30 —		Lunch Break	Lunch Break	Lunch Break	
14:00 —		Poster Session I	Poster Session II	Accelerated Testing Procedures and Reliability of CPV Systems and Components	Panel Discussion CPV Technology: How to Capture the Market Potential?
15:25 —		Coffee Break	Coffee Break	Coffee Break	
15:45 —					
16:00 —		Novel CPV Materials and Concepts	CPV Modules and Trackers	Code, Standards, Policies and Market Studies	
17:00 —				Closing Remarks	
17:30 —	Registration / Welcome Reception			IEC Standards Discussion	
17:45 —		Industry Session			
18:00 —					
18:30 —		Sponsors Reception	Dinner Reception		
19:00 —					
19:30 —			Conference Dinner		
20:30 —					

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http://cms.cpv-11.org/mobile

Chairperson‘s Message

Mathieu Baudrit

Head of the CPV Lab
Solar Technologies Department
CEA-INES

Since the story of CPV-x started in 2002, a long way of development has been covered and there is still some to go. The PV environment is changing very fast, as does the CPV environment. Some may see uncertainty where others see great potential. However, there is one thing that is reliable in the CPV world: its strong community.

On behalf of the conference committees, it is my honor to welcome you to the 11th International Conference on Concentrator Photovoltaics (CPV-11) where we are all committed to continue the CPV-x conference series as the premier technical conference in the areas of high- and low-concentration PV components, modules, trackers and systems.

If Aix-les-Bains is not heaven on earth, it is close to it: beautiful landscapes along with good connections to the rest of the world. The town is perched on the edge of the Lac du Bourget, France‘s largest freshwater lake, which boasts beautiful sandy beaches offering all manner of watersports in summer. In winter the nearby Grand Revard Mountains offer the best cross-country skiing in France, at the beginning of the French Alpes, close to the Mont-Blanc. This designated station nautique was a favorite holiday destination of Queen Victoria, who visited the town for its thermal baths, which are still popular.

During the technical tour, you will be guided by CEA researchers of the National Solar Energy Institute (INES), it is France’s center of reference in the field of solar energy. It ensures close links between basic research and applied research carried out in association with industry leaders on solar thermal, photovoltaic and energy-efficient buildings. The institute’s laboratories, clean rooms, pilot facilities and demonstrations allow its scientists and technicians to work on optimizing all aspects of solar photovoltaic energy, from cells to systems and from positive-energy buildings to solar mobility. All these facilities will be shown and explained to you.

The conference proceedings of CPV-11 are published with the American Institute of Physics (AIP, www.aip.org). Accepted papers will be published, indexed, and citable through the AIP website.

I wish you a successful conference and an enjoyable stay in Aix-les-Bains!

Mathieu Baudrit

Committees

Scientific Chair

Mathieu Baudrit, CEA-INES, France

Chair Committee

Chair Committee Chair
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Kenji Araki, Daido Steel, Japan
Mathieu Baudrit, CEA-INES, France
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Ralf Leutz, Leutz Optics and Illumination UG, Germany
Antonio Luque, IES-UPM

Sunday, April 12, 2015

17:00 - 19:00 Pre-Registration and Welcome Reception

The Welcome Reception is sponsored by

Agence Économique de Savoie

and Savoie Technolac

Thank you!

Monday, April 13, 2015

08:00 Registration

09:00 - 09:30 Welcome

Chair: Mathieu Baudrit (CEA-INES) & Ignacio Antón (IES-UPM)

09:00 Welcome to CPV-11

Mathieu Baudrit (CEA-INES)

09:10 Welcome from INES and CEA

Philippe Malbranche (Director of INES)

09:20 Welcome from CPV Consortium

Claire van Zuiden (CPV Consortium)

09:30 - 10:15 Oral Session 1: Opening Session

Chair: Mathieu Baudrit (CEA-INES) & Ignacio Antón (IES-UPM)

09:30 Soitec 4J Solar Cell Modules One Year on Sun

Eckart Gerster[1]

[1] *Soitec Solar GmbH*

09:45 Energy Yield Determination of Concentrator Solar Cells Using Laboratory Measurements

John Geisz[1], Iván García[1], William McMahon[1], Myles Steiner[1], Ryan France[1], Aron Habte[1], Daniel Friedman[1]

[1] *NREL*

10:00 36.7% CSTC Efficiency for a FLATCON® CPV Module Using Four-junction Solar Cells

Marc Steiner[1], Armin Bösch[1], Alexander Dilger[1], Frank Dimroth[1], Tobias Dörsam[1], Matt Muller[2], Thorsten Hornung[1], Gerald Siefer[1], Maike Wiesenfarth[1], Andreas W. Bett[1]

[1] *Fraunhofer ISE;* [2] *NREL*

10:15 Coffee Break

10:35 - 11:00 Invited Lecture

CPV and Solar Market - A Technical Advisor Perspective

Xavier Daval, kiloWattsol

Xavier Daval

Xavier Daval is founder and CEO of kiloWattsol. Ever since its creation in 2007 as a spin-off of an associated laboratory of the French national research network CNRS, he led the company to becoming one of the most experienced European Technical Advisors in the field of photovoltaic projects with a track record exceeding 4GWp world-wide. Daval is an Electronic engineer and former Director EMEA of OK International, world leading manufacturer of tools for the electronics industry, a subsidiary of Dover Corp. a NY listed group.

Daval is a board member of the French solar industry association (SER-SOLER), and was recently appointed as a steering committee member of the Franco-German Coordination Office for Renewables, a joint agency of the German and French national governments.

Besides, he is in charge of the PV class for ENTPE's 3rd year Engineer students and guest lecturer for renewable energies and Entrepreneurship at EM-Lyon, one of Europe's top 10 business schools.

11:00 - 12:30 Oral Session 2: Advanced CPV Cells and Materials

Chair: John Geisz (NREL)

11:00 Investigation of New Approaches for InGaN Growth with High Indium Content for CPV Application

Jean Paul Salvestrini[1]

[1] *Laboratoire LMOPS - UL & Supelec*

11:15 Improving Optical Performance of Concentrator Cells by Means of a Deposited Nanopattern Layer

Pablo Garcia-Linares[1], Cesar Dominguez[1], Olivier Dellea[1], Mathieu Baudrit[1]

[1] *CEA*

11:30 InP-based Composite Substrates for Four-junction Concentrator Solar Cells

Aurélie Tauzin[1]

[1] *CEA*

11:45 Si-Ge-Sn Alloys with 1.0 eV Gap for CPV Multijunction Solar Cells

Radek Roucka[1]

[1] *Translucent Inc.*

12:00 Realizing the Next Generation of CPV Cells Using Transfer Printing

Matthew Lumb[1], Kenneth Schmieder[1], Shawn Mack[1], Maria Gonzalez[1], Matthew Meitl[2], Scott Burroughs[2], Michael Yakes[1], Mitchell Bennett[1], Xing Sheng[3], John Rogers[3], Robert Walters[1]

[1] *Naval Research Laboratory;* [2] *Semprius Inc.;* [3] *UIUC*

12:15 Mass Production of High Efficiency Multi-junction Solar Cells for CPV Applications

Werner Bensch[1]

[1] *AZUR SPACE Solar Power*

12:30 Lunch Break

14:00 - 15:25 Poster Session 1

The poster numbers are based on topics:

A Concentrating Optics and Related Materials
B CPV Manufacturing Aspects and Utility Scale Installations
C High-Concentration PV: Modules and Trackers
D Low-Concentration CPV Systems

A-1 Specularity of Concentrator Mirrors for CPV Measured with VLABS

Tobias Schmid[1], Anna Heimsath[1], Thorsten Hornung[1], Peter Nitz[1]

[1] *Fraunhofer ISE*

B-1 Making Large Glass Solar Mirrors for CPV

Roger Angel[1], Thomas Stalcup[1], Brian Wheelwright[1], Kimberly Hammer[1]

[1] *University of Arizona*

B-2 CPVRS Pre-series Field Installation, Operation and Maintenance Experience

Ricard Pardell[1]

[1] *Valldoreix Greenpower*

B-3 Automated CPV-Module Manufacturing

André Angermeyer[1], Markus Gruber[1]

[1] *Grenzebach Maschinenbau GmbH*

C-1 The Optimal Configuration of Bypass Diodes for High Concentrated Photovoltaic Systems

Chun-Yi Chen[1]

[1] *Arima Photovoltaic & Optical Corporation*

C-2 Dependence of HCPV Acceptance Angle on Solar Cells Interconnections

Artashes Yavrian[1], Raymond Gilbert[1], Steeve Tremblay[1], Alexandre Gilbert-Vanasse[1]

[1] *Opsun Technologies Inc.*

C-3 Composite Made of Phase Change Materials and Graphite for CPV Cells Thermal Management and Cooling

Sandrine Pincemin[1], Nadia Martaj[1], Yvan Cuminal[2], Emmanuel Giudicelli[1]

[1] *EPF Ecole d'ingénieur;* [2] *IES*

C-4 Combined Heat and Power Generation with a HCPV System at 2000 Suns

Fabio Montagnino[1], Filippo Paredes[1], Gaetano Bonsignore[2], Alessandro Buscemi[1], Sergio Milone[1], Simonpietro Agnello[2], Marco Barbera[2], Franco M. Gelardi[2], Luisa Sciortino[2], Alfonso Collura[3], Ugo Lo Cicero[3], Marco Cannas[2]

[1] *Idea Srl;* [2] *University of Palermo;* [3] *INAF*

C-5 Performance Analysis for a Novel Paraboloidal Dish Concentrating Photovoltaic/Thermal (PV/T) System

Yunfeng Wang[1]

[1] *Solar Energy Research Institute/Yunnan University*

C-6 Applicability and Effectiveness of PMMA and Sylgard as Coverglass for CPV Applications

Fahad Al Harbi[1], Nazmi Sellami[1], Nabin Sarmah[1], Tapas Mallick[2], Leonardo Micheli[1]

Presented by Nazmi Sellami[1]

[1] *University of Exeter;* [2] *Environment and Sustainability Institute*

C-7 MISPS Solar Position Sensor Development and Field Tests

Ricard Pardell[1]

[1] *Valldoreix Greenpower*

C-8 Applications in Steel in the CPV and PV-Sector

Albert Knotz[1]

[1] *Welser Profile GmbH*

C-9 Development and Empirical Test of Solar Tracking System for Concentrator Photovoltaic Applying Hybrid Solar Tracking Control System

Hyo Geun Lee[1], Sung Jo Kim[1], Su-Jin Park[1], Chang-wuk Yun[1], Gil-pyeong Im[1], Sang Suk Kim[1]

[1] *Samwon Tech Co., Ltd.*

C-10 Enhancement of Sun-tracking with Optoelectronic Devices

Jiunn-Chi Wu[1]

[1] *National Central University*

C-11 The Importance of Albedo Effects for Sunsensor Performance

Johan Leijtens[1]

[1] *Lens R&D*

C-12 Influence which Calibration in an Azimuth Direction to be Affected to the Tracking Error

Jun Hirota[1], Kensuke Nishioka[2]

[1] *THK Co., Ltd.;* [2] *University of Miyazaki*

C-13 SolTrack: A Simple, Free, Fast and Accurate Routine to Compute the Position of the Sun

Marc van der Sluys[1], Paul van Kan[1], Jurgen Reintjes[1], Piet Sonneveld[1]

[1] *HAN University of Applied Sciences*

C-14 Improved Dual-axis Tracker and Outdoor Characterization of CPV System

Merouan Belkasmi[1], Khalid Bouziane[1], Mohammed Akherraz[2], Tayeb Sadiki[1], Mustapha Faqir[1], Mohsine Bouya[1], Mohamed El Ouahabi[1]

[1] *International University of Rabat;* [2] *Université Mohamed V Agdal, Ecole Mohammadia d'Ingénieurs*

D-1 Optical Analysis of a Dielectric Based 3D-CPC with a Circular Entry and Square Exit Aperture

Hasan Baig[1]

[1] *ESI, University of Exeter*

D-2 Vertical Integration of Transparent and Standard Si Solar Cells

Eleftherios Skuras[1], Theodore Makris[1], Eleftherios Skuras[1]

[1] *University of Loannina*

D-3 Volume Holograms for Low-concentration PV Applications: Analysis of Influential Parameters on System

Julia Marín-Saez[1], Daniel Chemisana[1], Mª Victoria Collados[2], Jesús Atencia[2]

[1] *University of Lleida;* [2] *University of Zaragoza*

D-4 Optical Analysis and Thermal Management of 2-Cell Strings Linear Concentrating Photovoltaic System

K S Reddy[1]

[1] *Indian Institute of Technology Madras*

D-5 Mirrors Boosting Energy Collection of PV Plants

Ralf Leutz[1], Ricard Pardell[2], Bruce Wang[3]

[1] *Leutz Optics and Illumination UG;* [2] *Valldoreix Greenpower;* [3] *Suntrix Company Limited*

15:25 Coffee Break

15:45 - 17:30 Oral Session 3: Novel CPV Materials and Concepts

Chair: Andreas Bett (Fraunhofer ISE) & Matthew Muller (NREL)

15:45 Enhancing the Performance of BICPV System Using Phase Change Materials

Shivangi Sharma[1], Nazmi Sellami[1], Asif Tahir[1], Tapas K. Mallick[1]

[1] *University of Exeter*

16:00 Development of Commercial Amorphous Carbon Mold for Homogeneous Glass Fresnel Lens of High Concentrator Photovoltaic Module

Sung-Bin Kim[1], Yoon-Suk Heo[1], Jang-Kyun Kim[1], Sang-Kyoung Oh[1], Seok-Min Kim[2], Young-Kyu Kim[2]

[1] *AnyCasting;* [2] *Chung-Ang University*

16:15 Fabrication of High Concentration CPV Module with Light Guide Structure

Kisung Park[1], Seon-Myeong Shin[1], Gil-Dong Lee[1], Jun-Hee Park[1]

[1] *LED Pack*

16:30 New Material Fresnel Lens with High Performance in Wide Temperature Range

Yasuyuki Ota[1], Koji Abe[2], Katsuhiro Fujita[2], Kensuke Nishioka[1]

[1] *University of Miyazaki;* [2] *KURARAY Co., Ltd.*

16:45 Technical Analysis and Optimization of a High Concentrating Photovoltaic Power Tower

Karolina Ordonez Moreno[1], Anna Heimsath[1], Maike Wiesenfarth[1], Peter Schöttl[1], Peter Nitz[1]

Presented by Thorsten Hornung[1]

[1] *Fraunhofer ISE*

17:00 Towards a Flat 45%-Efficient Concentrator Module

Rubén Mohedano[1], Maikel Hernández[1], Juan Vilaplana[1], Juan Carlos Miñano[2], Pablo Benítez[2], Simone Sorgato[1], Julio Chaves[1], Waqidi Falicoff[1]

[1] *LPI;* [2] *UPM*

17:15 Angular Tolerance and Daily Performance Variability of the Suncycle Tracking-integrated CPV System

Philippe Voarino[1], César Dominguez[1], Peter Penning[2], Roy Bijl[2]

[1] *CEA;* [2] *Suncycle*

17:30 - 18:25 **Industry Session**

Chair: Claire van Zuiden (CPV Consortium) & Mathieu Baudrit (CEA-INES)

17:30 Presentation dsolar

17:40 Presentation HeliosLite

17:50 Presentation Morgan Solar

18:00 Presentation Solar Added Value

18:10 Presentation Suncore

18:20 Presentation Grenzebach

18:30 - 20:30 Sponsors Reception

Tuesday, April 14, 2015

08:15 - 10:15 **Oral Session 4: Characterization of Modules and System Components**

Chair: Valery Rumyantsev (Ioffe Institute) & Hansjörg Lerchenmüller (Soitec Solar)

08:15 Characterizing CPV in a Lattice Mismatched World

Stephen Askins[1], Ruben Nuñez[1], Gabriel Sala Pano[1], Ignacio Antón[1]

[1] *IES-UPM*

08:30 Further Investigations on the Stepwise Measurement Procedure for the Characterization of Large Area PV Modules

Christoph Rapp[1], Marc Steiner[1], Gerald Siefer[1], Andreas Bett[1]

Presented by Gerald Siefer[1]

[1] *Fraunhofer ISE*

08:45 Evaluation of the SOPHIA CPV Module Round Robin on Power Rating at CSOC

Gerald Siefer[1], Marc Steiner[1], Mathieu Baudrit[2], Cesar Dominguez[2], Ignacio Antón[3], Franco Roca[4], Raffaele Fucci[4], Paola Maria Pugliatti[5], Agnese Di Stefano[5], Robert Kenny[6], Matthew Norton[6], Alessandro Minuto[7], Paolo Morabito[7], Matthew Muller[8]

[1] *Fraunhofer ISE;* [2] *CEA-INES;* [3] *UPM;* [4] *ENEA;* [5] *ENEL E&R;* [6] *JRC ESTI;* [7] *RSE;* [8] *NREL*

09:00 Understanding Causes and Effects of Non-uniform Light Distributions on Multi-junction Cells: Procedures for Estimating Efficiency Losses

Rebeca Herrero[1], Marta Victoria[1], Steve Askins[1], Ignacio Antón[1], Gabriel Sala[1]

[1] *IES-UPM*

09:15 Methodologies for Characterizing Electrical, Thermal and Optical Devices – METHOD- : A Tool for Innovative CPV Integrations

Pierre Besson[1], César Dominguez[2], Mathieu Baudrit[2], Philippe Voarino[2]

[1] *CEA;* [2] *CEA-INES*

09:30 Mapping HCPV Module or System Response to Solar Incident Angle

Daniel Riley[1]

[1] *Sandia National Laboratories*

09:45 Characterization of the Ecosole HCPV Tracker and Single Module Inverter

Gianni Borelli[1], Maurizio Carpanelli[1], Daniele Verdilio[1]

[1] *BECAR srl*

10:00 The Distance Temperature Map as Method to Analyse the Optical Properties of Fresnel Lenses and their Interaction with Multi-junction Solar Cells

Thorsten Hornung[1], Peter Kiefel[1], Peter Nitz[1]

[1] *Fraunhofer ISE*

10:15 Coffee Break

10:35 - 11:00 Invited Lecture

Renewable Energy Policies in Morocco

Dennoun Saifaoui, Laboratory of Applied Physics and Renewable Energy

Dennoun Saifaoui

Professor Dennoun Saifaoui is the Director of the Laboratory of Applied Physics and Renewable Energy at the Hassan II university of Casablanca. He is responsible for the coordination of the master "Renewable Energy".

Dennoun Saifaoui is also the regional coordinator of the National Energy Pole and the president of the association for training and research on renewable energy and environment.

He has been the Head of Physics Department between the years 2005-2011 and has been responsible for several projects in plasma physics, controlled fusion and renewable energy.

11:00 - 12:30 Oral Session 5: Characterization and Simulation of CPV Cells

Chair: Alain Dollet (CNRS PROMES) & Kensuke Nishioka (University of Miyazaki)

11:00 Why Can't I Measure the External Quantum Efficiency of the Ge Subcell of my Multi-junction Solar Cell?

Enrique Barrigon[1]

[1] *Instituto de Energia Solar - UPM*

11:15 Temperature Influence on Luminescent Coupling Yield in Concentrator MJ SC

Maxim Shvarts[1], Viktor Emelyanov[1], Valeri Evstropov[1], Mikhail Mintairov[1], Nailya Timoshina[1]

[1] *Ioffe Institute*

11:30 Heterointerfaces in MJ SC: IV Curves and their Pecularities

Mikhail Mintairov[1], Evstropov Valerii[1], Nikolay Kalyuzhnyy[1], Sergey Mintairov[1], Nailya Timoshina[1], Maxim Shvarts[1]

[1] *Ioffe Institute*

11:45 „Direct“ Measurement of Sheet Resistance in Inter-subcell Layers of Multi-junction Solar Cells

Valery Rumyantsev[1], Valery Larionov[1], Pavel Pokrovskiy[1]
[1] *Ioffe Institute*

12:00 Key Aspects on Semiconductor Structure Design for Ultra-high Concentration Multi-junction Solar Cells

Mario Ochoa[1], Enrique Barrigón[1], Laura Barrutia[1], Ignacio Rey-Stolle[1], Carlos Algora[1]
[1] *Solar Energy Institute*

12:15 Simulation of a Through-substrate Vias Contact Structure for Multi-junction Solar Cells Under Concentrated Illumination

Olivier Richard[1], Abdelatif Jaouad[1], Boussairi Bouzazi[1], Richard Arès[1], Simon Fafard[1], Vincent Aimez[1]
[1] *UMI-LN2 (3IT)/Université de Sherbrooke*

12:30 Lunch Break

14:00 - 15:25 Poster Session 2

The poster numbers are based on topics:

E Advanced CPV Cells and Materials
F Concentrator Solar Cells, Cell Assemblies and Related Materials
G Novel CPV Modules and Receiver Concepts

E-1 GaAs Solar Cells on Mesoporous Silicon Templates

Abderraouf Boucherif[1]
[1] *Université de Sherbrooke*

E-2 Through-substrate Vias in Multi-junction Solar Cells by Plasma Etching

Maïté Volatier[1]
[1] *Université de Sherbrooke*

E-3 Solar Cells with Gallium Phosphide / Silicon Heterojunctions

Maxime Darnon[1], Renaud Varache[2], Mederic Descazeaux[2], Mickael Martin[1], Thierry Baron[1], Delfina Munoz[2]
[1] *CNRS-LTM;* [2] *CEA-INES*

E-4 The Influence of Ag Migration During Triple Junction IMM Solar Cell Chip Process for Concentration Photovoltaic

Guanzhou Liu[1], Jingfeng Bi[1], Meijia Yang[1], Mingyang Li[1], Senlin Li[1], Xin Li[1], Weiping Xiong[1], Minghui Song[1], Guijiang Lin[1], Wenjun Chen[1]

[1] *Tianjin San'an Optoelectronics Co.*

E-5 New CPV Performance Horizon with Wafer Bonded Multi-junction Solar Cells

Rainer Krause[1]

[1] *Soitec Solar GmbH*

E-6 Inverted Epitaxial Growth of High Efficiency Triple Junction Metamorphic Solar Cell for CPV Application

Jingfeng Bi[1], Guanzhou Liu[2], Meijia Yang[2], Mingyang Li[2], Senlin Li[2], Weiping Xiong[2], Minghui Song[2], Guijiang Lin[2], Wenjun Chen[2]

[1] *San'an Optoelectronics Co.Ltd.;* [2] *Tianjin San'an Optoelectronics Co.*

E-8 Reliability of Sintered Silver Die Attach Paste for Cell Attachment

Kevin McLaughlin[1], Koji Sasaki[2], Noritsuka Mizumura[2]

[1] *NAMICS Technologies, Inc.;* [2] *NAMICS Corporation*

E-9 Towards CPV Systems Using Dilute Nitride-containing 4-Junction Solar Cells

Christopher Valdivia[1], Matthew Wilkins[1], Pratibha Sharma[1], Ross Cheriton[1], Anna Trojnar[1], Gitanjali Kolhatkar[2], Abderraouf Boucherif[2], Abdelatif Jaouad[2], Boussairi Bouzazi[2], Simon Fafard[2], Vincent Aimez[2], Richard Arès[2], Karin Hinzer[1]

Presented by Karin Hinzer[1]

[1] *University of Ottawa;* [2] *Université de Sherbrooke*

E-10 Decrease in the Electrical Parameters of Solar Cells Under Gamma Irradiation

Aydin Gholizadeh[1]

[1] *Electrical Engineering Department, University of Azerbaijan*

E-11 Effects of Non-ideal Losses on the Optimal Bandgap Arrangement of Multijunction Solar Cells Comprising up to 5 Subcells

Alexis Vossier[1], Alain Dollet[1]

[1] *CNRS PROMES*

E-12 Modelling and Fabrication of Photovoltaic CU(INX,GA1-X)SE2 Micro Solar Cells under Differenz Light Concentration Fluxes

Diego Sancho-Martínez[1], Berit Heidmann[1], Phillip Manley[1], Bernhard Reinhold[1], Martha Ch. Lux-Steiner[2], Martina Schmid[1]

[1] *Nanooptical Concepts for PV, Helmholtz Zentrum Berlin;* [2] *Heterogeneous Material Systems, Helmholtz Zentrum Berlin*

E-13 Preparation of Copper-Indium-Diselenide Absorber Islands for Micro-Concentrator Applications

Franziska Ringleb[1], Berit Heidmann[2], Martina Schmid[2], Christian Symietz[3], Jörn Bonse[3], Jörg Krüger[3], Martha Ch. Lux-Steiner[4], Torsten Boeck[1]

[1] *Leibniz-Institut für Kristallzüchtung (IKZ);* [2] *Nanooptical Concepts for PV, Helmholtz Zentrum Berlin;* [3] *Bundesanstalt für Materialforschung und -prüfung;* [4] *Heterogeneous Material Systems, Helmholtz Zentrum Berlin*

F-1 Reduction of Front-metallization Grid-shading in Concentrator Cells Through Laser Micro-grooved Cover Glass

Pablo Garcia-Linares[1], Philippe Voarino[1], Cesar Dominguez[1], Olivier Dellea[1], Pierre Besson[1], Pascal Fugier[1], Mathieu Baudrit[1]

[1] *CEA*

F-2 The Effects of Modified Production Method and New Parts Integration on CPV Modules

Hussam Khonkar[1]

[1] *KACST*

F-3 Quantum Efficiency Study in the InGaP/GaAs/Ge Solar Cells with Different Top Cell Emitter Layers

Youngjo Kim[1], Chang Zoo Kim[1], Sang Hyun Jung[1], Kangho Kim[2], Dong Hwan Jun[1], Hyun-Beom Shin[1], JeHyuk Choi[1], Won-Kyu Park[1], Jaejin Lee[2]

[1] *Korea Advanced Nano Fab. Center;* [2] *Ajou University*

F-4 Graded Doping Effects on the Efficiency of InGaP/InGaAs/Ge Triple-junction Solar Cells

Sang Hyun Jung[1], Chang Zoo Kim[1], Youngjo Kim[1], Kangho Kim[1], Dong Hwan Jun[1], Hyeong-Ho Park[1], Hyun-Beom Shin[1], JeHyuk Choi[1], Won-Kyu Park[1], Jaejin Lee[2]

[1] *Korea Advanced Nano Fab. Center;* [2] *Ajou University*

G-1 Thin Photovoltaic Modules at Ultra High Concentration

Pedro Perez-Higueras[1], Florencia Almonacid[1], Juan Pablo Ferrer-Rodríguez[1], Eduardo F. Fernández[1]

Presented by Eduardo F. Fernández[1]

[1] *University of Jaen*

G-2 Optical Study of a Spectrum Splitting Solar Concentrator Based on a Combination of a Diffraction Grating and a Fresnel Lens

Céline Michel[1], Jérôme Loicq[1], Tanguy Thibert[1], Serge Habraken[1]

[1] *Université de Liège*

G-3 Modeling and Thermo-economic Analysis of a Trigeneration HCPVT Power Plant

Angelos Selviaridis[1]

[1] *dsolar / IBM Research - Zürich*

G-4 Optical Performance of Partitioned Linear Fresnel Lens and Lens-parquet for Medium-CPV Module

Wongun Jang[1]

[1] *Korea Photonics Technology Institiute*

G-5 Micro Solar Concentrator: Design and Fabrication for Microcells Arrays

Sebastien Jutteau[1], Myriam Paire[1], Florian Proise[2], Jean-François Guillemoles[2]

[1] *EDF;* [2] *IRDEP*

G-6 CPVLIS Laminated Interconnection System for CPV Receiver Panels, Development and Tests

Ricard Pardell[1]

[1] *Valldoreix Greenpower*

G-7 Thermal Performance Investigation of CPV Module Cooling by Segmented Spiral-channel Heat Recovery System

K. S. Reddy[1]

[1] *Indian Institute of Technology Madras*

G-8 AlGaAs Converters and Arrays for Laser Power Beaming

Vladimir Khvostikov[1]

[1] *Ioffe Institute*

G-9 Optical and Heat Transfer Performance of a Novel Non-imaging Concentrator

Nazmi Sellami[1]

[1] *University of Exeter*

G-10 Optical Analysis of Secondary Concentrator with Homogenizer for Dispersed 12 X 12 Array CPV Receiver

K. S. Reddy[1]

[1] *Indian Institute of Technology Madras*

G-11 Enhancing Ultra-high CPV Passive Cooling Using Least-material Finned Heat Sink

Leonardo Micheli[1], Eduardo Fernández[1], Florencia Almonacid[2], K.S. Reddy[3], Tapas Mallick[1]

[1] *Environment and Sustainability Institute;* [2] *University of Jaen;* [3] *Indian Institute of Technology Madras*

15:25 Coffee Break

15:45 - 17:45 Oral Session 6: CPV Modules and Trackers

Chair: Gerald Siefer (Fraunhofer ISE) & Dan Riley (Sandia National Laboratories)

15:45 Evaluation of the IEC 62817 Mechanical Testing for Tracker Validation

Wolfgang Aipperspach[1], Shelley Bambrook[1], Pablo Trujillo[1], Francisca Rubio[1]

Presented by Francisca Rubio[1]

[1] *Soitec Solar Gmbh*

16:00 CPV Module with Fresnel Lens Primary Optics and Homogenizing Secondary Optics

Maike Wiesenfarth[1], Tobias Dörsam[1], Fabian Eltermann[1], Thorsten Hornung[1], Gerald Siefer[1], Alexander Boos[2], Andreas Gombert[2], Martin Neubauer[2], Sascha van Riesen[2], Sven Wanka[2], Andreas W. Bett[1]

[1] *Fraunhofer ISE;* [2] *Soitec Solar GmbH*

16:15 Introduction to Morgan Solar's 4th Generation CPV System

John Paul Morgan[1], Brett Barnes[1], Michael Sinclair[1], Stefan Myrskog[1]

[1] *Morgan Solar Inc.*

16:30 CPV Module Design Optimization for Advanced Multi-junction Solar Cell Concepts

Marc Steiner[1], Peter Kiefel[1], Gerald Siefer[1], Maike Wiesenfarth[1], Frank Dimroth[1], Andreas W. Bett[1]

[1] *Fraunhofer ISE*

16:45 New Module Design with 4-Junction (4-J) Solar Cells for Highest Efficiencies

Sascha van Riesen[1], Andreas Gombert[1], Martin Neubauer[1], Alexander Boos[1], Sven Wanka[1], Christophe Gourdel[1]

Presented by Eckart Gerster[1]

[1] *Soitec Solar GmbH*

17:00 A Low Concentrating Cell and Receiver Concept Based on Low Cost Crystalline Silicon Concentrator Cells

Matthieu Ebert[1], Tobias Fellmeth[1], Tobias Dörsam[1], Ingrid Hädrich[1], Daniel Biro[1], Maike Wiesenfarth[1], Ulrich Eitner[1], Florian Clement[1]

[1] *Fraunhofer ISE*

17:15 Performance of a 200kW Central Receiver CPV System

John Lasich[1], Ian Thomas[1]

[1] *Raygen Resources*

17:30 Field Performance Validation and Analysis of Wind Loads on a Novel Class of Dual–axis Tracker

Etienne Menard[1], Gauthier Dambrine[1], Stephen Gale[1], Jay Boardman[1], Mathieu Baudrit[2], Christophe Mangeant[2], Yannick Roujol[2]

[1] *HeliosLite SAS;* [2] *CEA-INES*

18:30 Dinner Reception

Refer to page 33 for more information

19:30 - 22:00 Conference Dinner

Refer to page 33 for more information

Wednesday, April 15, 2015

08:15 - 10:15 Oral Session 7: Field Performance, Grid Integration and Energy Prediction

Chair: Gabriel Sala (IES-UPM) & Marc Steiner (Fraunhofer ISE)

08:15 Simple Lens Temperature Estimation for Improving CPV Power Rating Procedures and Energy Yield Estimations

César Domínguez[1], Pierre Besson[2]

[1] *CEA-INES;* [1] *CEA*

08:30 Next Generation Solar Spectral Irradiance Meter with Enhanced Reliability

Viktar Tatsiankou[1], Karin Hinzer[1], Joan Haysom[1], Henry Schriemer[1], Richard Beal[2]

[1] *University of Ottawa;* [2] *COFOVO Energy*

08:45 Characterization of Suncore's Utility-scale CPV Power Plants

James Foresi[1], Alaric Babej[1], Rick Han[2], Tingdi Liao[2], Charlie Wang[1]

[1] *Suncore Photovoltaics Inc.;* [2] *Suncore Photovoltaics Technology*

09:00 Large-scale and Long-term CPV Power Plant Field Results

Tobias Gerstmaier[1], Tobias Zech[1], Michael Röttger[1], Christian Braun[1], Andreas Gombert[1]

Presented by Francisca Rubio[1]

[1] *Soitec Solar GmbH*

09:15 Spectral Network Based on Component Cells Under the SOPHIA European Project

Ruben Nuñez Judez[1], Ignacio Antón[1], Steve Askins[1], Gabriel Sala[1], Cesar Dominguez[2], Philippe Voarino[2], Marc Steiner[3], Gerald Siefer[3], Rafaelle Fucci[4], Franco Roca[4], Alessandro Minuto[5], Paolo Morabito[5]

[1] *IES-UPM;* [2] *CEA-INES;* [3] *Fraunhofer ISE;* [4] *ENEA;* [5] *RSE*

09:30 Effect of Different Cells on CPV Field Performance

Makoto Inagaki[1], Rui Mikami[1], Kenichi Kitayama[1], Yoshiya Abiko[1], Kenji Saito[1], Youichi Nagai[1], Kazumasa Toya[1], Kaiji Sugiyama[1], Takashi Iwasaki[1], Yasuyuki Ota[2], Kensuke Nishioka[2]

[1] *Sumitomo Electric Industries, Ltd.;* [2] *University of Miyazaki*

09:45 Spectrum Sensitivity, Energy Yield, and Revenue Prediction of PV and CPV Modules

Geoffrey Kinsey[1]

[1] U.S. Department of Energy

10:00 Semprius System Field Results

Kanchan Ghosal[1]

[1] *Semprius Inc.*

10:15 Coffee Break

10:35 - 11:00 Invited Lecture

CPV at the Crossroads?

Andreas W. Bett, Fraunhofer ISE

Andreas W. Bett

Andreas W. Bett received the Dipl. Degree in physics and the Dipl. degree in mathematics from the Albert Ludwigs-University, Freiburg, Germany in 1988 and 1989, respectively and the PhD degree in physics from the University in Konstanz, Germany in 1992. He joined the Fraunhofer Institute for Solar Energy Systems, ISE in 1987. In 1993 he became the head of the group "III-V – epitaxy and solar cells". Since 2007 he is head of the department "Materials – Solar Cells and Technology" and since 2009 he is deputy director of the institute.

His main areas of research include the solar silicon material, epitaxial growth of Si and III-V semiconductors, development of characterisation techniques for advanced solar cell devices and the fabrication of solar cells. Furthermore, he develops concentrator module and systems and is involved in field testing.

He is also co-founder of the company Concentrix Solar, today Soitec Solar, which manufactures and installs CPV systems. In addition he is active member in the IEC TC82 WG7 for standardisation of CPV technologies and member of the European PV Platform. He has organised several international conferences and served in many scientific committees.

In 2009 he received the 17th European Becquerel Prize for outstanding merits in photovoltaics. In 2010 he was awarded with the Joseph von Fraunhofer Prize and the EARTO Prize. In 2012 he and Hansjoerg Lerchenmueller were awarded with the high-ranked German Environmental Prize of the DBU for the outstanding contribution to commercialise the CPV technology.

11:00 - 12:30 Poster Session 3

The poster numbers are based on topics:

H Characterization and Simulation of CPV Cells
I Characterization of Modules and System Components
J Accelerated Testing Procedures and Reliability of CPV Systems and Components
K Field Performance, Grid Integration and Energy Prediction

H-1 Analysis of a Four Lamp Flash System for Calibrating Multi Junction Solar Cells Under Concentrated Light

Michael Schachtner[1]

[1] *Fraunhofer ISE*

H-2 Low Temperature Measurements of State-of-the-art Concentrator Solar Cells

Valery Rumyantsev[1], Alexander Chekalin[1], Dmitry Malevskiy[1], Maxim Shvarts[1], Viacheslav Andreev[1]

[1] *Ioffe Institute*

H-3 Laser-based Characterization of Tunnel Junctions in Triple Junction Solar Cells

Kristine Drew[1], Pascal Dufour[1], Stefan Myrskog[1]

[1] *Morgan Solar Inc.*

H-4 Effect of Nonuniform Illumination on Triple Junction Solar Cells Under Concentration

Patrick M. White[1], Pratibha Sharma[1], Pierre Besson[2], Mathieu Baudrit[3], Simon Fafard[4], Henry Schriemer[1], Karin Hinzer[1]

[1] *University of Ottawa;* [2] *CEA;* [3] *CEA-INES;* [4] *Laboratoire Nanotechnologies Nanosystèmes (LN2) - CNRS UMI-3463*

H-5 Multijuction Solar Cell Analysis with the Tunable Automated Subcell Chraracterization Unit

Patrick M. White[1], Christopher Valdivia[1], Mark Yandt[1], Simon Fafard[2], Karin Hinzer[1], Henry Schriemer[1]

[1] *University of Ottawa;* [2] *Laboratoire Nanotechnologies Nanosystèmes (LN2) - CNRS UMI-3463*

H-6 Thermal Conductivity of GaSb and (III-V)-Sb

Emmanuel Giudicelli[1]

[1] *IES*

H-7 Voltage Bias External Quantum Efficiency Measurements for a Full Characterization of a Monolithic Multijunction Solar Cell Device

Boussairi Bouzazi[1], Baptiste Sichere[1], Abdelatif Jaouad[1], Vincent Aimez[1], Richard Arès[1], Simon Fafard[1]

[1] *Université de Sherbrooke*

H-8 Temperature Coefficients for GaInP/GaAs/GaInNAsSb Solar Cells

Arto Aho[1], Riku Isoaho[1], Antti Tukiainen[1], Ville Polojärvi[1], Timo Aho[1], Marianna Raappana[1], Mircea Guina[1]

[1] *Optoelectronics Research Centre, Tampere University of Technology*

H-9 Photovoltaic Characteristics of Concentrator Solar Cells with Different Heat Dissipation Structures

Kangho Kim[1], Youngjo Kim[1], Sang Hyun Jung[1], Chang Zoo Kim[1], Dong Hwan Jun[1], Hyun-Beom Shin[1], Jaejin Lee[1]

[1] *Korea Advanced Nano Fab. Center*

I-1 Analysis of the Output of Two Isotype Cell Sets Compared to a Precision Spectroradiometer

Robert Kenny[1]

[1] *JRC ESTI*

I-3 Prototyping and Validation of Two Low-cost Inline CPV Module Efficiency Characterization Methods

Michael Sinclair[1], Stephen Caelers[1], Pascal Dufour[1], Stefan Myrskog[1], John Paul Morgan[1]

[1] *Morgan Solar Inc.*

I-4 MPPT Implementation for the Outdoor Characterization of CPV Modules

Daniel Sánchez[1]

[1] *ISFOC*

I-5 Characterization of Concentrator Receivers by an Appropiate Solar Tester: System Development and Measurement Procedure

Valentín Pérez[1], Rebeca Herrero[1], Ignacio Antón[1], Gabriel Sala[1]

[1] *IES-UPM*

I-6 Automated DNI Sensor Operation Systems

Joachim Jaus[1]

[1] *Black Photon Instruments*

I-7 New Iso-type Reference Cell – from Design to Prototype

Willem Zaaiman[1], Mariacristina Casale[2], Erik Haverkamp[3]

[1] *European Commission - DG-JRC;* [2] *CESI;* [3] *Radboud University Nijmegen*

I-8 The Numerical Simulation in a Micro-channel Using a Lattice Boltzmann Method to Enhance the Efficiency of Solar Cell Module for the Reflective Type CPV System

Yong Hyun Kim[1], Young-Woo Kim[1]

[1] *Korea Photonics Technology Institiute*

I-9 External Test Bench Measurement Methods for Studing CPV Modules with Secondary Optics Featuring Wide Range Acceptance Angles

Dominic Larkin[1], Vincent Aimez[1], Abdelatif Jaouad[1], Richard Arès[1], Simon Fafard[1], Artashes Yavrian[1], Alexandre Gilbert-Vanasse[1], Raymond Gilbert[1]

[1] *Laboratoire Nanotechnologies Nanosystèmes (LN2) - CNRS UMI-3464*

I-10 Spectral Losses of High Concentrator Photovoltaic Modules Depending on Latitude

Eduardo F. Fernández[1]

[1] *Environment and Sustainability Institute (University of Exeter)*

I-11 Characterization and Validation Tests on Ecosole C-Modules First Prototypes

Carmine Cancro[1], Giorgio Graditi[2], Raffaele Fucci[2], Gabriele Ciniglio[2], Aniello Borriello[2], Michele Pellegrino[2], Antonio Romano[2], Maurizio Carpanelli[3], Gianni Borrelli[3], Daniele Verdilio[3], Davide De Nardis[3], Fabrizio Migali[3], Rebecca Herrero[4], Marta Victoria[4], Ignacio Antón[4], Gabriel Sala[4]

[1] *Italian National Agency for New Technologies, Energy and Sustainable Economic Development;* [2] *ENEA;* [3] *BECAR srl;* [4] *IES-UPM*

J-1 Degradation Analysis of Soitec's CPV Technology: Six Years of Power Plant Data and Indoor Measurements

Tobias Zech[1], Tobias Gerstmaier[1], Michael Röttger[1], Renato Moretta[1], Christian Braun[1], Andreas Gombert[1], Marc Steiner[2], Gerald Siefer[2], Daniel Sánchez[3], Oscar de la Rubia[3], María Martínez[3]

[1] *Soitec Solar GmbH;* [2] *Fraunhofer ISE;* [3] *Instituto de Sistemas Fotovoltaicos de Concentración S.A.*

J-2 Influence of Damp Heat on the Electrical Properties of Triple Junction Solar Cell

Kai-Hsiang Yang[1]

[1] *Institute of Nuclear Energy Research*

J-3 Properties of a Veteran Acrylic Lens Relative to Acrylic Lens Materials After Accelerated Laboratory Weathering

Thomas Arndt[1], René Kogler[1], David Miller[2]

[1] *Evonik Industries AG;* [2] *NREL*

J-4 Pt Thermistors on (III-V) GaAs Substrate for PV Applications Under High Solar Concentrations

Emmanuel Giudicelli[1]

[1] *IES*

J-5 Evaluation of Solar Mirror Reliability

Rémi Girard[1], Olivier Raccurt[2], Christine Delord[2], Angela Disdier[2]

[1] *CEA-INES;* [2] *CEA LITEN*

J-6 Assessing the Impact of Inhomogeneous Irradiation on the Ageing of III-V Multijunction Solar Cells

Carolyn Carriere[1], Alexis Vossier[1], Ioannis Tsanakas[1], Mathieu Sicre[1], Rachid Elouamari[1], Alain Dollet[1], Vincent Aimez[2], Richard Ares[2], Abdelatif Jaouad[2]

[1] *CNRS PROMES;* [2] *Université de Sherbrooke*

K-1 Comparison of Theoretically Based Energy Modelling to Experimentally Observed Data of Concentrated Photovoltaic Modules

Lara Treiber[1], Pascal Dufour[1], Hannah Mundel[1], Nicholas Coish[1], Anton Fischer[1], Stefan Myrskog[1]

[1] *Morgan Solar Inc.*

K-2 First Commercial Installation of REhnu's Dish-based Concentrating Photovoltaic Generator

Thomas Stalcup[1], Roger Angel[1], Andrew Geary[2], Kimberly Hammer[2], Blake Coughenour[1], Brian Wheelwright[2]

[1] *REhnu, Inc.;* [2] *University of Arizona*

K-3 Day-ahead and Short Term Forecast for Concentrated PV Plant Production

Sylvain Lespinats[1], Philippe Voarino[1], Caroline Deforeit[2], Xavier Le Pivert[2]

[1] *CEA;* [2] *SteadySun*

K-4 On the Deployment of MW-Scale Monitoring for CPV Plants in France: Overview and Related Research Lines

Christophe Mangeant[1], Yannick Roujol[1], Philippe Voarino[1], Mathieu Baudrit[1]

[1] *CEA*

K-5 Toward a Consolidation of the CPV-Specific Test Procedures for Inverters

Philippe Voarino[1], Yannick Roujol[1], Anthony Bier[1], Mathieu Baudrit[1]

[1] *CEA*

K-6 Effect of Dust and Dirt Accumulation from Two CCPV Trackers Using PMMA and SOG Fresnel Lens

Hussam Khonkar[1]
[1] *KACST*

K-7 Optimal Sizing of the Inverter of Grid-connected High Concentrator Photovoltaics Systems

Eduardo F. Fernández[1]
[1] *Environment and Sustainability Institute (University of Exeter)*

K-8 CHP Efficiency of a 2000 × CPV System with Reflective Optics

Gaetano Bonsignore[1], Marco Cannas[1], Franco M. Gelardi[1], Simonpietro Agnello[1], Aurelio Agliolo Gallitto[1], Marco Barbera[1], Luisa Sciortino[1], Ugo Lo Cicero[2], Alfonso Collura[2], Alessandro Buscemi[3], Filippo Paredes[3], Fabio M. Montagnino[3]
[1] *University of Palermo;* [2] *INAF;* [3] *Idea Srl*

K-9 Prediction of Cloud Impact on HCPV System

Chih-Chieh Ma[1], Wan- Li Hsu[1], I-Tao Lung[1]
[1] *Institute of Nuclear Energy Research*

12:30 Lunch Break

14:00 - 15:30 Oral Session 8: Accelerated Testing Procedures and Reliability of CPV Systems and Components

Chair: Geoffrey Kinsey (U.S. Department of Energy) & Kanchan Ghosal (Semprius Inc.)

14:00 An End of Service Life Assessment of PMMA Lenses from Veteran Concentrator Photovoltaic Systems

David Miller[1], Hussameldin Khonkar[2], Rebeca Herrero[3], Ignacio Antón[3], Todd Vinzant[1], David Johnson[1], Bobby To[1], Gabriel Sala[3], Sarah Kurtz[1]
[1] *NREL;* [2] *KACST;* [3] *IES-UPM*

14:15 Temperature Step Stress Accelerated Life Test on Inverted Metamorphic Concentrator Solar Cells

Vincenzo Orlando[1], Carlos Algora[1], Pilar Espinet-Gonzalez[1], Neftali Nuñez[1], Manuel Vázquez[1], Kazuaki Sasaki[2], Takaaki Agui[2], Hiroyuki Juso[2], Tatsuya Tatsuya-san[2]
[1] *IES;* [2] *SHARP Corporation*

14:30 Weathering of Acrylic Lens Materials

Thomas Arndt[1], Steffen Richter[1], René Kogler[1], Michael Pasierb[2], Christopher Walby[2]

[1] *Evonik Industries AG;* [2] *Evonik Cyro LLC*

14:45 Thermal Cycling Durability Testing of Soitec CPV Receivers

Eckart Gerster[1]

[1] *Soitec Solar GmbH*

15:00 Degradation Analysis of a CPV Module After Six Years On-sun

Matthew Muller[1], Sarah Kurtz[1], Dirk Jordan[1]

[1] *NREL*

15:15 CPV Module's Reliability Test Results and the Degradation by Glass Dimming

Kazumasa Toya[1], Kenji Saito[1], Makoto Inagaki[1], Rui Mikami[1], Yoshiya Abiko[1], Youichi Nagai[1], Ken Kashima[1], Takashi Iwasaki[1]

[1] *Sumitomo Electric Industries, Ltd.*

15:30 Coffee Break

15:50 - 17:05 Oral Session 9: Code, Standards, Policies and Market Studies

Chair: Joan Haysom (University of Ottawa)

15:50 A Bottom-up Cost Analysis of a High Concentration PV Module

Kelsey Horowitz[1], Michael Woodhouse[1], Hohyun Lee[2], Greg Smestad[3]

[1] *NREL;* [2] *Santa Clara University;* [3] *Sol Ideas Technology Development*

16:05 Greenhouse Gas Emission of High Concentrated Photovoltaic Module by Life Cycle Assessment

Ke-Jen Chian[1]

[1] *The Institute of Nuclear Energy Research*

16:20 Levelized Cost of HCPV-generated Electricity in Chile and Turkey

Elina Nissilä[1]

[1] *Fortum Power & Heat*

16:35 Placement and Efficiency Effects on Radiative Forcing of Solar Installations

Bruno Michel[1], Brian Burg[1], Patrick Ruch[1], Stephan Paredes[1]

[1] *IBM Research - Zurich*

16:50 Life Cycle Analysis of a New HCPV Module

Philip Sandwell[1], Geoffrey Duggan[2], Jenny Nelson[1], Ned Ekins-Daukes[1]

[1] *Grantham Institute;* [2] *Fullsun Photovoltaics Limited*

17:05 - 17:35 Closing Session

Chair: Mathieu Baudrit (CEA-INES)

17:05 CPV-11 Scientific Highlights

Simon Philipps, Fraunhofer ISE

17:20 Closing Remarks

Mathieu Baudrit, CEA-INES

17:30 CPV-12 Announcement

17:35 - 18:35 IEC Standards Discussion

Thursday, April 16, 2015

08:45 - 12:00 Technical Tour

Refer to page 34 for more information

14:00 - 16:00 Panel Discussion

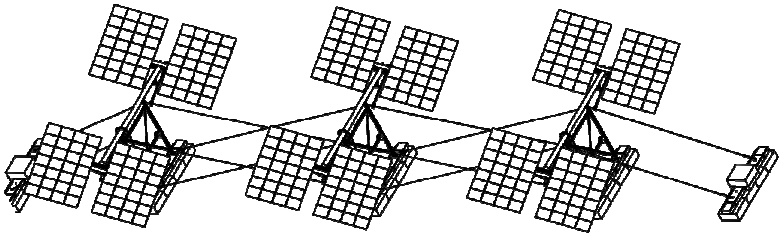
CPV Technology: How to Capture the Market Potential?

HELIOSLITE

The next generation of (C)PV trackers

Distinctive features

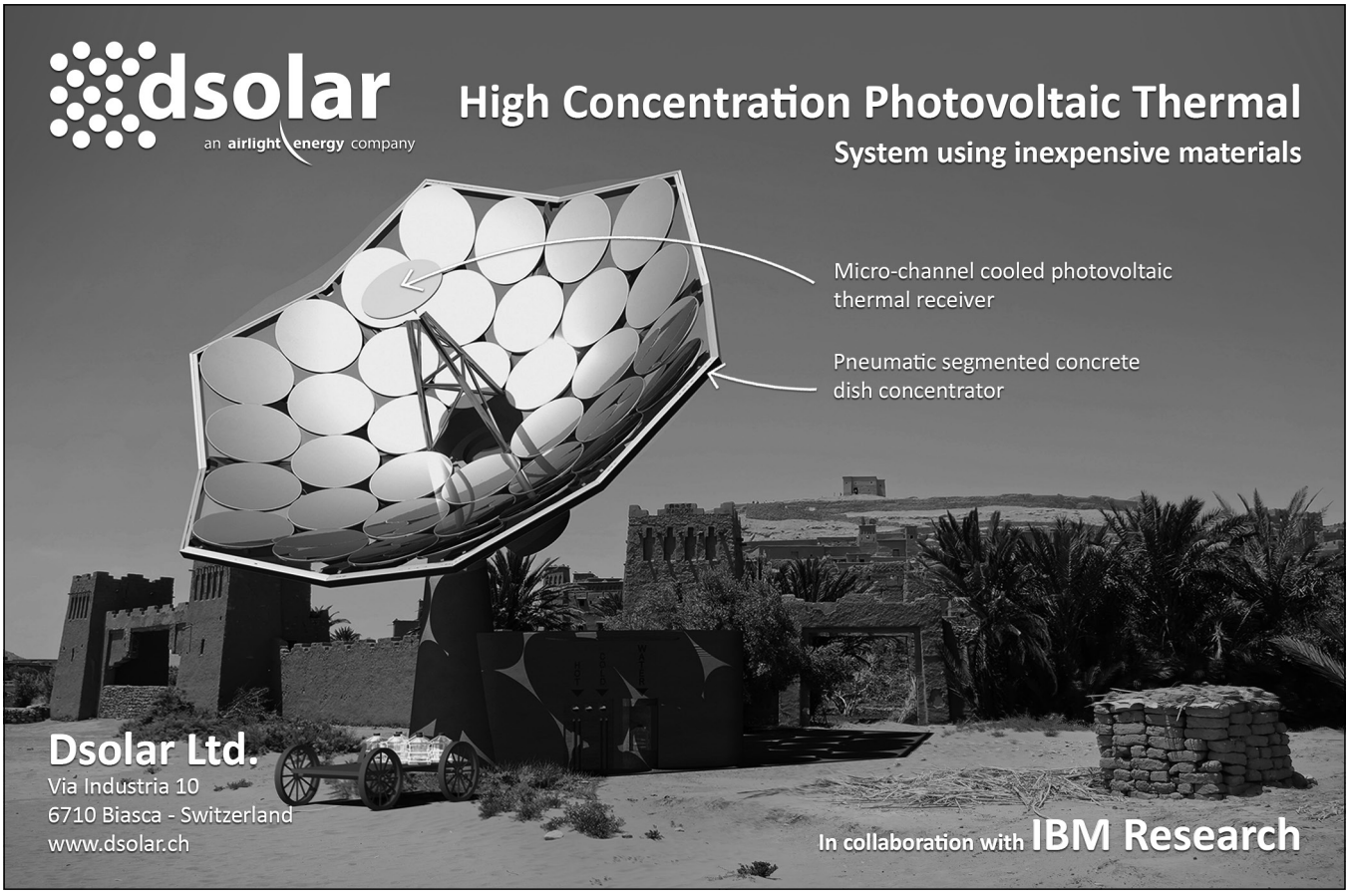
- Metal/m² : 30 to 50% less metal than pedestal trackers
- Installation: up to 50% less expensive
- Reliability: highly proven linear actuators
- Alignment: auto-corrective, max-power output
- Precision: validated by the CEA-INES
- Polyvalent: HCPV & PV, on & off grid, hillside,…
- International PCT patent pending



See our trackers at the April 16 Technical Tour!

dsolar
an airlight energy company

High Concentration Photovoltaic Thermal
System using inexpensive materials



Dsolar Ltd.
Via Industria 10
6710 Biasca - Switzerland
www.dsolar.ch

In collaboration with IBM Research

Side Events

Welcome Reception

All participants of CPV-11 are invited to take part in the Welcome Reception, which will take place on Sunday, April 12, 2015, from 17:00 to 19:00 at the conference venue.

The Welcome Reception will not only serve as an opening event and as an initial get-together for social networking in a relaxed atmosphere, it will also give participants the opportunity to register early for the conference. This will allow you to avoid long lines at the registration desks in the morning of the first conference day, and make registration easier for those who arrive later.

In addition poster presenters will already have the opportunity to mount their posters.

During the Welcome Reception, refreshments will be served.

Date: Sunday, April 12, 17:00 – 19:00

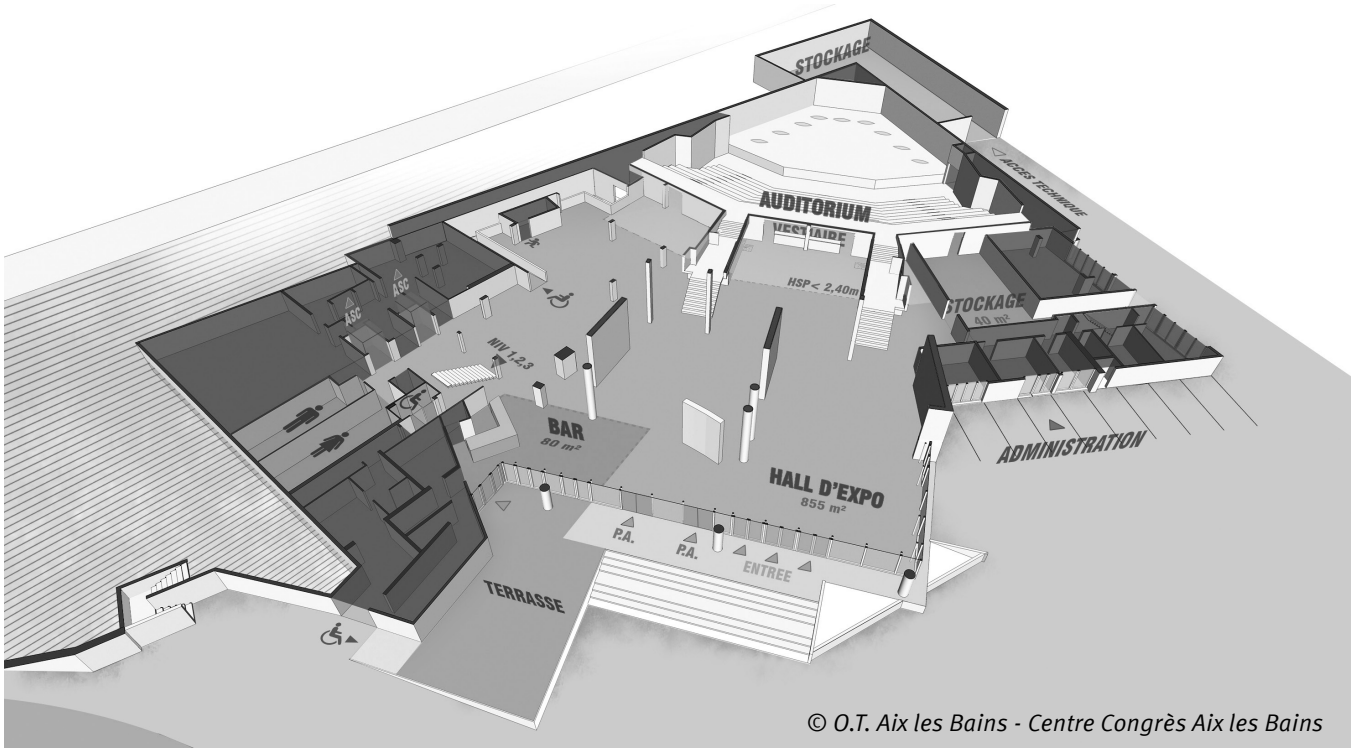
Location: Aix-les-Bains Congress Center (Centre des Congrès)

The Welcome Reception is sponsored by

Agence Économique de Savoie

and Savoie Technolac

Thank you!



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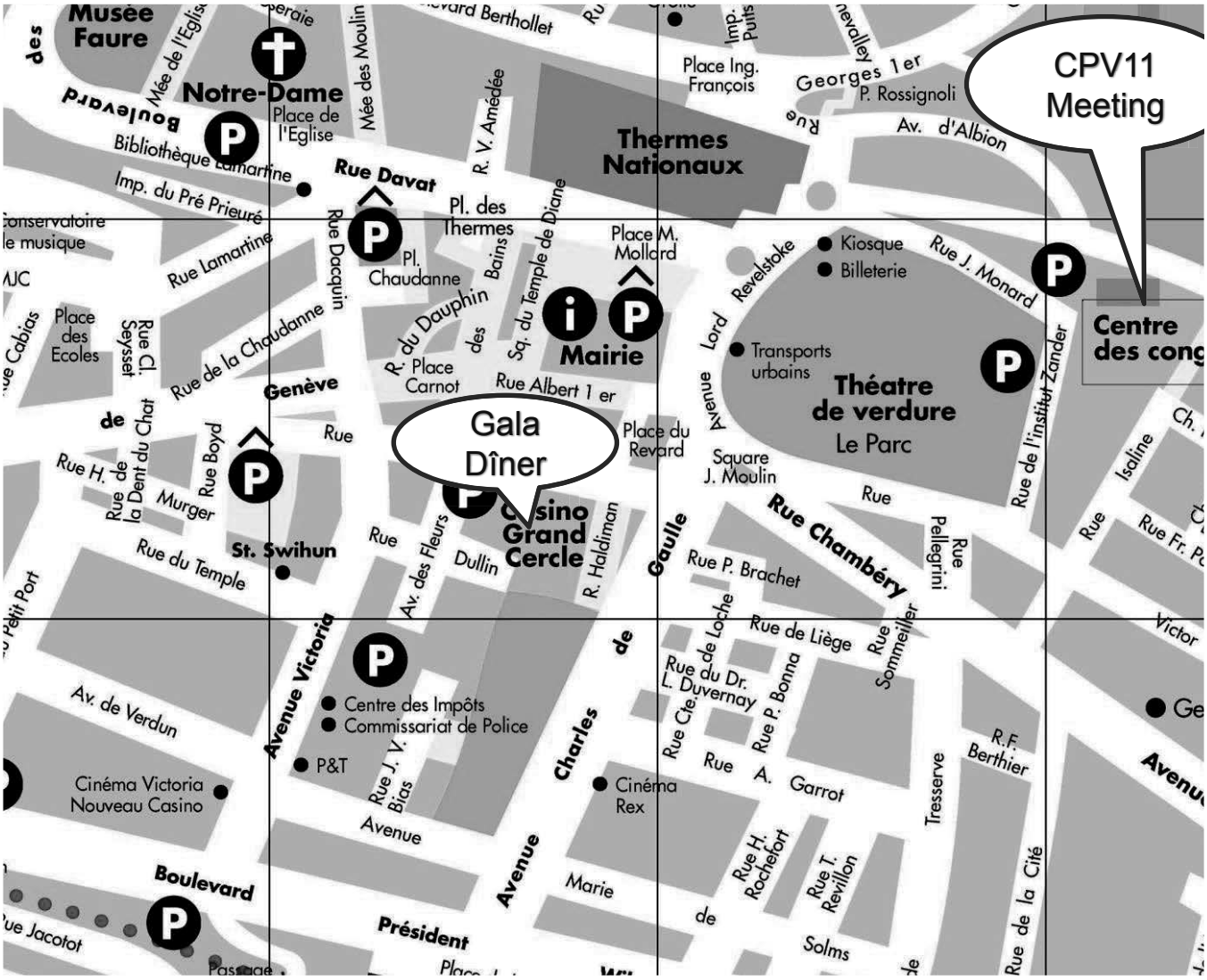
Conference Dinner

This year's gala dinner will take place inside of a masterpiece. The casino Grand Cercle at Aix-les-Bains is a lot more than a casino. Built in the second part of the 19th century, its architecture, design and painted walls make it a unique piece of history. During the gala dinner, you will see all the 3.500.000 of enamel tiles composing the 300m² of mosaic of the Casino roof and the unique painted walls decorating the different rooms.

Date: Tuesday, April 14
18:30 – 19:30 Dinner Reception
19:30 – 22:00 Conference Dinner

Fee: 65€ , pre-registration required

Location: Casino Grand Cercle
200 Rue du Casino
73100 Aix-les-Bains



Technical Tour

The CPV-11 Technical Tour will take place on Thursday, April 16 and will visit INES.

The National Solar Energy Institute (INES) is France's center of reference in the field of solar energy. Based at Savoie Technolac on the shores of Lake Bourget, the institute was set up with the backing of Savoie Départemental Council and Rhône-Alpes Regional Council, and includes research and development teams from the CEA, CNRS, University of Savoie and CSTB.

The institute's laboratories, clean rooms, pilot facilities and demonstrators allow its scientists and technicians to work on optimizing all aspects of solar photovoltaic energy, from cells to systems and from positive-energy buildings to solar mobility. In addition to carrying out research into solar photovoltaic energy, teams are being set up to study solar thermal energy for cooling and heating, and to investigate ways of optimizing passive energy through energy management in buildings and energy efficiency technologies.

This visit will be a unique opportunity to have an overview of all the topics active at INES with a special focus on the CPV activities developed since 2011.

A pre-registration for the tour was required. Due to security reasons a form had to be handed in, the deadline for the tour registration ended on March 23. Registration on-site will not be possible.

Date: Thursday, April 16

Time: 8:45 – 12:00

Meeting point: The bus for the technical tour will leave at 8:45 in front of the Aix-les-Bains Congress Center and return at 11:45.

Please don't forget to bring your ID/passport to the tour!

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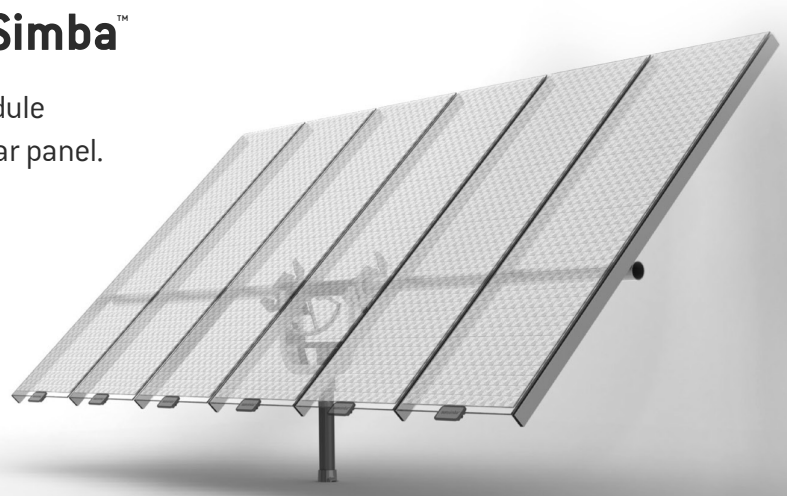

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General Information

Registration

Each participant must register in person at the registration desk to collect a conference bag and name badge before attending any sessions. Please make sure to wear your badge for admission to all sessions and social events. Participants who have lost their badge must report to the registration desk to get a new one.

Registration times are on Sunday, April 12, from 17:00 to 19:00 at the Welcome Reception and during conference hours, starting at 8:00.

Certificate of Attendance

A certificate of attendance for regular participants and students will only be available on-site at the registration desk and cannot be issued after the conference.

Conference Proceedings

The proceedings will be published with AIP, the American Institute of Physics (www.aip.org) after the conference, covering papers with sufficient scientific quality. This collaboration will provide optimum visibility of the proceedings and ensure that the authors' publications remain traceable and citable. Final online papers will be accessible on the AIP website and contain an ISBN number for each volume as well as individual DOI numbers for each paper.

List of Participants

Registered participants may download a list of participants on the conference website, www.cpv-11.org. The login and password sent to you during registration will be required to gain access to the download area.

Speaker Information

All presentations must be handed in at the Media Upload Desk one hour before your presentation. You will not be able to display your presentation directly from your laptop computer or USB flash drive. Our technical support team will welcome you at the Media Upload Desk during all conference days, starting at 8:00 on every conference day. Please meet your session chairs inside the conference room at least 10 minutes prior to the beginning of your oral session to acquaint yourself with the technical equipment.

WiFi Access

WiFi access will be available free of charge in the whole conference and catering / exhibition area.

Posters

On the following pages you will find more details on poster codes and their specific location. Please mount your poster before the start of the first poster session or during the first break. You may also mount your poster during the Welcome Reception on the eve of the conference.

Do not remove your poster until the end of the conference. The posters are an important part of the scientific program and should be displayed the whole time.

Please remove your poster before you leave. Remaining posters will be discarded.

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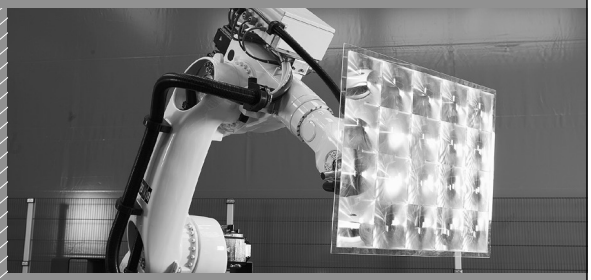

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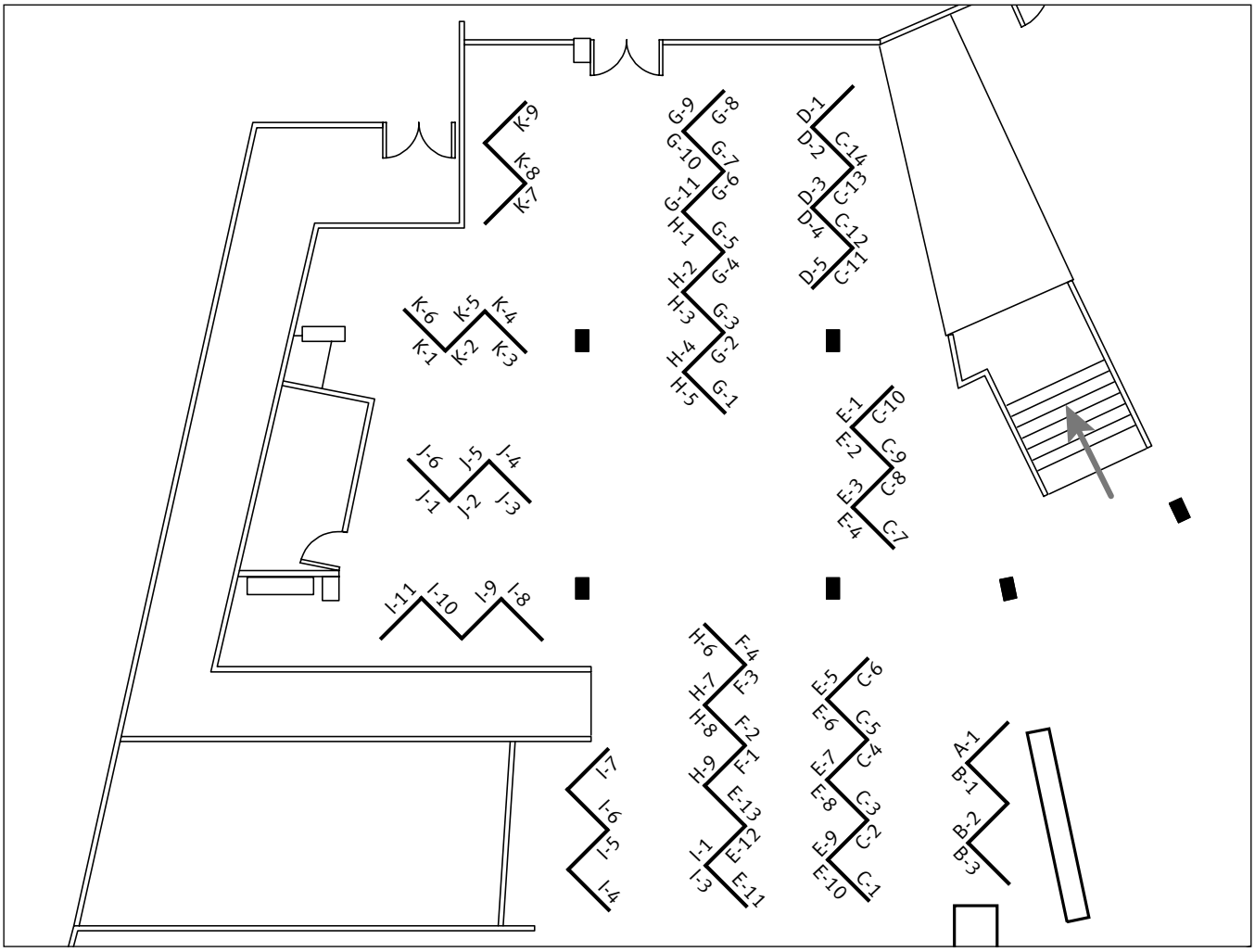
Poster Code

The poster numbers are based on topics:

- A Concentrating Optics and Related Materials
- B CPV Manufacturing Aspects and Utility Scale Installations
- C High-Concentration PV: Modules and Trackers
- D Low-Concentration CPV Systems
- E Advanced CPV Cells and Materials
- F Concentrator Solar Cells, Cell Assemblies and Related Materials
- G Novel CPV Modules and Receiver Concepts
- H Characterization and Simulation of CPV Cells
- I Characterization of Modules and System Components
- J Accelerated Testing Procedures and Reliability of CPV Systems and Components
- K Field Performance, Grid Integration and Energy Prediction

Poster Area



The listed companies and institutions have supported the 11th International Conference on Concentrator Photovoltaic Systems. Through their generous contributions they have made this conference a success in presenting a great opportunity to share knowledge and push the boundaries of solar science. **We thank our Sponsors.**

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