



# **EU PVSEC 2017**

**33rd European  
Photovoltaic Solar Energy  
Conference and Exhibition**

**The Innovation Platform  
for the global PV Solar Sector**



**Conference Programme  
Exhibition Catalogue**

**25 - 29 September 2017  
RAI Convention & Exhibition Centre  
Amsterdam, The Netherlands**

**[www.photovoltaic-conference.com](http://www.photovoltaic-conference.com)  
[www.photovoltaic-exhibition.com](http://www.photovoltaic-exhibition.com)**

## INSTITUTIONAL SUPPORT



With the support of UNESCO's  
Natural Sciences Sector



WCRE – World Council  
for Renewable Energy

## COORDINATION OF THE TECHNICAL PROGRAMME



## INSTITUTIONAL PV INDUSTRY COOPERATION



## ORGANISER

WIP  
Sylvensteinstr. 2  
81369 München, Germany  
Tel. +49-89-720 12 735  
Fax +49-89-720 12 791  
pv.conference@wip-munich.de  
pv.exhibition@wip-munich.de



## WITH THE SUPPORT

etaflorence  renewableenergies

## TABLE OF CONTENTS

Chairman's Message	1
Message from the Technical Programme Chair	3
Conference Programme	5
Monday, 25 September	6
Tuesday, 26 September	23
Wednesday, 27 September	41
Thursday, 28 September	63
Friday, 29 September	83
Visual Presentations	93
Authors Index	212
Parallel Events	277
New and Emerging PV Applications	280
PV System Performance and PV Module Reliability	282
PHOTOVOLTAICS   FORMS   LANDSCAPES Designing Energies in High Density Areas	284
BIPV – Bridging the Gap between PV Industry Supply and Construction Industry Demand	286
Solar Industry Forum	289
Exhibition	297
List of Exhibitors - alphabetical	299
Exhibition Layout with Exhibitors by stand number	339
General Information	349
Venue	351
Access	353
Conference Proceedings	354
Prizes & Awards	355
Networking	358
Services	359
Instructions for Authors and Presenters	360
Acknowledgements	363
Committees	364
Supporters	374
Sponsors	377
Media Partners	386

Conference Programme Outline of the week inside back cover

Please note: The explanation of the Session Code used for the Conference Programme is available together with the Programme Outline on the inside of the back cover of this booklet

The content represents the status as of 1 September 2017

**Welcome**

WELCOME

**Conference Programme**

PROGRAMME

**Parallel Events**

PARALLEL EVENTS

**Solar Industry Forum**

SOLAR IND. FORUM

**Exhibition**

EXHIBITION

**Information**

INFORMATION

**Acknowledgements**

ACKNOWLEDGEMENTS

## CHAIRMAN'S MESSAGE

### The photovoltaic revolution is just getting started!

The EU PVSEC 2017, the 33rd edition of the European Photovoltaic Solar Energy Conference and Exhibition, offers you an excellent opportunity to absorb, update and discuss the most recent and relevant developments in photovoltaics. We are honoured to host this world class event this year at the RAI Convention Center in Amsterdam, the Netherlands, from 25-29 September 2017.



Of course, it is not just about great conference location and facilities. It is about sharing our experience and vision on the fast advances in photovoltaic solar energy, that are mind blowing. Global cumulative installed nominal photovoltaic power has surpassed 300 GWp, and the moment that we exceed the magical boarder of 1 Terawatt is in sight. Currently, the wide variety of companies involved in the sector of photovoltaic solar energy facilitate ~2.8 million jobs worldwide. This number is expected to significantly grow in the near future. In 2016, the first tenders were won for solar farms in the Middle East at electricity prices well below 0.03 €/kWh. But even in Northern Europe we can see solar prices that are equally impressive – the lowest bidder in a recent German/Danish tender offered solar power at only 0.05 €/kWh. And the upcoming tender in sunny Spain should lead to solar price bids that are in the 0.03-0.04 €/kWh range. At these prices levels solar is starting to really disrupt the energy markets. The upscaling of battery manufacturing to facilitate the storage needs of the electric car industry has seen unprecedented drops in the cost of batteries. The days of cost-effective storage of solar electricity in autonomous PV systems are in sight and these advances will accelerate the electrification of the world.

Companies, institutes and universities carry on improving the performance of solar cells and modules to levels we could only dream of a decade ago. Record after record is being reported! The learning curves of photovoltaics keep dropping at impressive rates, challenging the global PV industry further.

Innovative applications of photovoltaic modules in products and buildings are opening up new markets. These developments are supporting all major future energy scenarios that forecast a key role for photovoltaic solar energy. In addition, these advances create new priorities, like solving grid-integration bottlenecks, improving system reliability, developing cost-effective storage concepts, powering electrical mobility, creation of sustainable financial solutions,

introducing effective government policies and creating high quality education and training programs in photovoltaic solar energy. Many reasons why we can expect that the PV sector will have an important impact on the energy infrastructure in the future.

Once again, the EU PVSEC 2017 continues to be the platform for a unique event to share the latest scientific, technical, financial, policy and market insights and developments and advances. Have a close look to an impressive programme that offers each of you a variety of interesting topics and an opportunity to intensively learn, discuss and network.

I am very pleased to welcome you in Amsterdam. I am sure the 33rd EU PVSEC will energize and inspire you in many ways.

Arno Smets  
EU PVSEC General Chairman  
Professor Solar Energy at Delft University of Technology

## WELCOME FROM THE TECHNICAL PROGRAMME CHAIR

A very warm welcome to the 33rd European Photovoltaic Solar Energy Conference! This year EU PVSEC is again the world's largest photovoltaic scientific conference, and a huge thanks to all the authors involved and indeed to all participants. I also take this opportunity to thank the Topic Organisers and the Paper Reviewers who diligently checked all the abstracts (over 1250 this year) and selected the plenaries, orals and visuals to make great programme for the week. Approximately 60% of the contributions were related to photovoltaic materials themselves (advanced concepts, silicon PV and thin film devices), with the balance looking at operational, integration, sustainability and economic aspects, so coverage is truly comprehensive. The plenary and oral sessions (about 30% of the contributions) aim to highlight particularly significant results and status updates on key issues. The contributions in the visual sessions on 4 days (more than 800 posters) provide a wealth of top-class results, ideas and analysis in an equally rewarding format.



The PV sector continues to “walk the talk” in terms of continued robust growth and increasing impact on our energy systems and markets. Just how far this can go will be highlighted in the opening panel discussion on how a multi-terawatt PV world could look like, and consequences not just for power, but also for mobility and our living environment. At the same time, large-scale PV needs to be part of the solution to energy access for the growing global population, when even today over 1 billion people lack basic clean energy services.

To meet these challenges, we need to get the best out of our research and innovation work, and this is what EU PVSEC is all about. We're confident that with your contribution, whether in a presentation, questions, comments or informal discussion, the conference will again provide a great forum for exchanging ideas and information, and help create clean energy solutions for the future.

Looking forward to seeing you in Amsterdam.

Dr. Nigel Taylor  
European Commission Joint Research Centre  
EU PVSEC Technical Programme Chair



## **CONFERENCE PROGRAMME**

Plenary, Oral and Visual Sessions

## CONFERENCE PROGRAMME

Please note, that this Programme may be subject to alteration and the organisers reserve the right to do so without giving prior notice. The current version of the Programme is available at [www.photovoltic-conference.com](http://www.photovoltic-conference.com).

(i) = invited

Monday, 25 September 2017

### CONFERENCE OPENING

08:30 - 10:00 Scientific Opening

#### PLENARY SESSION 1AP.1

08:30 - 09:30 Stairway to High Efficiency

#### Welcome Address

#### Chairpersons:

Nicholas J. Ekins-Daukes  
Imperial College London, United Kingdom

John Van Roosmalen  
ECN, The Netherlands

#### 1AP.1.1 Indirect to Direct Bandgap Transition in Methylammonium Lead Halide Perovskite

T. Wang, B. Daiber, S.A. Mann, E.C. Garnett & B. Ehrler  
AMOLF, Amsterdam, The Netherlands  
J.M. Frost & A. Walsh  
Imperial College London, United Kingdom

#### 1AP.1.2 EU PVSEC Student Award Winner presentation: Maximum Power Extraction Enabled by Monolithic Tandems Using Interdigitated Back Contact Bottom Cells with Three Terminals

M. Rienäcker, S. Kajari-Schröder, R. Niepelt,  
R. Brendel & R. Peibst  
ISFH, Emmerthal, Germany  
E. Warren, M. Schnabel, P. Stradins & A. Tamboli  
NREL, Golden, United States

#### 1AP.1.3 Monolithic III-V//Si Multi-Junction Solar Cell Exceeding an Efficiency of 31%

J. Benick, R. Cariou, P. Beutel, D. Lackner, N. Tucher,  
M. Hermle, S.W. Glunz, A.W. Bett & F. Dimroth  
Fraunhofer ISE, Freiburg, Germany

10:00 - 11:00 Opening Addresses

#### Chaired by

**Arno Smets**  
EU PVSEC General Chairman  
Professor Solar Energy at Delft University of Technology

- Ministry of Economic Affairs, The Netherlands
- European Commission DG Energy
- TKI - Top consortium for Knowledge and Innovation, Topsector Energy, The Netherlands

11:00 - 12:15 Moderated Panel Discussion

#### Topic:

- Multi-Terawatt Photovoltaics – Going Beyond Wholesale Electricity

#### Moderator

**Paolo Frankl**  
Head of Renewable Energy Division,  
International Energy Agency, France

12:15 Becquerel Prize Ceremony

For the latest programme details please check  
[www.photovoltic-conference.com](http://www.photovoltic-conference.com) or your  
Personal Programme Planner [www.eupvsec-planner.com](http://www.eupvsec-planner.com).

PROGRAMME

PROGRAMME





<b>Opening</b>			
<b>Scientific Opening 1AP.1 Main Auditorium</b>			
<b>Opening Addresses</b>			
<b>Moderated Panel Discussion</b>			
<b>Becquerel Prize Ceremony</b>			
Lunch			
<b>1AO.1 T1.1 Audit. Emerald</b>	<b>2AO.4 T2.5 Main Audit.</b>	<b>3AO.7 T3.1 Audit. G102-103</b>	<b>2AV.1 T2.1 Poster Area</b>
Break			
<b>1AO.2 T1.1 Audit. Emerald</b>	<b>2AO.5 T2.5 Main Audit.</b>	<b>3AO.8 T3.1 Audit. G102-103</b>	<b>2AV.2 T2.2 Poster Area</b>
Break			
<b>1AO.3 T1.2 Audit. Emerald</b>	<b>2AO.6 T2.6 Main Audit.</b>	<b>3AO.9 T3.1 Audit. G102-103</b>	<b>2AV.3 T2.3 Poster Area</b>

**1 New Materials and Concepts for Photovoltaic Devices**  
 T1.1 Fundamental Studies  
 T1.2 New Materials and Concepts for Cells and Modules

**2 Silicon Photovoltaics**  
 T2.1 Feedstock, Crystallisation, Wafering, Defect Engineering  
 T2.2 Homojunction Solar Cells  
 T2.3 Heterojunction Solar Cells  
 T2.4 Thin Film and Foil-Based Solar Cells  
 T2.5 Characterisation & Simulation Methods  
 T2.6 Manufacturing & Production

**3 Thin Film Photovoltaics**  
 T3.1 Cl(G)S, CdTe and Related Thin Film Solar Cells and Modules  
 T3.2 Perovskite, Organic and Dye-Sensitised Device

ORAL PRESENTATIONS 1AO.1

13:30 - 15:00 Devices & Characterisation

Chairpersons:

Martin C. Schubert  
Fraunhofer ISE, Germany

Albert Polman  
AMOLF, The Netherlands

1AO.1.1 **Analysis for Efficiency Potential of High Efficiency Solar Cells**

M. Yamaguchi  
TTI, Nagoya, Japan  
H. Yamada  
NEDO, Kawasaki, Japan  
Y. Katsumata  
JST, Chiyoda, Japan

1AO.1.2 **Special Introductory Presentation: Efficiency Limit of a 17.8% Efficiency Nanowire Solar Cell**

J.E.M. Haverkort, D. van Dam, Y. Cui, A. Cavalli,  
N.J.J. van Hoof, P.J. van Veldhoven & E.P.A.M. Bakkers  
Eindhoven University of Technology, The Netherlands  
S.A. Mann & E.C. Garnett  
AMOLF, Amsterdam, The Netherlands  
J. Gómez Riva  
DIFFER, Eindhoven, The Netherlands

1AO.1.3 **EU PVSEC Student Award Winner Presentation: Multi-Segment Photovoltaic Laser Power Converters and Their Electrical Losses**

R. Kimovec & M. Topic  
University of Ljubljana, Slovenia  
H. Helmers & A.W. Bett  
Fraunhofer ISE, Freiburg, Germany

1AO.1.4 **Feasibility of Thin-Film InGaP/GaAs/InGaAs Multi-Junction Solar Cells Using Light Trapping for Low-Cost and High-Efficiency Applications**

A.G. Reddy, K. Watanabe, M. Sugiyama & Y. Nakano  
University of Tokyo, Japan  
L. Zhu & H. Akiyama  
University of Tokyo, Kashiwa, Japan

1AO.1.5 **Uncertainty Propagation on the Spectral Matching Ratios Using a Calibrated Spectroradiometer. Preliminary Results**

D. Pavanello & R. Galleano  
European Commission JRC, Ispra, Italy

ORAL PRESENTATIONS 2AO.4

13:30 - 15:00 Characterisation of Contacts and Doped Layers

Chairpersons:

Rolf Brendel  
ISFH, Germany

Maarten Debucquoy  
imec, Belgium

2AO.4.1 **Reconstructing Photoluminescence Spectra from Heavily Doped Regions of Silicon Solar Cells**

H. Wu, H.T. Nguyen & D. Macdonald  
ANU, Canberra, Australia

2AO.4.2 **EU PVSEC Student Award Winner Presentation: Efficient Carrier Injection from Amorphous Silicon into Crystalline Silicon Determined from Photoluminescence**

A.R. Paduthol, M.K. Juhl, Z. Hameiri & T. Trupke  
UNSW Australia, Sydney, Australia  
G. Nogay & P. Löper  
EPFL, Lausanne, Switzerland

2AO.4.3 **On the Determination of the Contact Resistivity for Passivating Contacts Using 3D Simulations**

G. Kökbudak, R. Müller, F. Feldmann, A. Fell & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany  
R. Turan  
METU, Ankara, Turkey

2AO.4.4 **Front Side Metallization of p and n-Type Si Solar Cells: A Percolation Model for Explaining the Current Path**

M. Pfeffer, P. Kumar, M. Zehender, B. Wiillsch & O. Eibl  
University of Tuebingen, Germany

2AO.4.5 **Investigation on the Ag-Al Metal Spiking into Boron-Diffused p+ Layer of Industrial Bifacial n-Type Silicon Wafer Solar Cells by Numerical Simulation**

M. Li, R. Stangl & A.G. Aberle  
SERIS, Singapore  
F.-J. Ma & B. Hoex  
UNSW Australia, Sydney, Australia  
G.S. Samudra  
NUS, Singapore

2AO.4.6 **The Role of the Oxide in the Carrier Selectivity of Metal/Poly-Si/Oxide Contacts to Silicon Wafers**

G.J.M. Janssen, M.K. Stodolny, I.G. Romijn & B.G. Geerligs  
ECN, Petten, The Netherlands

**ORAL PRESENTATIONS 3AO.7**

**13:30 - 15:00 Optical Losses and TCO's**

**Chairpersons:**

Wiltraud Wischmann  
ZSW, Germany

Alessandro Romeo  
University of Verona, Italy

**3AO.7.1 Mechanism of Efficiency Enhancement of Cu(In,Ga)Se<sub>2</sub> Solar Cells by Insertion of Cu-Deficient Layer**

T. Nishimura, S. Toki, H. Sugiura, K. Nakada & A. Yamada  
Tokyo Institute of Technology, Japan

**3AO.7.2 Determination of Optical and Recombination Losses in Cu<sub>2</sub>ZnSn(S,Se)<sub>4</sub>-Based Solar Cells**

A. Nakane & H. Fujiwara  
Gifu University, Japan  
H. Tampo, K. Kim, S. Kim, H. Shibata & S. Niki  
AIST, Tsukuba, Japan

**3AO.7.3 Light Management Approaches Based on Periodic Textures for Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells**

R. Vismara, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands  
L. Grenet & F. Emieux  
CEA, Grenoble, France

**3AO.7.4 Effects of Ultra-Thin Copper Layer on the Performance and Stability of CdTe/CdS Solar Cells**

E. Artegiani, D. Menossi & A. Romeo  
University of Verona, Italy

**3AO.7.5 Amorphous Indium Zinc Oxide Windows of Different Composition for Cu(In,Ga)Se<sub>2</sub> Solar Cells**

R. Menner, T. Magorian-Friedlmeier, S. Paetel, P. Jackson & W. Wischmann  
ZSW, Stuttgart, Germany

**3AO.7.6 Application of In<sub>2</sub>O<sub>3</sub>-Based Transparent Conducting Oxide Layers in Cu(In,Ga)Se<sub>2</sub> Solar Cells**

T. Koida, Y. Ueno, J. Nishinaga, H. Higuchi, H. Takahashi, M. Iioka & H. Shibata  
AIST, Tsukuba, Japan

**VISUAL PRESENTATIONS 2AV.1**

**13:30 - 15:00 Feedstock, Crystallisation, Wafering, Defect Engineering**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**ORAL PRESENTATIONS 1AO.2**

**15:15 - 16:45 Optics and Materials**

**Chairpersons:**

Invited

Diego Alonso-Álvarez  
Imperial College London, United Kingdom

**1AO.2.1 High-Efficiency CuInS<sub>2</sub>-Based Nanocrystal Luminescent Solar Concentrators**

D.L. Patrick  
Western Washington University, Bellingham, United States

**1AO.2.2 Recent Applications of the Luminescent Solar Concentrator: A Standalone Chemical Microfactory**

M.G. Debije, D. Cambie, F. Zhao & T. Noël  
Eindhoven University of Technology, The Netherlands

**1AO.2.3 Analysis of Backsheet and Rear Cover Reflection Gains for Bifacial Solar Cells**

M. Mittag, A. Schmid, A. Grünzweig, M. Wiese & M. Ebert  
Fraunhofer ISE, Freiburg, Germany

**1AO.2.4 Silver Paste Design from Rheological Viewpoints**

Y.-H. Wen & W.-C. Tang  
Heraeus, Taoyuan, Taiwan  
H.-C. Lee, J.-S. Jiang & C.-C. Hua  
National Chung Cheng University, Chiayi, Taiwan

**1AO.2.5 A New Design of Intermediate Band Solar Cell with Multi-Layer MoS<sub>2</sub> Nanoribbons**

S.-F. Chen & Y.-R. Wu  
NTU, Taipei, Taiwan

**1AO.2.6 Benefit of Textured CIGS Cells for Low Reflecting Nanogrid Application**

J. van Deelen & M. Barink  
TNO, Eindhoven, The Netherlands

ORAL PRESENTATIONS 2AO.5

15:15 - 16:45 Characterisation of Cells and Modules

Chairpersons:

Francesca Ferrazza  
eni spa, Italy

Axel Herguth  
University of Konstanz, Germany

**2AO.5.1 Multi-Wire Interconnection for Multi-Busbar Interdigitated Back-Contact Cells: Opportunities and Pitfalls in Cell-Module Co-Design**

J. Govaerts, T. Borgers, P. Manganiello, M. Debucquoy,  
A. van der Heide, H. Goverde, E. Voroshazi, J. Szlufcik &  
J. Poortmans  
imec, Leuven, Belgium

**2AO.5.2 PCBtouch: A Flexible Solution for the Measurement of Complex Solar Cells in Production and Laboratory Environments**

J. Levrat, P. Häfliger, J. Champliand, C. Ballif &  
M. Despeisse  
CSEM, Neuchâtel, Switzerland  
J. Geissbühler  
EPFL, Neuchâtel, Switzerland  
N. Bassi, V. Fakhfoury & R. Ambigapathy  
Pasan, Neuchâtel, Switzerland

**2AO.5.3 Contactless Determination of Dielectric Absorption from the Spectral Response of Photoluminescence**

M.K. Juhl, M.E. Pollard, A.R. Paduthol, T. Trupke &  
Z. Hameiri  
UNSW Australia, Sydney, Australia

**2AO.5.4 Angle-Dependent Reflectance of Isotextured Silicon**

A. Alapont Sabater, J. Greulich, N. Tucher & B. Bläsi  
Fraunhofer ISE, Freiburg, Germany

**2AO.5.5 Benchmarking Mechanical Strength Data for New Solar Cell Concepts**

F. Kaule, S. Meyer & S. Schoenfelder  
Fraunhofer CSP, Halle, Germany

**2AO.5.6 Characterization of Large Area IBC Cells without Gaps between Emitters and BSFs**

H. Chu, G. Galbiati, J. Theobald, L.J. Koduvelikulathu,  
R. Roescu, D. Rudolph, A. Halm & V.D. Mihailetchi  
ISC Konstanz, Germany

ORAL PRESENTATIONS 3AO.8

15:15 - 16:45 Module Stability and Characterisation

Chairpersons:

Michael Powalla  
ZSW, Germany

Daniel Lincot  
CNRS, France

**3AO.8.1 Performance Characterisation and Extended Reliability Testing of CIGS PV Modules**

P. Lechner, J. Schnepf & D. Stellbogen  
ZSW, Stuttgart, Germany

**3AO.8.2 Separating the Influence of Material Composition and Local Defects on the Voc of CIGS Solar Modules**

J. Hepp, B. Hofbeck, C. Camus & J. Hauch  
ZAE Bayern, Erlangen, Germany  
A. Vetter & C.J. Brabec  
University of Erlangen-Nuremberg, Germany

**3AO.8.3 Towards an Improved Understanding of CIGS Thin Film Solar Cells**

T. Lavrenko, R. Vidal Lorbada, D. Mücke & T. Walter  
Ulm University of Applied Sciences, Germany  
B. Plesz  
BME, Budapest, Hungary

**3AO.8.4 The Nature of Non-Ohmic Shunts in CIS-Based Solar Cells**

A. Zelenina, F. Werner, H. ElAnzeery & S. Siebentritt  
University of Luxembourg, Belvaux, Luxembourg

**3AO.8.5 Reverse-Breakdown Stability of Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells**

M. Richter, M. Vrenegor & J. Parisi  
University of Oldenburg, Germany

**3AO.8.6 Imaging of TCO Lateral Resistance Effects in Thin-Film PV Modules by Lock-In Thermography and Electroluminescence Techniques**

A. Sinha, S. Roy & R. Gupta  
IIT Bombay, Mumbai, India  
M. Bliss, X. Wu & R. Gottschalg  
Loughborough University, United Kingdom

## VISUAL PRESENTATIONS 2AV.2

15:15 - 16:45 Homojunction Solar Cells

Detailed information on this Session is presented in the section entitled 'Visual Presentations'.

## ORAL PRESENTATIONS 1AO.3

17:00 - 18:30 Advanced and Novel Concepts for Very High-Efficiency Solar Cells

### Chairpersons:

Antonio Martí Vega  
UPM, Spain

Jonathan Govaerts  
imec, Belgium

### 1AO.3.1 Highly Reliable Low Concentration InGaP/GaAs/Si 3-Junction Solar Cells with Smart Stack Technology

K. Makita, R. Oshima, T. Tayagaki & T. Sugaya  
AIST, Tsukuba, Japan  
H. Mizuno & H. Takato  
AIST, Koriyama, Japan  
M. Baba & N. Yamada  
Nagaoka University of Technology, Japan

### 1AO.3.2 Increasing Photovoltage Boosted by Photon Up-Conversion in a Single Junction Solar Cell with a Hetero-Interface

S. Asahi, K. Kasaki, T. Kaizu & T. Kita  
Kobe University, Japan

### 1AO.3.3 Surface Passivation of InP Nanowires by ALD POx/Al<sub>2</sub>O<sub>3</sub> for Solar Cells

L.E. Black, A. Cavalli, M.A. Verheijen, J.E.M. Haverkort,  
E.P.A.M. Bakkers & W.M.M. Kessels  
Eindhoven University of Technology, The Netherlands

### 1AO.3.4 Achromatic Lens Casting Nearly Uniform Irradiance over MJ Solar Cells

M. Victoria Pérez, G. Vallerotto, S. Askins, I. Antón & G. Sala  
UPM, Madrid, Spain

### 1AO.3.5 Dielectric Nanoparticle Array for Low Loss Colorful Light Scattering Coatings in PV Application

V. Neder & A. Polman  
AMOLF, Amsterdam, The Netherlands  
S.L. Luxembourg  
ECN, Petten, The Netherlands

### 1AO.3.6 Optical Potential of BaSi<sub>2</sub> Absorber Material for Thin-Film PV Applications

R. Vismara, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands

## ORAL PRESENTATIONS 2AO.6

17:00 - 18:30 Industrial Production of Highly Efficient c-Si Solar Cells

### Chairpersons:

Peter Wohlfart  
Singulus Technologies, Germany

Peter Fath  
RCT-Solutions, Germany

### 2AO.6.1 Accuracy and Significance of the Projections in the International Technology Roadmap for Photovoltaic (ITRPV)

P. Baliozian, S. Al-Hajjawi, S. Nold & R. Preu  
Fraunhofer ISE, Freiburg, Germany  
J. Trube  
VDMA, Frankfurt am Main, Germany  
M. Fischer  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
R.G. Yadav  
University of Freiburg, Germany

### 2AO.6.2 Toward 21.4% Efficiency by Implementing Industrially Feasible Technologies in Printed-AIOx PERC Technology

Y.-S. Lin, C.-H. Ku, T.-C. Chen, C.-S. Hu & C.-C. Wen  
E-TON Solar Tech, Tainan, Taiwan  
J.-Y. Hung  
New E Materials, Kaohsiung, Taiwan  
J.-C. Wang  
Eternal Chemical, Kaohsiung, Taiwan

### 2AO.6.3 20% Efficient 15.6 × 15.6 cm<sup>2</sup> BackPEDOT Solar Cells with Screen-Printed Front Side

D. Zielke, R. Gogolin & J. Schmidt  
ISFH, Emmerthal, Germany  
R. Sauer & W. Lövenich  
Heraeus, Leverkusen, Germany

**2AO.6.4 Industrially Feasible PERC Cells on Diamond Wire Sawing Multi-Crystalline Silicon Wafers Textured by RIE towards 20.13% Efficiency**

W. Wang, J. Dong, Q. Ye, Y. Yang, W. Cai, J. Sheng, J. Yang, C. Zhang, X. Zhou & J. Zheng  
GCL System Integration Technology, Suzhou, China

**2AO.6.5 Ultrasonically Tinned PVD Al Rear Contacts on High-Efficiency Crystalline Silicon Solar Cells for Module Integration**

H. Nagel, D. Eberlein, S. Hoffmann, A. Kraft, U. Eitner, M. Glatthaar & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany  
H. Haverkamp  
Gebr. SCHMID, Freudenstadt, Germany  
T. Fischer  
Teamtechnik, Freiberg, Germany  
A. Hain & P. Wohlfart  
Singulus Technologies, Kahl am Main, Germany  
V. Mertens & J.W. Müller  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
T. Buck  
ISC Konstanz, Germany

**2AO.6.6 Effectiveness of the IEC 60904-9 Spectral Match Classification for Industrially-Relevant Si Solar Cells**

H. Wilterdink, R. Sinton & A. Blum  
Sinton Instruments, Boulder, United States  
E. Schneller & K.O. Davis  
University of Central Florida, Orlando, United States

**ORAL PRESENTATIONS 3AO.9**

**17:00 - 18:30 Device Characterisation**

**Chairpersons:**

James R. Sites  
Colorado State University, United States

Martha Ch. Lux-Steiner  
HZB, Germany

**3AO.9.1 In Situ Analysis of the In-Ga Inter-Diffusion in Cu(In,Ga)Se<sub>2</sub> Absorbers during Rapid Selenisation at High Se Pressure**

J. Marquez-Prieto, H. Stange, S. Levchenko, J.-P. Bäcker, T. Kodalle, A. Redinger, S.S. Schmidt, M. Klaus, C. Genzel, R. Schlatmann, T. Unold & R. Mainz  
HZB, Berlin, Germany

**3AO.9.2 Cu-Depleted Grains Induced by the Presence of Heavy-Alkali during the Growth of the CIGS Absorber**

O. Donzel-Gargand, F. Larsson & M. Edoff  
Uppsala University, Sweden  
T. Thersleff  
Stockholm University, Sweden  
E. Wallin & L. Stolt  
Solibro Research, Uppsala, Sweden

**3AO.9.3 Stacking Fault Annihilation through Grain Growth in Chalcopyrite Thin Films: A Model Supported by Simulation and In-Situ XRD**

H. Stange  
Technical University of Berlin, Germany  
S. Brunken, D. Greiner, M.D. Heinemann, S.S. Schmidt, J.-P. Bäcker, C.A. Kaufmann, M. Klaus, C. Genzel & R. Mainz  
HZB, Berlin, Germany  
D.A. Barragan Yaní  
Technical University of Darmstadt, Germany  
L.A. Wägele & R. Scheer  
Martin Luther University, Halle, Germany

**3AO.9.4 Micro-Electroluminescence Imaging and Simulation of Thin-Film CIGS Solar Cells**

U. Malm, T. Jarmar & O. Lundberg  
Solibro Research, Uppsala, Sweden

**3AO.9.5 Sub-Micrometer Resolved Electroluminescence Measurements on CZTSe and CIGSe Thin Film Solar Cells**

A. Redinger, S. Levchenko, J.M. Marquez-Prieto, D. Greiner, C.A. Kaufmann & T. Unold  
HZB, Berlin, Germany  
E. Saucedo & S. Giraldo  
IREC, Barcelona, Spain

**3AO.9.6 XPS and GD-OES Coupling for Advanced Profiling Characterization of CIGS Absorbers: The Challenge of the GD-OES Crater Engineering**

A. Loubat, M. Bouttemy, M. Frégnaux, D. Aureau & A. Etcheberry  
UVSQ, Versailles, France  
S. Gaiaschi & P. Chapon  
HORIBA, Longjumeau, France  
V. Achard, F. Donsanti, M. Jubault, N. Naghavi & D. Lincot  
CNRS, Chatou, France

**VISUAL PRESENTATIONS 2AV.3**

**17:00 - 18:30 Heterojunction Solar Cells**

*Detailed information on this Session is presented in the section entitled 'Visual Presentations'.*



**ORAL PRESENTATIONS 2BO.1**

**08:30 - 10:00 Silicon Crystallisation**

**Chairpersons:**

Anis Jouini  
CEA/INES, France

Atsushi Ogura  
Meiji University, Japan

**2BO.1.1 Properties of Multi-Crystalline Silicon Ingot Grown by Self-Nucleating Crucible**

J. Laurent & E. Drode  
Vesuvius, Feignies, France  
C. Reimann, M. Trempa & J. Friedrich  
Fraunhofer IISB, Erlangen, Germany  
C. Kranert  
Fraunhofer THM, Freiberg, Germany  
L. Teale, R. Dyer & I. Dorrity  
PV Crystalox Solar, Oxfordshire, United Kingdom

**2BO.1.2 Eco-Solar Factory: Multicrystalline Silicon Ingot Crystallisation from Reusable Silicon Nitride Crucibles**

M.P. Bellmann & G. Stokkan  
SINTEF, Trondheim, Norway  
K.E. Ekstrøm  
NTNU, Trondheim, Norway  
A. Ciftja & R. Roligheten  
Steuler Solar Technology, Porsgrunn, Norway  
J. Denafas  
Soli „Tek R&D“, Vilnius, Lithuania  
F. Buchholz  
ISC Konstanz, Germany  
K. Wambach  
bifa Environmental Institute, Augsburg, Germany  
S. Würzner & T. Kaden  
Fraunhofer THM, Freiberg, Germany

**2BO.1.3 Identification of Defect-Repressing Grain Boundaries in Multicrystalline Silicon Based on Measurements of as-Cut Wafers Using Advanced Image Processing**

T. Strauch, M. Demant, P. Krenckel, S. Riepe & S. Rein  
Fraunhofer ISE, Freiburg, Germany

**2BO.1.4 Control of Ingot Quality and Cell Appearance for Mono-Like Silicon Casting by Using Seed Partitions**

C.Y. Lan, Y.C. Wu, W.C. Lan, C.-F. Yang & C.-W. Lan  
NTU, Taipei, Taiwan  
W.C. Hsu  
SAS, Hsinchu, Taiwan  
C.M. Lu & A. Yang  
Solartech Energy, Hsinchu, Taiwan

**2BO.1.5 Silicon Crystal Growth from Granulate Crucible for Photovoltaic Application**

R. Menzel, K. Dadzis, N.V. Abrosimov & H. Riemann  
IKZ Institute for Crystal Growth, Berlin, Germany

**2BO.1.6 Ga Doped Monocrystalline Silicon by Continuous Czochralski (CCz) Process for Making Light Induced Degradation (LID) Free p-Type Solar Cells**

H. Xu, S. Keohane & S. Turchetti  
GT Advanced Technologies, Merrimack, United States  
Y. Zhang, Q. Li & R. Zhou  
LONGi Green Energy Technology, Xian, China

**ORAL PRESENTATIONS 5BO.5**

**08:30 - 10:00 Backsheet and Encapsulant Materials**

**Chairpersons:**

Gernot Oreski  
PCCL, Austria

William J. Gambogi  
DuPont, United States

**5BO.5.1 Hybrid Encapsulation Film for PV Modules Operating at High Voltage**

S.C. Pop, R.N. Schulze & X. Wang  
Yingli Green Energy, San Francisco, United States  
J. Kapur  
DuPont, Wilmington, United States  
P. Hacke & M. Kempe  
NREL, Golden, United States

**5BO.5.2 Extended Qualification Testing of 1-Cell Crystalline Si PV Laminates: Impacts of Advanced Cell Metallization and Encapsulation Schemes**

J. Govaerts, A. van der Heide, T. Borgers, E. Voroshazi,  
J. Szlufcik & J. Poortmans  
imec, Leuven, Belgium  
B. Geyer  
ZOEK, Cologne, Germany  
S. Hellström  
Borealis, Stenungsund, Sweden  
B. Broeders  
Borealis, Beringen, Belgium



- 5BO.5.3 Adhesion Degradation of the Metallization-Encapsulant Interface**  
N. Bosco, P. Hacke & S.R. Kurtz  
NREL, Golden, United States  
J. Tracy & R.H. Dauskardt  
Stanford University, United States
- 5BO.5.4 Depth Profiling of Optical, Chemical and Nanomechanical Properties of Glass/Encapsulant/Backsheet PV Laminates Aged under Different Intensities of UV Light**  
Y. Lyu, J.H. Kim, A. Fairbrother & X. Gu  
NIST, Gaithersburg, United States
- 5BO.5.5 Comparison of Accelerated UV Test Methods with Florida Exposure for Photovoltaic Backsheet Materials**  
E. Parnham, A. Whitehead, S. Pain & B. Brennan  
DuPont Teijin Films, Redcar, United Kingdom
- 5BO.5.6 Analysis of UV Degradation of PV Backsheets Using Arrhenius Formalism to Extract Intrinsic Material Characteristics and Model Lifetime Performance under Various Climate Conditions**  
A. Borne & S. Padlewski  
DuPont, Geneva, Switzerland  
T.-J. Trout  
DuPont, Wilmington, United States  
M. Köhl  
Fraunhofer ISE, Freiburg, Germany

**ORAL PRESENTATIONS 3BO.9**  
**08:30 - 10:00 Manufacturing and Performance Improvements**

**Chairpersons:**

Bernhard Dimmler  
Manz CIGS Technology, Germany

Veronica Bermudez  
Solar Frontier, Japan

- 3BO.9.1 Special Introductory Presentation: Wide Bandgap Sequential Absorber with Tunable Buffer Bandgap for CIGS<sub>Se</sub> Solar Modules at 18% Efficiency**  
R. Lechner, P. Eraerds, M. Stölzel, T.P. Niesen, M. Sode,  
A. Weber, M. Algasinger, C. Schubbert, R. Verma,  
T. Dalibor & J. Palm  
Avancis, Munich, Germany

- 3BO.9.2 Cd-Free Cu(In,Ga)Se<sub>2</sub> Thin-Film Solar Cells with High Ga Contents**  
D. Hariskos, W. Witte, S. Paetel, W. Hempel & M. Powalla  
ZSW, Stuttgart, Germany
- 3BO.9.3 Challenges for High-Efficiency Buffer-Free Cu(In,Ga)Se<sub>2</sub> Solar Cells**  
S. Ishizuka, T. Koida, N. Taguchi, S. Tanaka, P. Fons & H. Shibata  
AIST, Tsukuba, Japan
- 3BO.9.4 Cu(In,Ga)Se<sub>2</sub> Thin Films and Modules Fabricated on Polyimide Foils by the In-Line Evaporation Process Using Thermal Cracked Selenium**  
H. Wang, Y.T. Yang, L.Y. Yao, H. Zhang, R.B. Liu, Z.B. Xiao & Q. Sun  
Tianjin Institute of Power Sources, China
- 3BO.9.5 High Efficiency CdTe Solar Cells by Low Temperature Deposition with MgZnO HRT Layer**  
D. Menossi, E. Artegiani & A. Romeo  
University of Verona, Italy  
F. Bittau, J.W. Bowers & J.M. Walls  
Loughborough University, United Kingdom  
M. Barbato, M. Meneghini & G. Meneghesso  
University of Padua, Italy

**VISUAL PRESENTATIONS 6BV.1**

**08:30 - 10:00 Design and Operation of PV Systems (I)**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**NOTES**

.....

.....

.....

.....

.....

## PLENARY SESSION 2BP.1

10:30 - 12:10 Silicon Photovoltaics

### Chairpersons:

Giso Hahn  
University of Konstanz, Germany

Derk L. Bätzner  
Meyer Burger Research, Switzerland

### 2BP.1.1 Record-Breaking Efficiency Back-Contact Heterojunction Crystalline Si Solar Cell and Module

K. Yamamoto, K. Yoshikawa, D. Adachi, W. Yoshida, T. Irie, K. Konishi, T. Fujimoto, H. Kawasaki, M. Kanematsu, H. Ishibashi, T. Uto, Y. Takahashi, T. Terashita, G. Koizumi, N. Nakanishi & M. Yoshimi  
Kaneka, Osaka, Japan  
J.L. Hernández  
Kaneka, Westerlo-Oevel, Belgium

### 2BP.1.2 Pilot Line Results of n-Type IBC Cell Process in Mass Production Environment

I. Cesar, N. Guillevin & A.R. Burgers  
ECN, Petten, The Netherlands  
P. Venema  
Tempress, Vaassen, The Netherlands  
Z. Wang, J.Y. Zhai & D. Liu  
Yingli Green Energy, Baoding, China

### 2BP.1.3 Simultaneous Fabrication of n & p Contacts for Bi-Facial Cells by a Novel Co-Plating Process

R. Russell, L. Tous, E. Cornagliotti, F. Duerinckx & J. Szlufcik  
imec, Leuven, Belgium

### 2BP.1.4 Understanding Light-Induced Degradation in Multicrystalline Silicon: Possible Complex Formation Mechanisms

F. Schindler, W. Kwapil, J. Schön, R. Eberle, T. Niewelt & M.C. Schubert  
Fraunhofer ISE, Freiburg, Germany

### 2BP.1.5 Influence of the Precursor Layer Composition and Deposition Processes on the Electronic Quality of Liquid Phase Crystallized Silicon Absorbers

D. Amkreutz, N. Preissler, P. Sonntag, C. Thi-Trinh, R. Schlatmann & B. Rech  
HZB, Berlin, Germany

## ORAL PRESENTATIONS 2BO.2

13:30 - 15:00 LID and Defect Engineering

### Chairpersons:

Markus Rinio  
University of Karlstad, Sweden

Erik Sauar  
Brighterlite, Norway

### 2BO.2.1 Identification of Possible Impurities in mc-Si Wafers Responsible for Light-Induced Lifetime Degradation

D. Bredemeier, D.C. Walter & J. Schmidt  
ISFH, Emmerthal, Germany

### 2BO.2.2 Influence of Different Transition Metal Contaminations on Degradation and Regeneration in mc Si

A. Schmid, A. Zuschlag, D. Skorka, J. Fritz & G. Hahn  
University of Konstanz, Germany

### 2BO.2.3 New Insight into LID in Multi-PERC Solar Cells and Modules

A. Ciesla, D. Chen, C. Chan, D. Payne, I. Zafirovska, C. Sen, J. Colwell, B. Hallam, R. Chen, M. Abbott & S.R. Wenham  
UNSW Australia, Sydney, Australia  
C.M. Chong  
Nanyang Technological University, Singapore  
G. Bourret-Sicotte  
University of Oxford, United Kingdom

### 2BO.2.4 How to Assess the Electrical Quality of Silicon Material

B. Michl, F. Schindler & M.C. Schubert  
Fraunhofer ISE, Freiburg, Germany

### 2BO.2.5 Oxygen Precipitates in Czochralski Silicon: Influence of Growth Conditions on the Minority Carrier Lifetime

F. Rougieux, H.T. Nguyen & D. Macdonald  
ANU, Canberra, Australia  
B. Mitchell  
UNSW Australia, Sydney, Australia  
R. Falster  
SunEdison, Merano, Italy

### 2BO.2.6 Investigating the Influence of Interstitial Iron on the Study of Boron-Oxygen Defects

M. Kim, D. Chen, M. Abbott, S. Wenham & B. Hallam  
UNSW Australia, Sydney, Australia

**ORAL PRESENTATIONS 5BO.6**

**13:30 - 15:00 Electrical Characterisation of PV Devices**

**Chairpersons:**

Werner Herrmann  
TÜV Rheinland Energy, Germany

Ronald Sinton  
Sinton Instruments, United States

**5BO.6.1 Comparison of Primary Calibrations for Filtered Reference Cells**

H. Müllejans, W. Zaaiman & D. Pavanello  
European Commission JRC, Ispra, Italy  
I. Kröger  
PTB, Braunschweig, Germany

**5BO.6.2 Spectral Angular Responsivity Calibration Facility at PTB**

I. Kröger, T. Fey, F. Witt, F. Plag & S. Winter  
PTB, Braunschweig, Germany

**5BO.6.3 Extending Solar Simulators' Spectrum Characterisation from 300 nm to 1200 nm: Challenges on Spectral Measurements in UV and NIR**

G. Belluardo  
EURAC, Bolzano, Italy  
R. Galleano & W. Zaaiman  
European Commission JRC, Ispra, Italy  
M. Pravettoni  
Private Consultant, Milan, Italy  
M. Halwachs  
AIT, Vienna, Austria  
R. Fucci  
ENEA, Napoli, Italy  
A. Drobisch  
PI Berlin, Germany  
M. Friederichs  
PV Lab, Potsdam, Germany  
E. Haverkamp  
Radboud University, Nijmegen, The Netherlands  
A. Phinikarides  
University of Cyprus, Nicosia, Cyprus  
G. Friesen  
SUPSI, Canobbio, Switzerland

**5BO.6.4 Spectral and Angular Correction - a Multidimensional Approach to Model Measurements under Outdoor Conditions**

F. Plag, S. Riechelmann, I. Kröger & S. Winter  
PTB, Braunschweig, Germany

**5BO.6.5 Reproducible Outdoor I-V Curve Measurement by the Use of PV Module Irradiance Sensors and Comparison with Indoor Results**

Y. Hishikawa, T. Doi, M. Higa, T. Takenouchi, H. Ohshima & K. Yamagoe  
AIST, Tsukuba, Japan

**5BO.6.6 Smart PV Module Batch Testing: Reduction of Performance Measurement Uncertainty by Up to 50%**

B. Jaeckel  
UL International, Neu-Isenburg, Germany  
B. Mihaylov & R. Gottschalg  
Loughborough University, United Kingdom  
J. Arp  
PV Lab Germany, Potsdam, Germany

**ORAL PRESENTATIONS 3BO.10**

**13:30 - 15:00 Alkaline Treatments**

**Chairpersons:**

Akira Yamada  
Tokyo Institute of Technology, Japan

Thomas Dalibor  
Avancis, Germany

**3BO.10.1 Special Introductory Presentation: Influence of Post-Deposition Treatment with Alkali Elements on Bulk and Interface Properties of High Efficiency Cu(In,Ga)Se<sub>2</sub> Solar Cells: Results of the EU Project Sharc25**

W. Witte, P. Jackson, D. Hariskos, F. Kessler & M. Powalla  
ZSW, Stuttgart, Germany  
S. Buecheler, R. Carron, E. Avancini, B. Bissig, T. Weiss & A.N. Tiwari  
EMPA, Dübendorf, Switzerland  
S. Siebentritt, F. Werner & M.H. Wolter  
University of Luxembourg, Belvaux, Luxembourg  
P. Pareige, P. Mugerou, S. Duguay, E. Cadel, C. Castro & A. Vilalta-Clemente  
INSA Rouen, Saint Etienne du Rouvray, France  
R. Menozzi, G. Sozzi & S. Di Napoli  
University of Parma, Italy  
E. Bourgeois & G. Degutis  
imec, Leuven, Belgium  
M. Bär, R.G. Wilks & T. Kunze  
HZB, Berlin, Germany  
S. Sadewasser & N. Nicoara  
INL, Braga, Portugal  
M. Puska, M. Fedina, H.-P. Komsa & V. Havu  
Aalto University, Finland  
P. Reinhard  
Flisom, Dübendorf, Switzerland  
B. Dimmler & R. Wächter  
Manz CIGS Technology, Schwäbisch Hall, Germany

**3BO.10.2 Effect of KF Post Absorber Deposition Treatment on the Functionality of Different TCOs in CIGSe Solar Cells**

J. Keller, A. Aijaz, T. Kubart, M. Edoff & T. Törndahl  
Uppsala University, Sweden  
F. Chalvet, J. Joel & L. Stolt  
Solibro Research, Uppsala, Sweden

**3BO.10.3 Efficiency Improvement of Low Temperature (450°C) Deposited Cu(In,Ga)Se<sub>2</sub> Solar Cells by Alkali Treatment and Deposition of Cu-Poor Layer**

A. Sadono, T. Ogihara, K. Nakada & A. Yamada  
Tokyo Institute of Technology, Japan  
M. Hino & K. Yamamoto  
Kaneka, Osaka, Japan

**3BO.10.4 Sulfurization of Co-Evaporated Cu(In,Ga)Se<sub>2</sub> as a Post Deposition Treatment**

J.K. Larsen, J. Keller, J.J.S. Scragg, L. Riekehr & C. Platzer-Björkman  
Uppsala University, Sweden  
O. Lundberg, T. Jarmar & L. Stolt  
Solibro Research, Uppsala, Sweden

**3BO.10.5 Thermal Annealing Effect of KF-PDT on the Property of CIGS Solar Cell on Glass Substrate**

Y. Kamikawa-Shimizu, J. Nishinaga, S. Ishizuka,  
T. Tayagaki, H. Shibata & S. Niki  
AIST, Tsukuba, Japan

**VISUAL PRESENTATIONS 6BV.2**

**13:30 - 15:00 Design and Operation of PV Systems (II)**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**NOTES**

.....  
.....  
.....  
.....  
.....  
.....

**ORAL PRESENTATIONS 2BO.3**

**15:15 - 16:45 New Wafering Technologies**

**Chairpersons:**

Dirk Habermann (i)  
Meyer Burger Technology, Switzerland

Yoshio Ohshita  
Toyota Technological Institute, Japan

**2BO.3.1 Machining Behaviour of Silicon in Wire EDM for PV Applications**

M.M. Kane, A. Jadhav, M. Kumar, S.V. Kulkarni,  
S.S. Joshi & H. Bahirat  
IIT Bombay, Mumbai, India

**2BO.3.2 Kerf-Less Wafering Using Polymer Split Method for Photovoltaic Solar Cells and Modules**

S. Schoenfelder, F. Kaule & J. Schneider  
Fraunhofer CSP, Halle, Germany  
R. Lantzsch & K. Petter  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
C. Beyer & J. Richter  
SILTECTRA, Dresden, Germany

**2BO.3.3 Fabrication of Free-Standing Ultra-Thin Silicon Wafer by Controlled Exfoliation Process**

Y. Lee, S.M. Han & J. Oh  
KAIST, Daejeon, Korea South  
Y.-J. Kim  
KRISS, Daejeon, Korea South  
H.-E. Song  
KIER, Daejeon, Korea South

**2BO.3.4 Overview of Novel Dicing Methods for the Delineation and Exfoliation of Thin Kerfless Si Epitaxial Foils with High Mechanical Strength**

H. Sivaramakrishnan Radhakrishnan, K. Vanstreels,  
M. Xu, V. Depauw, K. Van Nieuwenhuysen, T. Bearda,  
S. Jambaldinni, M. Gonzalez, I. Gordon, M. Debucquoy,  
J. Szlufcik & J. Poortmans  
imec, Leuven, Belgium  
K. Yokoyama  
DISCO Hi-Tec, Munich, Germany  
F. Bamberg, H.-U. Zuehlke & M. Grimm  
3D-Micromac, Chemnitz, Germany

**2BO.3.5 Towards Multi- $\mu$ s Spatially Homogeneous Carrier Lifetimes from Epitaxial Silicon Wafers Grown on Porous Si**

S. Kajari-Schröder, C. Gemmel, J. Hensen & R. Brendel  
ISFH, Emmerthal, Germany

PROGRAMME

PROGRAMME

**2BO.3.6 Origin and Impact of Crystallographic Defects in Epitaxially Grown Si Wafers**

S. Janz, D. Amiri, E. Gust, S. Kühnhold-Pospischil,  
S. Riepe, F. Heinz & M. Drießen  
Fraunhofer ISE, Freiburg, Germany

**ORAL PRESENTATIONS 6BO.7**

**15:15 - 16:45 Advanced Field Performance Estimation**

**Chairpersons:**

Fabrizio Bonemazzi  
ENEL, Italy

Giorgio Graditi  
ENEA, Italy

**6BO.7.1 Survey on Yield of PV Systems in Germany 2014 to 2016**

H. te Heesen & M. Rimpler  
Trier University of Applied Science, Neubrücke, Germany  
V. Herbort  
Ulm University of Applied Sciences, Germany

**6BO.7.2 Statistical Analysis of the Performance Loss Rate of PV Plants Distributed in a Region: A Real-Case Study in South Tyrol**

G. Belluardo, P. Ingenhoven & D. Moser  
EURAC, Bolzano, Italy  
M. Pierro & C. Cornaro  
University of Rome, Italy

**6BO.7.3 A 368-kWp Grid-Connected PV System: Known and Hidden Losses**

G.H. Yordanov, G. Verbeek, K. Baert & J. Driesen  
KU Leuven, Belgium  
F. Smolders  
KU Leuven, Geel, Belgium  
A. Olaerts  
Affluent Energy, Leuven, Belgium

**6BO.7.4 Comparison of Soiling Sensitivity of the Performance of Polycrystalline and Amorphous Photovoltaic Systems in Benguerir, Morocco**

H. Zitouni, A. Benazzouz, Z. Naimi, A. Benlarabi & B. Ikken  
IRESEN, Rabat, Morocco  
A. Bennouna  
Cadi Ayyad University, Marrakech, Morocco  
M. Regragui  
University Mohammed V-Agdal, Rabat, Morocco

**6BO.7.5 Effects of Urban Environment on Solar PV Performance**

P. Moraitis, B.B. Kausika & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands

**6BO.7.6 Machine Learning PV System Performance Analyser**

S. Rodrigues  
M-ITI, Funchal, Portugal  
H. Geirinhas Ramos  
University of Lisbon, Portugal  
F. Morgado-Dias  
University of Madeira, Funchal, Portugal

**ORAL PRESENTATIONS 3BO.11**

**15:15 - 16:45 Kesterites**

**Chairpersons:**

Marc Meuris  
imec, Belgium

Susanne Siebentritt  
University of Luxembourg, Luxembourg

**3BO.11.1 Insights into the Formation Pathways of Cu<sub>2</sub>ZnSnSe<sub>4</sub> Using Rapid Thermal Processes**

A. Hernández-Martínez, M. Placidi, L. Arqués, S. Giraldo,  
Y. Sánchez, V. Izquierdo-Roca, P. Pistor & E. Saucedo  
IREC, Barcelona, Spain

**3BO.11.2 New Strategy to Deal with the Interface Problem - Improving Pure Sulfide Cu<sub>2</sub>ZnSnS<sub>4</sub> Solar Cell towards 10% Efficiency**

K. Sun, J. Huang, C. Yan, F. Liu, X. Hao & M.A. Green  
UNSW Australia, Sydney, Australia  
S.W. Johnson  
NREL, Golden, United States

**3BO.11.3 Characterization and Simulation of Cu<sub>2</sub>ZnSnS<sub>4</sub> Absorber Layers Fabricated by Sequential DC Magnetron Sputtering and Rapid Thermal Processing**

M. Zhukova, R. Kotipalli & D. Flandre  
Catholic University of Leuven, Louvain-la-Neuve, Belgium  
L. Samain & L. Fourdrinier  
CRM Group, Liège, Belgium

**3BO.11.4 Optimization of CZGeSe/CdS Interface**

L. Choubrac, L. Arzel, S. Harel, L. Assmann & N. Barreau  
University of Nantes, France  
G. Brammert & M. Meuris  
imec, Diepenbeek, Belgium  
B. Vermang  
Hasselt University, Belgium

**3BO.11.5 Compositional and Electronic In-Depth Analysis of the CdS/Cu<sub>2</sub>ZnGeSe<sub>4</sub> Solar Cell Interface**

X. Kozina, C. Hartmann, R. Félix, R.G. Wilks & M. Bär  
HZB, Berlin, Germany  
L. Choubrac  
University of Nantes, France  
G. Brammertz & M. Meuris  
imec, Diepenbeek, Belgium  
B. Vermang  
imec, Heverlee, Belgium

**3BO.11.6 Sodium Doping Strategies for Vacuum Processed Cu<sub>2</sub>ZnSnSe<sub>4</sub> Solar Cells**

C. Andres, S.G. Haass, R. Carron, Y.E. Romanyuk & A.N. Tiwari  
EMPA, Dübendorf, Switzerland  
R. Caballero  
UAM, Madrid, Spain

**VISUAL PRESENTATIONS 6BV.3**

**15:15 - 16:45 Solar Resource and Forecasting / Building, Infrastructure and Landscape Applications / Grid and Energy System Integration**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**ORAL PRESENTATIONS 2BO.4**

**17:00 - 18:30 Novel Approaches for c-Si Solar Cells**

**Chairpersons:**

Stefan W. Glunz  
Fraunhofer ISE, Germany

Invited

**2BO.4.1 Wide-Band Gap Silicon Carbide for Front Side Carrier Selective Contacts**

A. Ingenito, G. Nogay, J.A. Stuckelberger, P. Wyss, F.-J. Haug, P. Löper & C. Ballif  
EPFL, Neuchâtel, Switzerland  
J. Horzel, C. Allebé & M. Despeisse  
CSEM, Neuchâtel, Switzerland

**2BO.4.2 Principles of Carrier-Selective Contacts Based on Induced Junctions**

M. Bivour, C. Messmer, L. Neusel, F. Zähringer, J. Schön, M. Hermle & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany  
T. Matsui  
AIST, Tsukuba, Japan

**2BO.4.3 EU PVSEC Student Award Winner Presentation: Locally Conductive Transport Channel Formation in High Temperature Stable Hole-Selective Silicon-Rich Silicon Carbide Passivating Contact**

G. Nogay, J. Stuckelberger, P. Wyss, Q. Jeangros, F.-J. Haug, P. Löper & C. Ballif  
EPFL, Neuchâtel, Switzerland  
M. Hyvl, M. Ledinsky & A. Fejfar  
ASCR, Prague, Czech Republic  
C. Allebé & M. Despeisse  
CSEM, Neuchâtel, Switzerland

**2BO.4.4 Thermal Stability of Novel Hole-Selective Contacts for Silicon Wafer Solar Cells**

C.-Y. Lee, T. Zhang, K. Khoo & B. Hoex  
UNSW Australia, Sydney, Australia  
A.A. Abdallah, S. Rashkeev & N. Tabet  
QEERI, Doha, Qatar

**2BO.4.5 High Efficiency Locally Laser Doped IBC Solar Cells**

M. Ernst, E. Franklin, T.K. Chong, E.C. Wang, K.C. Fong, T. Kho & A. Blakers  
ANU, Canberra, Australia

**2BO.4.6 Optical Performance Enhancement of Flat Silicon Solar Cells and their Tandems with PDMS Scattering Layers**

S. Manzoor, Z.J. Yu, A. Ali, W. Ali & Z.C. Holman  
Arizona State University, Tempe, United States  
K.A. Bush, A.F. Palmstrom, S.F. Bent & M.D. McGehee  
Stanford University, United States

**ORAL PRESENTATIONS 6BO.8**

**17:00 - 18:30 Failure Modes and Degradation**

**Chairpersons:**

Christian Camus  
ZAE Bayern, Germany

Marko Topic  
University of Ljubljana, Slovenia

**6BO.8.1 Effect of PID on Energy Conversion Efficiency of Crystalline Silicon Photovoltaic Power Plant**

H. Yang, J. Chang, H. Wang, F. Wang & P. Zhao  
Xi'an Jiaotong University, China

**6BO.8.2 Quantitative Study of Potential Induced Degradation of a Roof-Top PV-Installation with IR-Imaging**

C. Buerhop-Lutz, T. Pickel, F.W. Fecher, C. Camus & J. Hauch  
ZAE Bayern, Erlangen, Germany  
C. Zetzmann  
Rauschert, Pressig, Germany  
C.J. Brabec  
University of Erlangen-Nuremberg, Germany

**6BO.8.3 Scientific Investigation of a PV Generator After Hail**

W. Mühleisen, L. Neumaier & C. Hirschl  
CTR, Villach, Austria  
M. Spielberger  
PVS, Guttaring, Austria  
H. Sonnleitner  
ENcome, Klagenfurt, Austria  
Y. Voronko  
OFI, Vienna, Austria

**6BO.8.4 The Development of Cell Thickness Reduction of Crystalline Solar Cells in PV Modules and Its Impacts on Large PV Power Plants**

E. Cunow  
LSPV Consulting, Gröbenzell, Germany

**6BO.8.5 Experimental Assessment of Performance Degradation for a PV Power Plant Operating in a Desert Maritime Climate**

D. Hassan Daher, L. Gaillard & M. Amara  
INSA Lyon, Villeurbanne, France  
C. Ménézo  
LOCIE, Le Bourget du Lac, France

**6BO.8.6 Implementation of an Accurate Measurement Procedure to Determinate Maximum Power of Modules at Standard Test Conditions in the Field through Correlation with Measurements Carried Out in Laboratory**

L. Perez, J.A. Florez, M. Martinez, F. Domínguez,  
G. Castillo, R. Gomez, M. Fernández, V. Parra & A. Velasco  
Enertis Solar, Alcobendas, Spain

**ORAL PRESENTATIONS 3BO.12**

**17:00 - 18:30 Organic Based PV**

**Chairpersons:**

Bruno Ehrler  
AMOLF, The Netherlands

Ching-Fuh Lin (*i*)  
NTU, Taiwan

**3BO.12.1 Phosphor Particles for Luminescent Down-Shifting in Photovoltaics: Determination of Complex Refractive Indices**

B. Lipovsek, J. Krc & M. Topic  
University of Ljubljana, Slovenia  
A. Solodovnyk, J. Gast & E. Stern  
ZAE Bayern, Erlangen, Germany  
D. Riedel, A. Osvet, K. Forberich, M. Batentschuk & C.J. Brabec  
University of Erlangen-Nuremberg, Germany

**3BO.12.2 TiO<sub>2</sub> Coated ZnO Core/Shell Electrodes Applying in Dye-Sensitized Solar Cell**

C. Li & S. Hou  
Kochi University of Technology, Kami, Japan

**3BO.12.3 Power Matrix Measurements and Energy Rating Analysis of Organic PV Mini-Modules**

G. Bardizza, E. Salis, A.M. Gracia Amillo, T. Huld & E. Dunlop  
European Commission JRC, Ispra, Italy

**3BO.12.4 Development of a Reproducible Laser Structuring Process of Stacked Thin Films on Ultra-Barrier Films for Organic Solar Devices**

N. Friedrich-Schilling & B. Gburek  
Heliatek, Dresden, Germany  
H. Fledderus  
Holst Centre, Eindhoven, The Netherlands  
T. Kuntze  
Fraunhofer IWS, Dresden, Germany  
F. Peuckert  
3D-Micromac, Chemnitz, Germany

**3BO.12.5 Roll to Roll Printed Polymeric Photovoltaic Modules based on P3HT (Poly(3-Hexylthiophene)) and Fullerene: A Comparison between PCBM (Phenyl-C61-Butyric Acid Methyl Ester) and ICBA (Indene-C60 Bisadduct)**

P. Apilo, M. Välimäki, K.-L. Väisänen, M. Ylikunnari & J. Hast  
VTT, Oulu, Finland  
R. Po, A. Bernardi & G. Corso  
eni spa, Novara, Italy  
M. Vilkmann  
VTT, Espoo, Finland

**3BO.12.6 Evaluation Emerging PV Performance Rating under Indoor Lighting Simulator**

Y.-S. Long, E.-Y. Wang, M.-A. Tsai, S.-T. Hsu & T.-C. Wu  
ITRI, Hsinchu, Taiwan

**VISUAL PRESENTATIONS 5BV.4**

**17:00 - 18:30 PV Module Performance and Reliability (I)**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**NOTES**

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

PROGRAMME

1CO.1 T1.2 Audit. Emerald	5CO.5 T5.1 Audit. G102-103	2CO.9 T2.6 Audit. G104-105	6CO.13 T6.2 Main Audit.	3CV.1 T3.1 Poster Area
------------------------------------	-------------------------------------	-------------------------------------	----------------------------------	---------------------------------

Break

<b>3CP.1</b> <b>Main Auditorium</b>  12:00				
---	--	--	--	--

Lunch

1CO.2 T1.2 Audit. Emerald	5CO.6 T5.1 Audit. G102-103	2CO.10 T2.2/3 Audit. G104-105	6CO.14 T6.2 Main Audit.	2CV.2 T2.4/5/6 Poster Area
------------------------------------	-------------------------------------	--	----------------------------------	-------------------------------------

Break

3CO.3 T3.2 Audit. Emerald	5CO.7 T5.1 Audit. G102-103	2CO.11 T2.2 Audit. G104-105	6CO.15 T6.2 Main Audit.	1CV.3 T1.1/2 Poster Area
------------------------------------	-------------------------------------	--------------------------------------	----------------------------------	-----------------------------------

Break

3CO.4 T3.2 Audit. Emerald	5CO.8 T5.1 Audit. G102-103	2CO.12 T2.4 Audit. G104-105	6CO.16 T6.4 Main Audit.	4CV.4 T4.1 Poster Area
------------------------------------	-------------------------------------	--------------------------------------	----------------------------------	---------------------------------

<b>1 New Materials and Concepts for Photovoltaic Devices</b> T1.1 Fundamental Studies T1.2 New Materials and Concepts for Cells and Modules				
---	--	--	--	--

<b>2 Silicon Photovoltaics</b> T2.1 Feedstock, Crystallisation, Wafering, Defect Engineering T2.2 Homojunction Solar Cells T2.3 Heterojunction Solar Cells T2.4 Thin Film and Foil-Based Solar Cells T2.5 Characterisation & Simulation Methods T2.6 Manufacturing & Production				
---	--	--	--	--

<b>3 Thin Film Photovoltaics</b> T3.1 C(G)S, CdTe and Related Thin Film Solar Cells and Modules T3.2 Perovskite, Organic and Dye-Sensitised Device				
--	--	--	--	--

<b>4 Concentrator and Space Photovoltaics</b> T4.1 III-V-Based Devices for Terrestrial and Space Applications				
--	--	--	--	--

<b>5 Performance, Reliability and Sustainability of Photovoltaic Modules and Balance of System Components</b> T5.1 PV Module Performance and Reliability T5.2 Inverters and Balance of System Components T5.3 Sustainability and Recycling				
---	--	--	--	--

<b>6 PV System Performance and Integration</b> T6.1 Solar Resource and Forecasting T6.2 Design and Operation of PV Systems T6.3 Building, Infrastructure and Landscape Applications T6.4 Grid and Energy System Integration				
---	--	--	--	--



## ORAL PRESENTATIONS 1CO.1

08:30 - 10:00 Advanced Materials and Technologies for PV Modules

### Chairpersons:

Jozef Poortmans  
imec, Belgium

Marta Victoria Pérez  
UPM, Spain

### 1CO.1.1 Shingling Technology for Cell Interconnection: Technological Aspects and Process Integration

D. Tonini, M. Bertazzo, A. Fecchio & M. Gializzo  
Applied Materials, Olmi di San Biagio, Italy

### 1CO.1.2 FEM-Based Development of Novel Back-Contact PV Modules with Ultra-Thin Solar Cells

A.J. Beinert & U. Eitner  
Fraunhofer ISE, Freiburg, Germany  
R. Leidl  
AIT, Vienna, Austria  
P.M. Sommeling  
ECN, Petten, The Netherlands  
J. Aktaa  
Karlsruhe Institute of Technology, Germany

### 1CO.1.3 Effects of Tuning the Innovative Additive-Free Silver Paste Formulation for Fine Line Printing and High Efficiency

C. Yüce & N. Willenbacher  
Karlsruhe Institute of Technology, Germany  
A. Grumbach & M. König  
Heraeus, Hanau, Germany  
F. Clement, M. Linse & M. Pospischil  
Fraunhofer ISE, Freiburg, Germany

### 1CO.1.4 TPedge: Progress on Cost-Efficient and Durable Edge-Sealed PV Modules

M. Mittag & U. Eitner  
Fraunhofer ISE, Freiburg, Germany  
T. Neff  
Bystronic, Neuhausen, Germany

### 1CO.1.5 How Cell Texturing Impacts Annual Yield of Solar Modules and the Role of Module Embedding

I. Haedrich, A. Thomson, M. Ernst & D. Macdonald  
ANU, Canberra, Australia  
P. Zheng, X. Zhang & H. Jin  
Jinko Solar, Haining, China

### 1CO.1.6 New Chemical Functionalization Concept for Anti-Reflective and Anti-Soiling Front Glass of PV Modules Based on Surface Structuring and Modification

C. Pfau, K. Ilse, J. Schneider, M. Turek, P. Miclea & C. Hagendorf  
Fraunhofer CSP, Halle, Germany  
P. Zabek & W. Szczepanik  
DA Glass, Rzeszów, Poland

## ORAL PRESENTATIONS 5CO.5

08:30 - 10:00 Performance Enhancing Coatings and Outdoor Performance

### Chairpersons:

Mike Van Iseghem  
EDF R&D, France

Sener Oktik  
Sisecam, Turkey

### 5CO.5.1 High-Performance AR Coating on Glass Applied Using High-Pressure Molding

J. Jong & E. Brouwer  
TOWA Europe, Duiven, The Netherlands  
V. Rosca, A.R. Burgers, A.J. Carr & L.A.G. Okel  
ECN, Petten, The Netherlands

### 5CO.5.2 PV Module Sand Abrasion Testing

G. Mathiak, N. Pfeiffer, L. Rimmelspacher, W. Herrmann, F. Reil & J. Althaus  
TÜV Rheinland Energy, Cologne, Germany  
C. Holze  
toughrough, Bremen, Germany  
A. Morlier  
ISFH, Emmerthal, Germany

### 5CO.5.3 Evaluation of Antireflection and Antisoiling Coatings for PV Modules in the Atacama Desert

D. Diaz Almeida, F. Araya & P. Ferrada  
University of Antofagasta, Chile  
A. Sanz Martinez  
Tecnalia Research & Innovation, Derio, Spain  
N. Yurrita & O. Zubillaga  
Tecnalia, San Sebastian, Spain

### 5CO.5.4 Estimation of Soiling Rates from PV Modules in the Desert Climate of Dubai

J.J. John, A. Elnosh, A. Safieh, A. Almheiri, M. Stefancich & P. Banda  
Dubai Electricity and Water Authority, United Arab Emirates

**5CO.5.5 Performance and Reliability of Photovoltaic Modules in Desert Environment**

A.A. Abdallah, A. Abotaleb, M. Houchati & M. Buffière  
QEERI, Doha, Qatar

**5CO.5.6 Long Term Statistics over 6 Years on Micro Cracks and Their Impact on Performance**

J. Arp  
PV Lab, Potsdam, Germany  
B. Jaeckel  
UL International, Neu-Isenburg, Germany

**ORAL PRESENTATIONS 2CO.9**

**08:30 - 10:00 Production Technologies for Silicon Solar Cells**

**Chairpersons:**

Axel Metz  
Germany

Adrien Danel  
CEA, France

**2CO.9.1 Pilot Production of High Efficient MCT Textured DWS mc-Si Solar Cell and Nickel-Copper Plated Front Contacts**

D. Pysch, J. Burschik, N. Bay, W. Dümpelfeld, H. Kühnlein,  
M. Passig, M. Sieber, K. Vosteen & K. Vosteen  
RENA, Freiburg, Germany  
B. Lee & A. Letize  
MacDermid, Waterbury, United States

**2CO.9.2 Development and Optimization of a Novel Inline Black Silicon Texturing Process for Increased Solar Cell Performance**

W. Jooss, I. Melnyk, A. Teppe, T. Werling, O. Voigt,  
F. Binaie Masouleh & P. Fath  
RCT-Solutions, Konstanz, Germany  
B. Hu, Q. Zhang & P. Tian  
RCT Automation Equipment, Suzhou, China  
X. Gou, W. Fan, S. Zhou, Q. Huang, J. Huang & X. Zhang  
CECEP Solar Energy Technology, Zhenjiang, China

**2CO.9.3 High Throughput Printing for Highly Efficient Cost-Effective Si Solar Cells**

F. Clement, A. Lorenz, M. Pospischil, D. Biro & R. Preu  
Fraunhofer ISE, Freiburg, Germany  
H. Brocker, D. Bangel, R. Greutmann & M. Lehner  
Gallus Ferd. Rüesch, St. Gallen, Switzerland  
T. Ott, F. Hage, K. Oppelt, T. Honold & L. Wende  
ASYS, Dornstadt, Germany  
A. Senne  
ContiTech, Northeim, Germany  
J. Rohde  
Zecher, Paderborn, Germany

**2CO.9.4 Production-Compatible Regeneration of Boron-Doped Czochralski-Silicon in a Combined Fast-Firing and Regeneration Belt-Line Furnace**

D.C. Walter, V. Steckenreiter & J. Schmidt  
ISFH, Emmerthal, Germany  
T. Pernau  
centrotherm photovoltaics, Blaubeuren, Germany

**2CO.9.5 In-Line Capable Ultrafast Regeneration Process for Preventing Light Induced Degradation of Boron Doped p-Type Cz-Si PERC Solar Cells**

A.A. Brand, K. Krauß, S. Gutscher, S. Roder, S. Rein & J. Nekarda  
Fraunhofer ISE, Freiburg, Germany

**2CO.9.6 Mass Production of Q.ANTUM Solar Cells and Modules on p-Type Cz Silicon Substrates**

F. Fertig, R. Lantzsch, A. Mohr, M. Schaper, F. Kersten,  
S. Bordihn, M. Bartzsch, D. Wissen, A. Mette, S. Peters,  
A. Eidner, M. Schütze, J. Cieslak, K. Duncker,  
M. Junghänel, E. Jarzembowski, M. Kauert, S. Geißler,  
S. Hörnlein, C. Klenke, L. Niebergall, A. Schönmann,  
A. Weihrauch, A. Hofmann, T. Rudolph, A. Schwabedissen,  
J.W. Müller & D.J.W. Jeong  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany

**ORAL PRESENTATIONS 6CO.13**

**08:30 - 10:00 Bifacial and Shaded System Performance**

**Chairpersons:**

Khalid Radouane  
EDF EN, France

Robert P. Kenny  
European Commission JRC, Italy

**6CO.13.1 Data Analysis for Effective Monitoring of Partially Shaded Photovoltaic Systems**

O. Tsafarakis & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands  
K. Sinapis  
ECN, Eindhoven, The Netherlands

**6CO.13.2 Effects of Combining Shading Analysis and the Unique I-V Characteristics of the PV Module**

R. Herrero Alonso, R. Silva Simplicio, C. Biasi de Moura,  
A. Alves Myazaki & M. Knörich Zuffo  
University of São Paulo, Brazil

**6CO.13.3 Outdoor Field Performance from Bifacial Photovoltaic Modules and Systems**

J.S. Stein, D.S. Riley, M. Lave & C.W. Hansen  
Sandia National Laboratories, Albuquerque, United States  
C. Deline  
NREL, Golden, United States  
F. Toor  
University of Iowa, United States

**6CO.13.4 Performances Estimation of Bifacial PV Modules: A Simulation Approach through Both Physical and Semi-Empirical Math Models and Its Validation Using a Real Bifacial Plant Data**

M. Catena, I. Cascone, C. Lo Piano & M. Carbone  
ENEL, Rome, Italy

**6CO.13.5 Bifacial Performance Assessment with One Simulation Tool in Development, and One Monitored 50 KWc Outdoor Power Plant Demonstrator**

E. Pilat, J. Sayritupac, H. Colin, F. Haffner & Y. Veschetti  
CEA, Le Bourget du Lac, France

**6CO.13.6 Simulation Resolution of PV System Partial Shading Studies**

K. Lappalainen & S. Valkealahti  
Tampere University of Technology, Finland

**VISUAL PRESENTATIONS 3CV.1**

**08:30 - 10:00** **CI(G)S, CdTe and Related Thin Film Solar Cells and Modules (I)**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**NOTES**

.....  
.....  
.....  
.....  
.....  
.....  
.....

**PLENARY SESSION 3CP.1**

**10:30 - 12:00** **Thin Film PV: Pushing the Limits with Breakthroughs in Industry and Research**

**Chairpersons:**

Ayodhya Nath Tiwari  
EMPA, Switzerland

Sjoerd Veenstra  
ECN, The Netherlands

**3CP.1.1 Keynote: Present Status of Solar Frontier Cu(In,Ga)(Se,S)2 Record Efficiencies and Overall Progress**

V. Bermudez, K.F. Tai, J.-L. Wu, A. Handa, T. Yagioka,  
H. Sugimoto & T. Kato  
Solar Frontier, Atsugi, Japan

**3CP.1.2 17% Total Area Efficiency at Commercial Size CIGS Module**

P. Kratzert, S. ten Haaf, S. Hartnauer, S. Jander, R. Hunger,  
M. Vogl & S. Weeke  
Solibro Hi-tech, Bitterfeld-Wolfen, Germany  
O. Lundberg, E. Wallin, V. Gusak, S. Lotfi, U. Malm,  
T. Jarmar, L. Stolt & J. Mathiasson  
Solibro Research, Uppsala, Sweden

**3CP.1.3 Enhancements to CdTe Cell Efficiency**

J.R. Sites, A. Munshi, J. Kepar, D. Swanson, A. Moore &  
W. Sampath  
Colorado State University, Fort Collins, United States

**3CP.1.4 Progress with Perovskite/Silicon and All-Perovskite Tandem Solar Cells**

M.A. Green & A.W.Y. Ho-Baillie  
UNSW Australia, Sydney, Australia

**NOTES**

.....  
.....  
.....  
.....  
.....  
.....  
.....

PROGRAMME

PROGRAMME

ORAL PRESENTATIONS 1CO.2

13:30 - 15:00 **New Materials and Advanced Applications for Photovoltaics**

Chairpersons:

Ignacio Antón  
UPM, Spain

Jens Schneider  
Fraunhofer CSP, Germany

**1CO.2.1 Low-Cost Large-Area Graphene Layer Deposition for Transparent Conducting Electrodes in Photovoltaics**

G. Jia, J. Plentz, J. Dellith, A. Dellith & G. Andrä  
IPHT, Jena, Germany

**1CO.2.2 Solar-Driven Water Splitting: 14.2% Stable Solar-to-Fuel Conversion Efficiency Using Silicon Heterojunction Solar Cells**

J.-W. Schüttauf, A. Faes, M. Despeisse, C. Ballif & J. Bailat  
CSEM, Neuchâtel, Switzerland  
M.A. Modestino, E. Chinello, D. Psaltis & C. Moser  
EPFL, Lausanne, Switzerland

**1CO.2.3 Fabrication and Characterization of White-Light Solar Windows Based on a Glass Waveguide Plate**

G. Lee & M. Shin  
Korea Aerospace University, Goyang, Korea South  
G.Y. Lee & H. Ko  
KIST, Seoul, Korea South

**1CO.2.4 Combined Interconnection and Lamination of Bifacial Busbarless Cells through Woven Wiring**

T. Borgers, J. Govaerts, E. Voroshazi, J. Szlufcik & J. Poortmans  
imec, Leuven, Belgium  
J. D'Haen & P. Nivelle  
imomec, Leuven, Belgium

**1CO.2.5 Co-Extrusion of a Novel Multilayer Photovoltaic Backsheet Based on Polyamide-Ionomer Alloy Skin Layers**

C. Thellen, A. Rothacker, R. Davis & D. Santoleri  
Tomark-Worthen, Nashua, United States

**1CO.2.6 Using Photovoltaic Concepts to Improve the Back Surface Field of an Amorphous Silicon Carbide (a-SiC:H) Photocathode**

P. Perez Rodriguez, I. Digdaya, A. Mangel Raventos, R. Vasudevan, M. Zeman, W. Smith & A.H.M. Smets  
Delft University of Technology, The Netherlands

ORAL PRESENTATIONS 5CO.6

13:30 - 15:00 **Potential Induced Degradation, Light & Elevated Temperature Induced Degradation and Partial Shading Effects on PV Modules**

Chairpersons:

Roland Einhaus  
Apollon Solar, France

Christos Monokroussos  
TÜV Rheinland, China

**5CO.6.1 Voltage Dependence of Potential-Induced Degradation and Recovery on Photovoltaic One-Cell Laminates**

J. Carolus & M. Daenen  
Hasselt University, Belgium  
J. Govaerts, E. Voroshazi & W. De Ceuninck  
imec, Leuven, Belgium

**5CO.6.2 Investigation of Correlation between Field Performance and Indoor Acceleration Measurements of Potential Induced Degradation (PID) for c-Si PV Modules**

Y. Chen, Z. Wang, P.P. Altermatt, Z. Feng & P.J. Verlinden  
Trina Solar Energy, Changzhou, China  
K. VanSant  
Colorado School of Mines, Golden, United States  
C. Deline, P. Hacke & S.R. Kurtz  
NREL, Golden, United States  
Y.S. Khoo, W. Luo, J. Chai, Y. Wang & A.G. Aberle  
SERIS, Singapore

**5CO.6.3 Potential-Induced Degradation of Photovoltaic Modules Composed of Interdigitated Back Contact Solar Cells Observed in an Actual Photovoltaic System**

T. Ishii  
CREIPI, Yokosuka, Japan  
R. Sato, S. Choi, Y. Chiba & A. Masuda  
AIST, Tosu, Japan

**5CO.6.4 Performance Loss Induced by LeTID in the Field: Experiment and Simulation**

F. Kersten, F. Fertig, K. Petter, B. Klöter, M.B. Strobel & J.W. Müller  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
E. Herzog  
Hanwha Q CELLS, Berlin, Germany  
J. Heitmann  
Freiberg University of Technology, Germany

**5CO.6.5 A Detailed Analysis of Visible Defects Formed in Silicon Thin-Film Modules by Partial Shading**

A. Gerber, C. Zahren, B.E. Pieters & U. Rau  
Forschungszentrum Jülich, Germany  
S.W. Johnson  
NREL, Golden, United States

**5CO.6.6 Shadows from People and Tools Can Cause Permanent Damage in Monolithic Thin-Film Photovoltaic Modules**

T.J. Silverman & I. Repins  
NREL, Golden, United States

**ORAL PRESENTATIONS 2CO.10**

**13:30 - 15:00 c-Si Solar Cell Process Technology**

**Chairpersons:**

Jörg Horzel  
CSEM, Switzerland

Joachim John  
imec, Belgium

**2CO.10.1 Constructing Submicron-Texture on Diamond-Wire-Sawn Multi-Crystalline Silicon Solar Cells via Copper Catalyzed Chemical Etching**

X. Su, J. Zha, T. Wang, C. Pan, K. Chen & F. Hu  
Soochow University, Suzhou, China

**2CO.10.2 Early Efficiency Prediction of Silicon Heterojunction Cells Processed on Thermal Donors-Rich Czochralski Wafers**

J. Veirman, R. Varache, A. Danel, M. Albaric, E. Letty, B. Martel & C. Roux  
CEA, Le Bourget du Lac, France

**2CO.10.3 Towards “Defect-Free” n-Type Emitters Using Oxygen during POCl<sub>3</sub> Diffusion**

H. Li, F.-J. Ma, Z. Hameiri, S.R. Wenham & M. Abbott  
UNSW Australia, Sydney, Australia

**2CO.10.4 Solar Cell Efficiency of 23.3% Reached by Rapid Vapour Direct Diffused Emitter**

S. Kühnhold-Pospischil, A. Richter, B. Steinhauser, M. Drießen, B. Michl, J. Greulich, J. Benick & S. Janz  
Fraunhofer ISE, Freiburg, Germany  
S. Lindekugel  
SICK, Waldkirch, Germany

**2CO.10.5 Charge-Controllable Mg-Doped AlO<sub>x</sub> Passivation Layers for p- and n-Type Silicon**

H. Lee, T. Kamioka, N. Iwata & Y. Ohshita  
TTI, Nagoya, Japan  
F. Nishimura & H. Yoshida  
University of Hyogo, Himeji City, Japan

**2CO.10.6 Laser-Transferred Ni-Seed for the Metallization of Silicon Heterojunction Solar Cells by Cu-Plating**

A. Rodofili, R. Rohit, J. Becerra, F. Al-Falahi, G. Cimiotti, W. Wolke, L. Kroely, M. Bivour, J. Bartsch, M. Glatthaar & J.-F. Nékarda  
Fraunhofer ISE, Freiburg, Germany

**ORAL PRESENTATIONS 6CO.14**

**13:30 - 15:00 Design of PV Plants & Hybrid Systems and Their Applications**

**Chairpersons:**

Nigel Taylor  
European Commission JRC, Italy

Stephen Koopman  
CSIR, South Africa

**6CO.14.1 La Silla PV Plant as a Utility-Scale Side-by-Side Test for Innovative Modules Technologies**

A. Di Stefano, G. Leotta & F. Bizzarri  
ENEL Green Power, Catania, Italy

**6CO.14.2 Validation Study of Solar PV Energy Simulation Tools and Methodologies**

M. Aspinall  
Prevailing Analysis, Bristol, United Kingdom

**6CO.14.3 Managing Technical Risks in PV Investments – How to Quantify the Impact of Risk Mitigation Measures for Different PV Project Phases?**

U. Jahn & M. Herz  
TÜV Rheinland Energy, Cologne, Germany  
D. Moser & G. Belluardo  
Eurac Research, Bolzano, Italy  
M. Richter  
3E, Brussels, Belgium

**6CO.14.4 Review of Different Software Solutions for the Holistic Simulation of Distributed Hybrid Energy Systems for the Commercial Energy Supply**

L. Schmeling  
University of Oldenburg, Germany  
P. Klement, B. Hanke, K. von Maydell & C. Agert  
NEXT ENERGY, Oldenburg, Germany  
T. Erfurth & J. Kästner  
KEHAG Energiehandel, Oldenburg, Germany

**6CO.14.5 Advanced Modelling of EIPV Systems from Location to Load**

O. Isabella, R. Caroprese Castro, R. Santbergen & M. Zeman  
Delft University of Technology, The Netherlands

**6CO.14.6 The Impact of PV Penetration on Energy Communities: a UK Domestic Study**

K. Panagiotou, C. Klumpner & M. Sumner  
University of Nottingham, United Kingdom

**VISUAL PRESENTATIONS 2CV.2**

**13:30 - 15:00 Thin Film and Foil-Based Solar Cells / Characterisation & Simulation Methods / Manufacturing & Production**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**NOTES**

.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....  
.....

**ORAL PRESENTATIONS 3CO.3**

**15:15 - 16:45 Materials, Interfaces & Charge Dynamics in Perovskite Solar Cells**

**Chairpersons:**

Brett Kamino  
CSEM, Switzerland

Klaus Jäger  
HZB, Germany

**3CO.3.1 Atomic Layer Deposition Processing for Perovskite Solar Cells: Opportunities and Challenges**

Y. Kuang, D. Koushik, R.J. van Gils, W.M.M. Kessels & M. Creatore  
Eindhoven University of Technology, The Netherlands  
V. Zardetto  
Solliance, Eindhoven, The Netherlands  
R.E.I. Schropp  
University Utrecht, The Netherlands

**3CO.3.2 Contact Passivation for Efficient and Stable Low-Temperature-Processed Planar Perovskite Solar Cells**

H. Tan, A. Jain, O. Voznyy, S. Hoogland & E.H. Sargent  
University of Toronto, Canada

**3CO.3.3 Long-Lived Carriers Found in Double Metal Perovskite Cs<sub>2</sub>AgBiBr<sub>6</sub> Single Crystals by TRMC**

D. Bartesaghi & T. Savenije  
Delft University of Technology, The Netherlands  
A. Slavney & H. Karunadasa  
Stanford University, United States

**3CO.3.4 Anharmonicity and Dielectric Properties in Hybrid and Inorganic Perovskite Materials Used for Photovoltaics Applications**

A. Marrognier, H. Lee, D. Tondelier, B. Geffroy, J.-E. Bouree & Y. Bonnassieux  
CNRS, Palaiseau, France  
C. Eypert & J.P. Gaston  
HORIBA, Palaiseau, France  
G. Roma  
University of Paris Saclay, France

**3CO.3.5 Determination of Charge Transport Properties and Their Limiting Factors in Hybrid Perovskite Photovoltaic Devices via Time-Resolved Photocurrent Studies**

I. Grill, M. Aygüler, N. Giesbrecht, T. Bein, P. Docampo, N.F. Hartmann, M. Handloser & A. Hartschuh  
LMU Munich, Germany

**3CO.3.6 Enhanced Environmental Stability of ZnO Film Based Planar Perovskite Solar Cells by Suppressing Photocatalytic Decomposition**

S. Li, P. Zhang, Y. Wang, D. Liu, Z. Wang & Z.D. Chen  
UESTC, Chengdu, China  
J. Wu  
University College London, United Kingdom

**ORAL PRESENTATIONS 5CO.7**

**15:15 - 16:45 Bifacial Characterisation, Energy Rating and Yield Prediction**

**Chairpersons:**

Hartmut Nussbaumer  
ZHAW, Switzerland

Ralph Gottschalg  
Loughborough University, United Kingdom

**5CO.7.1 Single-Side Versus Double-Side Illumination Method I-V Characterization for Bifacial PV Modules under Different Irradiances and Temperatures**

S. Roest, W. Nawara & E. Garcia Goma  
Eternal Sun, The Hague, The Netherlands

**5CO.7.2 Electrical Performance of Bifacial PV Modules – Comparative Measurements of Market-Ready Products**

M. Schweiger & W. Herrmann  
TÜV Rheinland Energy, Cologne, Germany

**5CO.7.3 Comparison of Electrical Performance of Bifacial Silicon PV Modules**

J. Lopez-Garcia & T. Sample  
European Commission JRC, Ispra, Italy

**5CO.7.4 Progress in Energy Rating Standards: Accuracy and Optimisation**

J.C. Blakesley  
National Physics Laboratory, Teddington, United Kingdom  
T. Huld & H. Müllejans  
European Commission JRC, Ispra, Italy

**5CO.7.5 Energy Rating of Commercial c-Si PV-Modules in Accordance with IEC 61853-1,-2 and Impact on the Annual Energy Yield**

C. Monokroussos, X.Y. Zhang, D. Etienne, S. ChanKam, A. Zhou, V. Feng, Y. Zhang & C. Zou  
TÜV Rheinland, Shanghai, China  
M. Schweiger  
TÜV Rheinland, Cologne, Germany

**5CO.7.6 A Systematic Comparison of >7 Empirical Models Used for Energy Yield Predictions vs PV Technology**

S. Ransome  
Steve Ransome Consulting, Kingston upon Thames, United Kingdom

**ORAL PRESENTATIONS 2CO.11**

**15:15 - 16:45 c-Si Homojunction Cells**

**Chairpersons:**

Arthur W. Weeber  
ECN, The Netherlands

Jörg Müller  
Hanwha Q CELLS, Germany

**2CO.11.1 Key Aspects for Fabrication of p-Type Cz-Si PERC Solar Cells Exceeding 22% Conversion Efficiency**

S. Werner, E. Lohmüller, P. Saint-Cast, J.M. Greulich, J. Weber, S. Maier, A. Moldovan, A.A. Brand, T. Dannenberg, S. Mack, S. Wasmer, M. Demant, M. Linse, R. Ackermann, A. Wolf & R. Preu  
Fraunhofer ISE, Freiburg, Germany

**2CO.11.2 Formation of Cu-Containing Precipitates at mc-LID Sensitive mc-PERC Cells**

T. Luka, M. Turek, S. Großler & C. Hagendorf  
Fraunhofer CSP, Halle, Germany

**2CO.11.3 Bifacial p-Type PERL Solar Cells with Screen-Printed Pure Ag Metallization and 89% Bifaciality**

E. Lohmüller, S. Werner, M.H. Norouzi, S. Mack, M. Demant, S. Gutscher, P. Saint-Cast, M. Hermle & A. Wolf  
Fraunhofer ISE, Freiburg, Germany  
B. Bitnar, P. Palinginis & H. Neuhaus  
SolarWorld Innovations, Freiberg, Germany  
M. König  
Heraeus, Hanau, Germany

**2CO.11.4 Research of Industrial High Efficiency n-Type Solar Cell with Selective Back Surface Field Process**

D. Liu, Z. Wang, J. Zhai, F. Li, J. Shi & D. Song  
Yingli Green Energy, Baoding, China

**2CO.11.5 Large-Area (6 Inch) Screen-Printed IBC Solar Cells with Efficiency Approaching 24% without Passivated Contacts**

G. Xu, Y. Yang, X. Zhang, S. Chen, W. Liu, Y. Chen, Y. Chen, P.P. Altermatt, P.J. Verlinden & Z. Feng  
Trina Solar Energy, Changzhou, China

**2CO.11.6 Quantification of pn-Junction Recombination in Industrial Interdigitated Back-Contact Solar Cells**

B.W.H. van de Loo & W.M.M. Kessels  
Eindhoven University of Technology, The Netherlands  
P. Spinelli & I. Cesar  
ECN, Petten, The Netherlands  
A.H.G. Vlooswijk  
Tempress, Vaassen, The Netherlands

**ORAL PRESENTATIONS 6CO.15**

**15:15 - 16:45 Innovative O&M and Inspection Methods and Safety Aspects**

**Chairpersons:**

Felice Montanari  
ENEL Green Power, Italy

Gerhard Mütter  
Alternative Energy Solutions, Austria

**6CO.15.1 Field Testing of Portable LED Flasher for Nominal Power Measurements of PV-Modules On-Site**

R. Knecht, F.P. Baumgartner & F. Carigiet  
ZHAW, Winterthur, Switzerland  
C. Frei & F. Beglinger  
Electrosuisse, Fehraltorf, Switzerland  
W. Zaaïman, D. Pavanello, M. Field, R. Galleano & T. Sample  
European Commission JRC, Ispra, Italy

**6CO.15.2 Dynamic IV Analysis System for Diagnosis of PV-Module Strings in a Large Scale PV-Power Plant**

M. Vervaart, S. Lespinats & F. Al Shakarchi  
CEA, Le Bourget du Lac, France

**6CO.15.3 Automated Multi-Megawatt PV Plant Thermal Inspection Process Development & Implementation**

A. Padros, E. Guelbenzu Michelena, M. de la Parra & M. Tirapu  
Acciona Energía, Sarriguren, Spain

**6CO.15.4 Implementation of a Friendly Daylight Electroluminescence System for the Inspection of Solar PV Panels**

M. Guada, A. Moretón, S. Rodríguez-Conde, O. Martínez, M.A. González, J. Jiménez & J. Pérez  
UVa, Valladolid, Spain  
M. Martínez, J.A. Florez, F. Domínguez, A. Velasco, L. Perez & V. Parra  
Enertis Solar, Madrid, Spain

**6CO.15.5 Digital Plant Lifecycle Record – A New Standard for Efficient PV O&M**

C. Bertsch-Engel  
CEE Operations, Hamburg, Germany

**6CO.15.6 NEC2017 Rapid Shutdown: Useful Safety Feature or Unnecessary Nuisance?**

D. Gfeller, J. Wälten, U. Muntwyler, C. Renken & M. Rutschi  
BUAS, Burgdorf, Switzerland

**VISUAL PRESENTATIONS 1CV.3**

**15:15 - 16:45 Fundamental Studies / New Materials and Concepts for Cells and Modules**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**ORAL PRESENTATIONS 3CO.4**

**17:00 - 18:30 Processing and Upscaling of Perovskite Solar Cells and Modules**

**Chairpersons:**

Giorgio Bardizza  
European Commission JRC, Italy

Hairen Tan  
University of Toronto, Canada

**3CO.4.1 Scaling Limits to Large Area Perovskite Solar Cell Efficiency**

B.M.W. Wilkinson, M.A. Green & A.W.Y. Ho-Baillie  
UNSW Australia, Sydney, Australia

**3CO.4.2 Laser-Patterning Engineering for Perovskite Solar Modules with 95% Aperture Ratio**

A.L. Palma, F. Matteocci, A. Agresti, S. Pescetelli, E. Calabrò, L. Vesce & A. Di Carlo  
University of Rome II, Italy  
G. Mincuzzi  
ALPHANOV, Talence, France  
S. Christiansen  
MPI, Erlangen, Germany  
M. Schmidt  
University of Erlangen-Nuremberg, Germany



**3CO.4.3 NIR-Transparent Flexible Perovskite Solar Cells: All-Laser Scribed Mini-Modules Fabricated by Large-Area Scalable Deposition Methods**

S. Pisoni, F. Fu, T. Feurer, A.N. Tiwari & S. Buecheler  
EMPA, Dübendorf, Switzerland  
R. Ziltener  
Flisom, Dübendorf, Switzerland

**3CO.4.4 High Efficiency Perovskite Solar Modules Using a Low-Cost Nanosecond Pulse-Laser Ablation in All P1-P3 Processes**

K.-Y. Tian & W.-F. Su  
NTU, Taipei, Taiwan  
C.-P. Hsu & H.-C. Liao  
Frontmaterials, Taipei, Taiwan

**3CO.4.5 From Sheet-to-Sheet to Roll-to-Roll Production of High Efficiency Flexible Perovskite Solar Cells**

F. Di Giacomo, Y. Galagan, S. Shanmugam, G. Kirchner,  
H. Gorter, I. de Vries, H. Lifka,  
P. Groen & R.A.J.M. Andriessen  
TNO, Eindhoven, The Netherlands  
M. Dörenkämper  
ECN, Petten, The Netherlands  
W. Qiu, T. Aernouts & S.C. Veenstra  
imec, Leuven, Belgium

**3CO.4.6 Integration of Established Back-End Processing Steps to Perovskite Solar Cells for Scale Up**

B. Kamino, S.-J. Moon, A. Walter, L. Löfgren, D. Sacchetto,  
G. Cattaneo, J. Levrat, N. Badel, A. Faes, M. Despeisse,  
J. Bailat, S. Nicolay & C. Ballif  
CSEM, Neuchâtel, Switzerland  
J. Werner, F. Sahil, M. Bräuniger & B. Niesen  
EPFL, Neuchâtel, Switzerland  
S. Narbey, F. Oswald & D. Martineau  
Solaronix, Aubonne, Switzerland

NOTES

.....  
.....  
.....  
.....  
.....

**ORAL PRESENTATIONS 5CO.8**

**17:00 - 18:30 Accelerated Testing and Imaging Techniques**

**Chairpersons:**

Ulrike Jahn  
TÜV Rheinland Energy, Germany

Eszter Voroshazi  
imec, Belgium

**5CO.8.1 Characterization of Adhesion in Flexible PV Modules Using the Climbing Drum Peel Test Method**

V. Bheemreddy & K. Hardikar  
MiaSolé, Santa Clara, United States

**5CO.8.2 Performance Analysis of Pre-Cracked PV-Modules at Realistic Loading Conditions**

C. Buerhop-Lutz, T. Winkler, F.W. Fecher, C. Camus,  
J. Hauch & C.J. Brabec  
ZAE Bayern, Erlangen, Germany  
A. Bemm  
Allianz Risk Consulting, Munich, Germany

**5CO.8.3 Experimental Investigation of Sensitivities Regarding the In-Laminate Fatigue of Solar Cell Interconnectors**

M. Pander, S. Dietrich & R. Meier  
Fraunhofer CSP, Halle, Germany

**5CO.8.4 Degradation Behavior with Acetic Acid in Crystalline Silicon Photovoltaic Cells**

T. Tanahashi, Y. Hara & A. Masuda  
AIST, Tsukuba, Japan

**5CO.8.5 Quantification of Solar Cell Failure Signatures Based on Statistical Analysis of Electroluminescence Images**

S.V. Spataru & D. Sera  
Aalborg University, Denmark  
P. Hacke  
NREL, Golden, United States

**5CO.8.6 Non-Destructive Evaluation of Delamination in Photovoltaic Module by Thermography**

A. Sinha, H. Mohammed Niyaz & R. Gupta  
IIT Bombay, Mumbai, India

**ORAL PRESENTATIONS 2CO.12**

**17:00 - 18:30 Thin Film and Foil-Based Silicon Solar Cells**

**Chairpersons:**

Paola Delli Veneri  
ENEA, Italy

Julio Cárabe  
CIEMAT, Spain

**2CO.12.1 EU PVSEC Student Award Winner Presentation: Quadruple-Junction Thin-Film Silicon Solar Cells Using Four Different Absorber Materials**

F.T. Si, H. Tan, D.Y. Kim, G. Yang, R. Santbergen, R.A.C.M.M. van Swaaij, A.H.M. Smets, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands

**2CO.12.2 Solar Cells on < 50µm Thick Epitaxial Foils Conductively Bonded to Low-Cost Si Carrier**

H. Sivaramakrishnan Radhakrishnan, T. Bearda, K. Van Nieuwenhuysen & I. Gordon  
imec, Leuven, Belgium  
N. Bednar & N. Adamovic  
Vienna University of Technology, Austria  
R. Roozeman & J. Heikkinen  
INKRON, Espoo, Finland  
A. Ulyashin & M. Syvertsen  
SINTEF, Oslo, Norway

**2CO.12.3 Smart Applications of Textiles with Amorphous Silicon Thin Film Solar Cells: Energy Harvesting and Safety Sensors**

J. Plentz, U. Brückner, D. Müller, A. Gawlik & G. Andrä  
IPHT, Jena, Germany

**2CO.12.4 Texturing of 50-um Thin Epitaxial Foils with Minimal Silicon Removal and High Reflectance**

A. Umer, K. Van Nieuwenhuysen, T. Bearda, S. Jambaldinni, J. John, M. Haslinger, H. Sivaramakrishnan Radhakrishnan, V. Depauw, M. Filipic, A. Razzaq, M. Xu, I. Gordon, M. Debucquoy & J. Poortmans  
imec, Leuven, Belgium

**2CO.12.5 Development of Liquid Phase Crystallized Silicon Thin Film Modules**

S. Kühnapfel, T. Frijnts, H. Rhein, Z. Müller-Karpe & S. Gall  
HZB, Berlin, Germany

**2CO.12.6 Color Controllability and Improved Performance of a-Si:H Transparent Solar Cells by Regulating the Conditions of Al<sub>2</sub>O<sub>3</sub> Passivation Films**

J.-W. Lim, G. Kim & S.J. Yun  
ETRI, Daejeon, Korea South  
M. Shin  
Korea Aerospace University, Seoul, Korea South

**ORAL PRESENTATIONS 6CO.16**

**17:00 - 18:30 PV Energy System Integration within the Building**

**Chairpersons:**

Franz P. Baumgartner  
ZHAW, Switzerland

Kristian Peter  
ISC Konstanz, Germany

**6CO.16.1 Analysing the Effect of PV System Size and Battery Storage Capacity on the Self-Sufficiency Degree and Self-Consumption Ratio for Different Consumers**

M. Basappa Ayanna, T. Bischof-Niemz, P. Klein & S. Koopman  
CSIR, Pretoria, South Africa

**6CO.16.2 Synthesizing Residential Load Profiles Using Behavior Simulation**

N. Pflugradt & U. Muntwyler  
BUAS, Burgdorf, Switzerland

**6CO.16.3 Evaluation of the Performance of Household Li-Ion Battery Storage Systems and Their Impact on Profitability**

N. Munzke, B. Schwarz, F. Büchle & J. Barry  
Karlsruhe Institute of Technology,  
Eggenstein-Leopoldshafen, Germany

**6CO.16.4 Grid-Relieving Effects of PV Battery Energy Storage Systems with Optimized Operation Strategies**

G. Angenendt, S. Zurmühlen, J. Badeda & D.U. Sauer  
RWTH Aachen University, Germany

**6CO.16.5 Identifying Risks, Costs and Lessons from ARENA-Funded off-Grid Renewable Energy Projects in Regional Australia**

B. Herteleer & L. Frearson  
CAT Projects, Alice Springs, Australia  
A. Dobb, O. Boyd & S. Rodgers  
ARENA, Canberra, Australia

**6CO.16.6 Impact of Self-Consumption on Integration of Photovoltaics in Martinique: Simulation Results from the Insolations Project**

F. Bourry, F. Al Shakarchi & N. Martin  
 CEA, Le Bourget du Lac, France  
 S. Darivon & L. Bellemare  
 AME, Ducos, Martinique

**VISUAL PRESENTATIONS 4CV.4**

**17:00 - 18:30 III-V-Based Devices for Terrestrial and Space Applications**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**EU PVSEC Dinner**

**NOTES**

.....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....

**5DP.1**  
**Main Auditorium**  
 10:10

Break

**6DP.2**  
**Main Auditorium**  
 12:00

Lunch

<b>2DO.1</b> T2.3 Main Audit.	<b>4DO.4</b> T4.1 Audit. G102-103	<b>3DO.7</b> T3.2 Audit. G104-105	<b>6DO.10</b> T6.3 Audit. Emerald	<b>7DV.1</b> T7.1/2 Poster Area
-------------------------------------	---	---	---	---------------------------------------

Break

<b>2DO.2</b> T2.3/2 Main Audit.	<b>5DO.5</b> T5.2 Audit. G102-103	<b>7DO.8</b> T7.1 Audit. G104-105	<b>6DO.11</b> T6.3 Audit. Emerald	<b>3DV.2</b> T3.1/2 Poster Area
---------------------------------------	---	---	---	---------------------------------------

Break

<b>2DO.3</b> T2.3 Main Audit.	<b>6DO.6</b> T6.1 Audit. G102-103	<b>7DO.9</b> T7.1 Audit. G104-105	<b>6DO.12</b> T6.3 Audit. Emerald	<b>5DV.3</b> T5.1/2/3 Poster Area
-------------------------------------	---	---	---	---

**2 Silicon Photovoltaics**  
 T2.1 Feedstock, Crystallisation, Wafering, Defect Engineering  
 T2.2 Homojunction Solar Cells  
 T2.3 Heterojunction Solar Cells  
 T2.4 Thin Film and Foil-Based Solar Cells  
 T2.5 Characterisation & Simulation Methods  
 T2.6 Manufacturing & Production

**3 Thin Film Photovoltaics**  
 T3.1 CIGS, CdTe and Related Thin Film Solar Cells and Modules  
 T3.2 Perovskite, Organic and Dye-Sensitised Device

**4 Concentrator and Space Photovoltaics**  
 T4.1 III-V-Based Devices for Terrestrial and Space Applications

**5 Performance, Reliability and Sustainability of Photovoltaic Modules and Balance of System Components**  
 T5.1 PV Module Performance and Reliability  
 T5.2 Inverters and Balance of System Components  
 T5.3 Sustainability and Recycling

**6 PV System Performance and Integration**  
 T6.1 Solar Resource and Forecasting  
 T6.2 Design and Operation of PV Systems  
 T6.3 Building, Infrastructure and Landscape Applications  
 T6.4 Grid and Energy System Integration

**7 PV Economics, Markets and Policies**  
 T7.1 PV Economics and Markets  
 T7.2 PV-Related Policies, Strategies and Societal Issues

## PLENARY SESSION 5DP.1

08:30 - 10:10 Performance, Reliability and Sustainability of Photovoltaic Modules and Balance of System Components

### Chairpersons:

Karsten Wambach  
Wambach-Consulting, Germany

Tony Sample  
European Commission JRC, Italy

5DP.1.1 **Keynote: PV Module Performance Characterization – Challenges from Recent Technology Advances and Demands from Energy Yield Perspective**

W. Herrmann  
TÜV Rheinland Energy, Cologne, Germany

5DP.1.2 **Keynote: Qualitative versus Quantitative Reliability Testing of PV - Gaining Confidence in a Rapidly Changing Technology**

S.R. Kurtz  
NREL, Golden, United States

5DP.1.3 **Google's Little Box Challenge and the Development of the True AC-Module**

H. Oldenkamp  
OKE-Services, The Hague, The Netherlands

5DP.1.4 **The Product Environmental Footprint (PEF) of Photovoltaic Modules – Lessons Learned from the Environmental Footprint Pilot Phase on the Way to a Single Market for Green Products in the European Union**

A. Wade  
First Solar, Mainz, Germany  
P. Stolz & R. Frischknecht  
Treeze, Uster, Switzerland  
G. Heath  
NREL, Golden, United States  
P. Sinha  
First Solar, Tempe, United States

## PLENARY SESSION 6DP.2

10:30 - 12:00 PV System Performance and Integration

### Chairpersons:

Peter Lechner  
ZSW, Germany

Heinz Ossenbrink  
Band Gap, Germany

6DP.2.1 **Keynote: Optimal Sizing of Batteries for PV Self-Consumption: Usage for Peak Shaving**

W. Schram & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands

6DP.2.2 **Aesthetics and Performance of PV**

T. Minderhoud  
UNStudio, Amsterdam, The Netherlands

6DP.2.3 **PV Production Forecasting Model Based on Artificial Neural Networks (ANN)**

S. Theocharides, V. Venizelou, G. Makrides & G.E. Georghiou  
University of Cyprus, Nicosia, Cyprus

6DP.2.4 **Predictive Maintenance in Photovoltaic Plants with a Big Data Approach**

A. Betti, F. Ruffini & C. Lanzetta  
I-EM, Livorno, Italy  
M.L. Lo Trovato, F.S. Leonardi & G. Leotta  
ENEL Green Power, Rome, Italy

## ORAL PRESENTATIONS 2DO.1

13:30 - 15:00 c-Si Heterojunction Solar Cells

### Chairpersons:

Delfina Muñoz  
CEA, France

Rutger Schlatmann (i)  
HZB, Germany

2DO.1.1 **High Efficiency Silicon Heterojunction Solar Cells with Improved IR Response**

L.-L. Senaud, G. Christmann, N. Badel, C. Allebé, L. Barraud, A. Descoedres, S. Martin de Nicolàs, J. Geissbühler, B. Paviet-Salomon, S. Nicolay, C. Ballif & M. Despeisse  
CSEM, Neuchâtel, Switzerland

**2DO.1.2 From Advanced Thin-Films Modules to High Efficiency Silicon Heterojunction Technology at 3SUN**

W. Favre, A.-S. Ozanne, D. Muñoz, A. Moustafa, A. Valla, J. Stendera, F. Medlège, M. Fernandes & P.J. Ribeyron  
CEA, Le Bourget du Lac, France  
G. Condorelli, A. Canino, P. Rotoli, A. Battaglia, A. Ragonesi & M. Guercio  
3Sun, Catania, Italy  
C. Gerardi  
ENEL Green Power, Catania, Italy

**2DO.1.3 A New Pilot Research Facility for HJT and Selective Contact Solar Cells – PV-TEC SELECT**

J. Rentsch, A. Moldovan, M. Bivour, F. Feldmann, D. Erath, S. Mack, M. Hermle, S.W. Glunz & R. Preu  
Fraunhofer ISE, Freiburg, Germany

**2DO.1.4 High Efficiency Silicon Heterojunction Solar Cells with Electrodeposited Copper Contacts: Progress in Process Development for Bifacial Cells**

J. Geissbühler, A. Lachowicz, A. Faes, N. Badel, J. Horzel, J. Champiaud, L. Curvat, C. Ballif & M. Despeisse  
CSEM, Neuchâtel, Switzerland  
P. Papet & B. Strahm  
Meyer Burger Research, Hauterive, Switzerland  
J. Hermans  
Meyer Burger, Eindhoven, The Netherlands

**2DO.1.5 Versatile Pilot Line to Support the Heterojunction Solar Cell Industrial Development: Busbar and Busbar-Less Configurations**

R. Varache, A. Danel, S. Harrison, M. van den Bossche, N. Rey, P. Lefillastre, J. Gaume, J. Veirman, A. Bettinelli & C. Roux  
CEA, Le Bourget du Lac, France

**2DO.1.6 Contact Resistance of the p-Type Amorphous Silicon Hole Contact in Silicon Heterojunction Solar Cells**

M. Leilaoui, W. Weigand, P. Muralidharan, D. Vasileska, S. Goodnick & Z.C. Holman  
Arizona State University, Tempe, United States  
M. Boccard  
EPFL, Neuchâtel, Switzerland

**ORAL PRESENTATIONS 4DO.4**

**13:30 - 15:00 III-V-Based Devices for Terrestrial and Space Applications**

**Chairpersons:**

Carla Signorini  
ESA-ESTEC, The Netherlands

Giovanni Flamand  
imec, Belgium

**4DO.4.1 Wafer Integrated Micro-Scale Concentrating Photovoltaics**

T. Gu, L. Li, D. Li & J. Hu  
MIT, Cambridge, United States  
B.H. Jared, G. Keeler, B. Miller, W.C. Sweatt, S.M. Paap, M.P. Saavedra, C. Alford, J. Mudrick & A. Tauke-Pedretti  
Sandia National Laboratories, Albuquerque, United States  
U.K. Das & S. Hegedus  
University of Delaware, Newark, United States

**4DO.4.2 EU PVSEC Student Award Winner Presentation: MBE Growth of 1.7eV AlGaAs Solar Cells on Si Using Dislocation Filters: An Alternative Pathway Toward III-V Si Multijunction Architectures**

A. Onno, J. Wu, M. Tang & H. Liu  
University College London, United Kingdom  
Y. Maidaniuk, M. Benamara, Y.I. Mazur & G.J. Salamo  
University of Arkansas, Fayetteville, United States  
L. Oberbeck  
TOTAL, Paris, France

**4DO.4.3 Development of III-V on Si Multijunction Photovoltaics by Wafer Bonding**

L. Vauche, E. Veinberg Vidal, C. Jany, C. Morales, C. Dupre & P. Mur  
CEA, Grenoble, France  
J. Decobert  
GIE IIIVLab, Palaiseau, France

**4DO.4.4 Measurement of Subcell Capacitance in Multijunction Solar Cells with Pulsed Lasers**

M. Rutzinger, M. Salzberger, H. Nesswetter, A. Gerhard & C.G. Zimmermann  
Airbus, Taufkirchen, Germany  
P. Lugli  
Munich University of Technology, Germany

**4DO.4.5 Analysis of Current Generation in InGaP/GaAs/Ge Triple Junction Solar Cells with Optically Non-Uniform Luminescence Coupling Effect**

B.M.F. Yu Jeco, K. Yoshida, R. Tamaki & Y. Okada  
University of Tokyo, Japan

**4DO.4.6 Solar Powered Vehicles with Static Concentrator Photovoltaics**

T. Masuda, K. Okumura, S. Urabe, Y. Kudo, K. Kimura, T. Nakadoa & A. Sato  
Toyota, Susono, Japan  
K. Araki & M. Yamaguchi  
TTI, Nagoya, Japan

**ORAL PRESENTATIONS 3DO.7**

**13:30 - 15:00 Perovskite-Based Hybrid Tandems**

**Chairpersons:**

Mariadriana Creatore  
Eindhoven University of Technology, The Netherlands

Bart G. Geerligs  
ECN, The Netherlands

**3DO.7.1 The Impact of Local Operating Conditions on the Field Performances of Silicon-Based Tandem Devices**

O. Dupré, J. Cattin, J. Haschke, B. Niesen, M. Boccard & C. Ballif  
EPFL, Neuchâtel, Switzerland  
S. De Wolf  
KAUST, Thuwal, Saudi Arabia

**3DO.7.2 Numerical Optical Optimization of Perovskite-Silicon Tandem Solar Cells**

K. Jäger, M. Werth, L. Mazzarella, S. Calnan, F. Ruske, L. Korte, B. Stannowski, B. Rech & S. Albrecht  
HZB, Berlin, Germany

**3DO.7.3 High Efficiency 4-Terminal Perovskite/c-Si Hybrid Tandem Solar Cells**

D. Zhang, M. Najafi, W. Verhees & S.C. Veenstra  
ECN, Eindhoven, The Netherlands  
V. Zardetto  
TNO, Eindhoven, The Netherlands  
A. Jamodkar  
Delft University of Technology, The Netherlands  
A. Gutjahr, I.G. Romijn, B. Geerligs & A.W. Weeber  
ECN, Petten, The Netherlands  
T. Aernouts  
imec, Leuven, Belgium  
R.A.J.M. Andriessen  
Holst Centre, Eindhoven, The Netherlands

**3DO.7.4 Efficient and Stable NIR-Transparent Perovskite Solar Cells Prepared by Partial Ion Ex-Change Method for All-Thin-Film Tandem Applications**

F. Fu, S. Pisoni, T. Feurer, A. Wäckerlin, S. Nishiwaki, A.N. Tiwari & S. Buecheler  
EMPA, Dübendorf, Switzerland

**3DO.7.5 High-Efficiency 4-Terminal and Monolithic Perovskite / Silicon Tandem Solar Cells**

J. Werner, F. Sahil, M. Bräuniger, R. Monnard, B. Niesen & C. Ballif  
EPFL, Neuchâtel, Switzerland  
B. Kamino, D. Sacchetto, A. Walter, S.-J. Moon, L. Barraud, B. Paviet-Salomon, J. Geissbühler, C. Allebé, M. Despeisse & S. Nicolay  
CSEM, Neuchâtel, Switzerland

**3DO.7.6 EU PVSEC Student Award Winner Presentation: 23.6%-Efficient Monolithic Perovskite/Silicon Tandem Cell**

Z.J. Yu & Z.C. Holman  
Arizona State University, Tempe, United States  
K.A. Bush, A.F. Palmstrom, S.F. Bent & M.D. McGehee  
Stanford University, United States

**ORAL PRESENTATIONS 6DO.10**

**13:30 - 15:00 Photovoltaics and the Building Envelope: Main Issues and Challenges**

**Chairpersons:**

Gabriele C. Eder  
OFI, Austria

Laurent Quittre  
ISSOL, Belgium

**6DO.10.1 BIPV Products Overview for Solar Building Skin**

P. Bonomo, I. Zanetti & F. Frontini  
SUPSI, Canobbio, Switzerland  
M.N. van den Donker, F. Vossen & W. Folkerts  
SEAC, Eindhoven, The Netherlands

**6DO.10.2 Building-Integrated Photovoltaics (BIPV) over the Time – Represented within Competitions**

G. Becker, F. Flade, R. Krippner, B. Schiebelsberger & W. Weber  
SeV Bavaria, Munich, Germany

**6DO.10.3 PV Quality Issues Applying Building Integrated Photo Voltaic (BIPV) on Façade and Roof when Deep Renovating a 50 Years Old Apartment Building**

A. Andersson  
RISE Research Institute of Sweden, Boras, Sweden  
D.-E. Archer  
Emulsionen, Göteborg, Sweden  
Z. Norwood  
Chalmers University of Technology, Göteborg, Sweden

**6DO.10.4 Design of an Autonomous Solar Charging Station for E-Bikes**

R.M.E. Valckenborg, R. Ghotge & W. Folkerts  
SEAC, Eindhoven, The Netherlands

**6DO.10.5 An Architectural Approach for Improving Aesthetics of PV**

L.H. Slooff & J.A.M. Van Roosmalen  
ECN, Petten, The Netherlands  
T. Minderhoud  
UNStudio, Amsterdam, The Netherlands  
T. Sepers  
TS Visuals, Oudkarspel, The Netherlands

**6DO.10.6 Flexible Pneumatic Actuator for PV Solar Tracking Applications**

B. Svetozarevic, J. Hofer, I. Hischier & A. Schlueter  
ETH Zurich, Switzerland

**VISUAL PRESENTATIONS 7DV.1**

**13:30 - 15:00 PV Economics and Markets / PV-Related Policies, Strategies and Societal Issues**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

**ORAL PRESENTATIONS 2DO.2**

**15:15 - 16:45 c-Si Solar Cells with Poly-Si Based pn-Junction**

**Chairpersons:**

Invited

Barbara Terheiden  
University of Konstanz, Germany

**2DO.2.1 Tunnel Oxide Passivated Electron Contacts as Full-Area Rear Emitter of High-Efficiency p-Type Silicon Solar Cells**

A. Richter, J. Benick, R. Müller, F. Feldmann, C. Reichel,  
M. Hermle & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany

**2DO.2.2 Building Blocks for Industrial, Screen-Printed Two Sides-Contacted POLO Cells with Highly Transparent ZnO:Al Layers**

R. Peibst, S. Reiter, Y. Larionova, R. Reineke-Koch & R. Brendel  
ISFH, Emmerthal, Germany  
D. Tetzlaff, J. Krügener & T. Wietler  
Leibniz University of Hannover, Germany  
U. Höhne & J.-D. Kähler  
centrotherm photovoltaics, Hannover, Germany  
H. Mehlich  
Meyer Burger, Hohenstein-Ernstthal, Germany

**2DO.2.3 Optimized IBC c-Si Solar Cells Based on Poly-Si(Ox) Carrier-Selective Passivating Contacts**

G. Yang, P. Procel Moya, Y. Zhang, A.W. Weeber,  
O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands

**2DO.2.4 Interdigitated Back-Contacted Silicon Heterojunction Solar Cells Featuring an Interband Tunnel Junction Enabling Simplified Processing**

B. Paviet-Salomon, N. Badel, G. Christmann, L. Barraud,  
A. Descoedres, J. Geissbühler, A. Faes, S. Nicolay,  
C. Ballif & M. Despeisse  
CSEM, Neuchâtel, Switzerland  
A. Tomasi, Q. Jeangros & J.P. Seif  
EPFL, Neuchâtel, Switzerland  
D. Lachenal & B. Strahm  
Meyer Burger Research, Hauterive, Switzerland  
M. Ledinsky & A. Fejfar  
ASCR, Prague, Czech Republic  
S. De Wolf  
KAUST, Thuwal, Saudi Arabia

**2DO.2.5 Interdigitated Back Contact Silicon Solar Cells Featuring Ion-Implanted Poly-Si/SiOx Passivating Contacts**

C. Reichel, R. Müller, F. Feldmann, A. Richter, M. Hermle & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany

**2DO.2.6 Opto-Electrical Modelling of IBC Solar Cells Based on Poly-Si or Heterojunction Carrier-Selective Passivating Contacts**

P. Procel Moya, G. Yang, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands

## ORAL PRESENTATIONS 5DO.5

15:15 - 16:45 Balance of System Components

### Chairpersons:

Marion Perrin  
CEA, France

Nicola Pearsall  
Northumbria University, United Kingdom

#### 5DO.5.1 Update on Rankings of Conversion Efficiencies and Energy Yield of Micro-Inverters, Including Inverters for Two PV Modules

S. Krauter & J. Bendfeld  
University of Paderborn, Germany

#### 5DO.5.2 Analysis of the Single-Stage Transformerless Boost Grid-Connected Microinverter (STBM) under Partial Shading Conditions

F. Cardoso Melo, L. Sampaio Garcia, L. Carlos de Freitas, E.A.A. Coelho, V.J. Farias & L.C. Gomes de Freitas  
Federal University of Uberlândia, Brazil

#### 5DO.5.3 Verifying Defective PV-Module Recognition by IR-Imaging and Module Optimizers

C. Buerhop-Lutz, T. Pickel, C. Camus, J. Hauch & C.J. Brabec  
ZAE Bayern, Erlangen, Germany  
A. Häring & T. Adamski  
SolarEdge Technologies, Munich, Germany

#### 5DO.5.4 In-Situ Electromagnetic Compatibility Characterization of Three Selected Solar Photovoltaic (PV) Sites in Georgia Power Company Service Territory

P. Keebler  
Electrotek Concepts, Knoxville, United States  
M. Page  
Georgia Power Company, Atlanta, United States

#### 5DO.5.5 Electrical and Thermal Modeling of Junction Boxes

M. Mittag, C. Kutter, S. Hoffmann, A.J. Beinert, T. Zech & M. Ebert  
Fraunhofer ISE, Freiburg, Germany

#### 5DO.5.6 Increasing the Efficiency of Photovoltaic (PV) Batteries through Non-Intrusive Load Monitoring

P. Baumann & A. Heinzlmann  
ZHAW, Winterthur, Switzerland  
P. Held & D. Benyoucef  
HFU, Furtwangen, Germany

## ORAL PRESENTATIONS 7DO.8

15:15 - 16:45 Global PV Economics and Market Trends

### Chairpersons:

Thomas Nordmann  
TNC Consulting, Switzerland

Izumi Kaizuka  
RTS, Japan

#### 7DO.8.1 Solar Photovoltaics Demand for the Global Energy Transition in the Power Sector

C. Breyer, D. Bogdanov, A. Aghahosseini, A. Gulagi, M. Child, N. Ghorbani, A.S. Oyewo, U. Caldera, S. Afanasyeva, J. Farfan & K. Sadovskaia  
Lappeenranta University of Technology, Finland  
L.S.N.S. Barbosa  
University of São Paulo, Brazil  
P. Vainikka  
VTT, Lappeenranta, Finland

#### 7DO.8.2 Levelized Cost of PV Electricity in 2017

C. Kost, T. Schlegl, N. Saad Hussein & S. Philipps  
Fraunhofer ISE, Freiburg, Germany

#### 7DO.8.3 Affordable and Clean Energy: Addressing Project Development Challenges of Utility-Scale Solar PV Plants

S. Benmarraze, C. Ruiz & R. Roesch  
IRENA, Bonn, Germany

#### 7DO.8.4 Improving the Competitiveness of Solar PV with Electricity Storage

E. Vartiainen  
Fortum Growth, Finland  
G. Masson  
Becquerel Institute, Brussels, Belgium  
C. Breyer  
Lappeenranta University of Technology, Finland

#### 7DO.8.5 Simulation of a Tokenized Renewable Energy Certificate Market Using the Ethereum Blockchain

D. Coll-Mayor & A. Castellanos  
Mannheim University of Applied Sciences, Germany



**7DO.8.6 CrowdFundRES: A New Opportunity for Financing Renewable Energy Projects**

S. Caneva, I. Weiss, M. Papapetrou & P. Alonso  
WIP - Renewable Energies, Munich, Germany  
O. Gajda & K. Kohl  
European Crowdfunding Network, Brussels, Belgium  
A. Bergmann & B. Burton  
University of Dundee, United Kingdom  
T. Aschenbeck-Florange, A. Dlouhy & T. Drefke  
Osborne Clarke, Cologne, Germany  
A. de Ferrari & M. Martinoli  
youris.com EEIG, Milan, Italy  
J. Wahlmüller & S. Egger  
GLOBAL 2000, Vienna, Austria  
T. Harwood, R. van Maaren & K. Harder  
Abundance, London, United Kingdom  
S. Müller-Windisch & V. Daoud Henderson  
Green Crowding, Cologne, Germany  
A. Raguét & M.-V. Gauduchon  
Lumo, La Rochelle, France  
L. Pulles, M. de Jong, E. Hünewaldt & S. van Beurden  
Oneplanetcrowd International, Amsterdam, The Netherlands  
C. Arnaud, M. Papoutsi & A. Roesch  
SolarPower Europe, Brussels, Belgium  
S. Wannop, A. Gregory & D. Crockford  
Renewable Energy Generation, Exeter, United Kingdom  
D. Maguire, L. Clifford & R. Kelly  
BNRG Renewables, Dublin, United Kingdom  
C. Rumolino & F. Petit  
VALOREM, Carcassonne, France

**6DO.11.2 Effect of Module Orientation and Batteries on Performance of Building Integrated Photovoltaic Systems**

M. Lovati, L. Maturi & D. Moser  
Eurac Research, Bolzano, Italy

**6DO.11.3 Innovative BIPV-Elements: Optimization of the Interconnection of PV-Active Laminates to Façade Panels**

Y. Voronko, G.C. Eder, S. Felecan & M. Tonnhöfer  
OFI, Vienna, Austria

**6DO.11.4 PVOPTI-Ray: Optimisation of Reflecting Materials and Photovoltaic Yield in an Urban Context**

M. Revesz, A. Schneider & S. Zamini  
AIT, Vienna, Austria  
H. Trimmel, S. Oswald & P. Weihs  
BOKU, Vienna, Austria

**6DO.11.5 OPERASOL@: A Light Photovoltaic Panel with Integrated Connectors**

A. Boulanger, J. Gaume & F. Quesnel  
CEA, Le Bourget du Lac, France  
P. Ruols  
2CA, Belmont-Tramonet, France  
F. Rouby  
2CA, Arlanc, France

**6DO.11.6 Validation of a Façade PV Potential Model Based on LiDAR Data**

S.R. Freitas, J. Segadães & M. Brito  
University of Lisbon, Portugal

**ORAL PRESENTATIONS 6DO.11**

**15:15 - 16:45 Modelling and Optimisation Issues for BIPV**

**Chairpersons:**

Francesco Frontini  
SUPSI, Switzerland

Menno Van Den Donker  
SEAC, The Netherlands

**6DO.11.1 Detailed Modelling of Building Integrated Photovoltaics (BIPV) - From Component and Environmental Data to the System Output**

J. Eisenlohr, H.R. Wilson, C. Ferrara & T.E. Kuhn  
Fraunhofer ISE, Freiburg, Germany

**VISUAL PRESENTATIONS 3DV.2**

**15:15 - 16:45 CI(G)S, CdTe and Related Thin Film Solar Cells and Modules (II) / Perovskite, Organic and Dye-Sensitised Devices**

*Detailed information on this session is presented in the section entitled 'Visual Presentations'.*

## ORAL PRESENTATIONS 2DO.3

17:00 - 18:30 Structures with Poly-Si based High / Low Junction

### Chairpersons:

Jan Schmidt  
ISFH, Germany

Pierre-Jean Ribeyron  
CEA, France

### 2DO.3.1 Approaching 22% Efficiency with Multicrystalline n-Type Silicon Solar Cells

J. Benick, A. Richter, R. Müller, H. Hauser, P. Krenckel,  
S. Riepe, F. Schindler, M.C. Schubert, M. Hermle &  
S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany

### 2DO.3.2 Material Properties of LPCVD Processed n-Type Polysilicon Passivating Contacts and Application in PERPoly Industrial Bifacial Solar Cells

M.K. Stodolny, L.J. Geerligs, G.J.M. Janssen & I. Romijn  
ECN, Petten, The Netherlands  
B.W.H. van de Loo, J. Melskens & W.M.M. Kessels  
Eindhoven University of Technology, The Netherlands  
R. Santbergen & O. Isabella  
Delft University of Technology, The Netherlands  
J. Schmitz  
University of Twente, Enschede, The Netherlands  
M. Lenes & J.R.M. Luchies  
Tempress, Vaassen, The Netherlands

### 2DO.3.3 Evaluation of TOPCon Technology on Large Area Solar Cells

F. Feldmann, B. Steinhäuser, S. Kluska, M. Hermle &  
S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany

### 2DO.3.4 Ultrathin Silicon Oxide: What Makes It Suitable as Interlayer in Passivating Contacts for Silicon Solar Cells?

J. Melskens, J. Palmans, S. Karwal, M. Creatore &  
W.M.M. Kessels  
Eindhoven University of Technology, The Netherlands

### 2DO.3.5 Screen-Printed Metallization for p-Type Poly-Si Passivated Contacts Formed by LPCVD

S. Mack & T. Fellmeth  
Fraunhofer ISE, Freiburg, Germany  
M. Lenes  
Tempress, Vaassen, The Netherlands  
J.R.M. Luchies  
Amtech, Vaassen, The Netherlands

### 2DO.3.6 BBr<sub>3</sub> Emitter Passivation by Ultra-Thin Boron Doped LPCVD Polysilicon Layers

R.C.G. Naber, M. Lenes & J.R.M. Luchies  
Tempress, Vaassen, The Netherlands

## ORAL PRESENTATIONS 6DO.6

17:00 - 18:30 Solar Resource and Forecasting

### Chairpersons:

Wilfried Van Sark  
Utrecht University, The Netherlands

Christos Protopogopoulos  
EEPS, Greece

### 6DO.6.1 PVGIS Version 5: Improvements to Models and Features

T. Huld, I. Pinedo Pascua, A. Gracia Amillo & E. Dunlop  
European Commission JRC, Ispra, Italy

### 6DO.6.2 A New Model for the Calculation of the Diffuse Irradiance from Global Irradiance Time Series

M. Hofmann  
Valentin Software, Berlin, Germany  
G. Seckmeyer  
Leibniz University of Hannover, Germany

### 6DO.6.3 Combine Deep Neural Network and Tree Based Machine Learning Models Using Stacked Generalization to Forecast Hourly Solar Irradiance for Tropical Regions

Z. Dong, L. Zhao, W. Walsh & T. Reindl  
SERIS, Singapore

### 6DO.6.4 Toward Improved Modeling of Spectral Solar Irradiance for Solar Energy Applications

Y. Xie & M. Sengupta  
NREL, Golden, United States

**6DO.6.5 Validation of an All Sky Imager Based Nowcasting System for Industrial PV Plants**

P. Kuhn, B. Nouri, S. Wilbert & C. Prah  
German Aerospace Center, Tabernas, Spain  
T. Schmidt  
CSP Services, Cologne, Germany  
Z. Yasser  
TSK FLAGSOL, Cologne, Germany  
L. Ramirez & L. Zarzalejo  
CIEMAT, Madrid, Spain  
L. Vuilleumier  
MeteoSwiss, Payerne, Switzerland  
P. Blanc  
MINES ParisTech, France  
R. Pitz-Paal  
German Aerospace Center, Cologne, Germany

**6DO.6.6 A Flexible Optical Model for Predicting Non-Uniform Irradiance Distributions on PV Modules**

R. Santbergen, V.A. Muthukumar, L. Manzano Chavez,  
E. Garcia Goma, A.H.M. Smets & M. Zeman  
Delft University of Technology, The Netherlands

**ORAL PRESENTATIONS 7DO.9**

**17:00 - 18:30 Innovative National PV Market Economics Business Cases**

**Chairpersons:**

Christian Breyer  
Lappeenranta University of Technology, Finland

Gaetan Masson  
Becquerel Institute, Belgium

**7DO.9.1 Growth Regions in Photovoltaics 2016 - Update on Latest Global Solar Market Development**

C. Werner  
Chris Werner Energy Consulting, Dessau, Germany  
A. Gerlach  
Gerlach New Energy Consulting, Ellrich, Germany  
C. Breyer  
Lappeenranta University of Technology, Finland  
G. Masson  
Becquerel Institute, Brussels, Belgium

**7DO.9.2 ARENA's Large Scale Solar Funding Impact on Utility-Scale Solar in Australia**

B. Herteleer & L. Frearson  
CAT Projects, Alice Springs, Australia  
O. Boyd, A. Dobb & S. Rodgers  
ARENA, Canberra, Australia

**7DO.9.3 PV in Emerging Markets: The Sustainability of Policy-Driven Demand**

S. Mondal & A. Sanyal  
Vikram Solar, Kolkata, India

**7DO.9.4 Technical and Economic Potential of PV in Lebanon and Jordan Aiming for Regional Readiness Level Development**

M. Haidar, P. Baliozian & R. Preu  
Fraunhofer ISE, Freiburg, Germany  
S. Mourad & A. Mustafa  
University of Freiburg, Germany

**7DO.9.5 Evaluating the Effectiveness of Past and Future Feed-in Tariff Policy in Great Britain Using an Agent-Based Model**

P. Pearce & R. Slade  
Imperial College London, United Kingdom

**7DO.9.6 Smart Solar Charging: The Role of Photovoltaics in the Sharing Economy**

W.G.J.H.M. van Sark & M. Gerritsma  
Utrecht University, The Netherlands  
R. Berg  
Lomboxnet, Utrecht, The Netherlands  
B. van der Ree & C. van Hemel  
Utrecht Sustainability Institute, The Netherlands  
E. van Voorden  
Last Mile Solutions, Rotterdam, The Netherlands  
M. Boheemen  
Vidyn, Harderwijk, The Netherlands  
J. van Heesbeen  
Jedlix, Rotterdam, The Netherlands  
H. Fidder  
Stedin, Rotterdam, The Netherlands  
T. Wolfers & R. van der Lugt  
University of Applied Sciences Utrecht, The Netherlands





## ORAL PRESENTATIONS 5EO.1

08:30 - 10:00 Sustainability and Recycling

### Chairpersons:

Invited

Mariska De Wild-Scholten  
SmartGreenScans, The Netherlands

#### 5EO.1.1 Beyond Waste – The Fate of End-of-Life Photovoltaic Panels from Large Scale PV Installations in the EU – The Socio-Economic Benefits of High Value Recycling Compared to Re-Use

A. Wade  
First Solar, Mainz, Germany  
P. Sinha  
First Solar, Tempe, United States  
K. Drozdiak  
Ecowatt Consulting, Washington, United States

#### 5EO.1.2 Technology Trends in PV Module Recycling from Viewpoints of Patents and R&D Projects

K. Komoto  
Mizuho IR Institute, Tokyo, Japan  
J.S. Lee  
KIER, Daejeon, Korea South  
A. Wade  
First Solar, Mainz, Germany  
G. Heath  
NREL, Golden, United States

#### 5EO.1.3 Life Cycle Water Consumption of PV Electricity Based on Regionalised Life Cycle Inventories

P. Stolz & R. Frischknecht  
Treeze, Uster, Switzerland

#### 5EO.1.4 Eco-Solar Factory: Environmental Impact Optimisation of PV Production

K. Wambach, M. Seitz & R. Peche  
bifa Environmental Institute, Augsburg, Germany  
M.P. Bellmann  
SINTEF, Trondheim, Norway  
G.S. Park  
NorSun, Oslo, Norway  
J. Denafas  
Soli Tek, Vilnius, Lithuania  
F. Buchholz  
ISC Konstanz, Germany  
R. Einhaus  
Apollon Solar, Lyon, France

G. Noja  
Garbo, Cerano, Italy  
B. Ehlen  
Boukje.com Consulting, Bleiswijk, The Netherlands  
R. Roligheten  
Steuler Solar Technology, Porsgrunn, Norway  
P. Romero  
AIMEN, Porrino, Spain  
A. Bollar  
INGESEA, Elgoibar, Spain

#### 5EO.1.5 CABRISS: Recycling of Si-Kerf from PV

T. Halvorsen, M. Moen & K. Mork  
ReSiTec, Kristiansand, Norway  
D. Grosset-Bourbange & P. Rivat  
FerroPem, Chambéry, France  
H. Hamza & F. Coustier  
CEA, Le Bourget du Lac, France

#### 5EO.1.6 Development of a Modular Cradle to Cradle Process-Chain for c-Si-PV Panel Recycling

J. Glatthaar, H. Weigand, U. Ricklefs, E.A. Stadlbauer,  
E. Kamdje, J. Barnikel & R. Gissel  
Mittelhessen University of Applied Sciences, Giessen,  
Germany  
M. Dax  
Ruehl Solar, Lohra Kirchvers, Germany  
V. Schaub  
AWLD, Asslar, Germany  
H.G. Stevens  
SM-innotech, Bocholt, Germany  
B. Jehle  
ZME, Heuchelheim, Germany

## ORAL PRESENTATIONS 6EO.2

08:30 - 10:00 PV Energy System Integration into the Grid

### Chairpersons:

Ingrid Weiss  
WIP - Renewable Energies, Germany

Xavier Vallvé  
Trama TecnoAmbiental, Spain

#### 6EO.2.1 Renewable Energy High Penetration Scenarios Using Multi-Nodes Approach: Analysis for the Italian Case

M.G. Prina & D. Moser  
EURAC, Bolzano, Italy  
G. Manzolini  
Polytechnic University of Milan, Italy

**6EO.2.2 Decentralized Fuzzy-Based Voltage Control for LV Distribution Systems**

E. Bernal  
La Salle University, Bogotá, Colombia  
M. Bueno & M.M. Molinas Cabrera  
NTNU, Trondheim, Norway

**6EO.2.3 Implementation of Control Strategies for PV Power Ramp-Rate Limitation Using Energy Storage: Problems and Solutions Associated with the Different Battery Charge/Discharge Powers**

I. de la Parra, J. Marcos, M. Muñoz, M. García & L. Marroyo  
UPNa, Pamplona, Spain

**6EO.2.4 Optimisation of the Load Flow Calculation Method in Order to Perform Techno-Economic Assessments of Low-Voltage Distribution Grids**

F. Carigiet, F.P. Baumgartner, P. Korba & V. Knazkins  
ZHAW, Winterthur, Switzerland  
M. Koller  
EKZ, Zurich, Switzerland  
M. Niedrist  
EKS, Schaffhausen, Switzerland

**6EO.2.5 Spatial Analysis of Residential Combined Photovoltaic and Battery Potential: Case Study Utrecht, The Netherlands**

B.B. Kausika, G.B.M.A. Litjens & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands

**6EO.2.6 Reducing the Grid Load of South African Office Building by Implementation of Energy Efficiency Measures and Installation of Demand Optimized PV**

B. Hanke, D. Peters, M. Kühnel, K. von Maydell & C. Agert  
NEXT ENERGY, Oldenburg, Germany  
J. Smit  
Buffalo City Metropolitan Municipality, East London, South Africa  
R. Wiesmann & R. Saßmannshausen  
BFE-Oldenburg, Germany  
R. Hentschel  
City of Oldenburg, Germany

**ORAL PRESENTATIONS 7EO.3**

**08:30 - 10:00 PV-Related Policies, Strategies and Societal Issues**

**Session Chair:**

Emiliano Perezagua  
Consultores de Energía Fotovoltaica, Spain

Invited

**7EO.3.1 Trends in Photovoltaic Applications - The Latest Survey Results on PV Markets and Policies from the IEA PVPS Programme**

G. Masson  
Becquerel Institute, Brussels, Belgium  
J. Donoso Alonso  
Spanish Photovoltaic Industry Federation, Madrid, Spain  
P. Hüsser  
Nova Energie, Aarau, Switzerland  
I. Kaizuka  
RTS, Tokyo, Japan  
J. Lindahl  
Svensk Solenergi, Stockholm, Sweden  
F. Tilli  
GSE, Rome, Italy

**7EO.3.2 The Social Rate of Return of Photovoltaic Investments in Germany**

J. López Prol  
University of Graz, Austria

**7EO.3.3 Lithuanian Smart Specialization and Clustering Activities in Photovoltaic Sector**

J. Ulbikas & D. Naruseviciute  
PROTECH, Vilnius, Lithuania

**7EO.3.4 SOLAR-ERA.NET - ERA-NET on Solar Electricity for the Implementation of the Solar Europe Industry Initiative**

S. Nowak & M. Gutschner  
NET Nowak Energy & Technology, St. Ursen, Switzerland  
S. Oberholzer  
Swiss Federal Office of Energy, Bern, Switzerland  
C. Hünnekes, H. Bastek, D. Brockmann, M. Schulte & J. Kutscher  
Forschungszentrum Jülich, Germany  
S. Rabe  
CEF-NRW, Düsseldorf, Germany  
K. Wikman  
TEKES, Helsinki, Finland  
M. Gerbaud  
ADEME, Paris, France  
J. Herrero  
CIEMAT, Madrid, Spain  
S. Falcón Morales  
MINECO, Madrid, Spain  
L. Polain & N. Delsaux  
Public Service of Wallonia, Jambes, Belgium  
E. De Clercq  
VLAIO, Brussels, Belgium  
M. Garliska  
NCBR, Warszawa, Poland  
K. Karaösz & R. Seymen  
TUBITAK, Gebze, Turkey  
O. Bernsen  
RVO, The Hague, The Netherlands  
S. Tselepis  
CRES, Pikermi, Athens, Greece  
C. Inglis  
InnovateUK, Swindon, United Kingdom  
L. Antoniou & I. Sergidou-Loizou  
RPF, Lefkosia, Cyprus  
A. Agrimi  
Regione Puglia, Bari, Italy  
C. Gadaleta Caldarola  
ARTI, Valenzan, Italy  
D. Tornabene  
Regione Sicilia, Palermo, Italy  
T. Zillner  
Federal Ministry of Transport, Vienna, Austria  
E. Lutter & G. Wörther  
Climate and Energy Fund, Vienna, Austria  
P.-J. Rigole & T. Walla  
Swedish Energy Agency, Eskilstuna, Sweden

**7EO.3.5 Highlights from the FP7 Project on Photovoltaics CHEETAH: More Power with Less Materials**

J.M. Kroon  
ECN, Petten, The Netherlands

**7EO.3.6 Café au Light: How to Improve Guinean People's Lives by Combining Coffee and PV**

J. Cárabe  
CIEMAT, Madrid, Spain  
N.N. Malo  
UDECOM, Nzérékoré, Guinea  
A. Bautista & L. Barrios  
Cleanergetic, Madrid, Spain  
M. Loua  
Embassy of Guinea, Madrid, Spain

**PLENARY SESSION 7EP.1**

**10:30 - 11:30 Recent Developments in Competitive PV Markets**

**Chairpersons:**

Stefan Nowak  
NET Nowak Energy & Technology, Switzerland  
Pietro Menna  
European Commission DG Energy, Belgium

**7EP.1.1 Invited**

**7EP.1.2 New Business Models in PV**

D. Feldman  
NREL, Washington, USA

**7EP.1.3 The International Solar Alliance – Creating Momentum for New Global Solar Markets (i)**

G.-C. Werlings  
ISA, Paris, France



11:30 – 12:30 CONFERENCE CLOSING

At the time of printing the detailed Programme of the Closing Event is under final preparation. Please visit [www.photovoltaic-conference.com](http://www.photovoltaic-conference.com) for all information.

**Welcome:**

**Arno Smets**

EU PVSEC General Chairman  
Professor Solar Energy at Delft University of Technology

**Keynote speech**

**Arno Smets**

EU PVSEC General Chairman  
Professor Solar Energy at Delft University of Technology

**Highlights of the Conference Week**

**Nigel Taylor**

EU PVSEC Technical Programme Chairman  
European Commission Joint Research Centre

**Ceremony of the Poster Awards**

**Julio Cárabe**

CIEMAT Centre for Energy, Environment and Technology,  
Spain

**Ceremony of the Student Awards**

**Nigel Taylor**

EU PVSEC Technical Programme Chairman  
European Commission Joint Research Centre

**Arno Smets**

EU PVSEC General Chairman  
Professor Solar Energy at Delft University of Technology

**Announcement upcoming PV events**

**PVSEC / IEEE PVSC / EU PVSEC**

**What do we take home from the EU PVSEC? Farewell and Closing**

**Arno Smets**

EU PVSEC General Chairman  
Professor Solar Energy at Delft University of Technology



- 2AV.1.7 Effect of Deformation and Displacement of the Seeds Junction on Dislocation of Mono-Like Crystalline Silicon**  
W. Chen, Q. Wang & X. Yang  
Jinko Solar, Shangrao, China
- 2AV.1.8 Investigation about Classification, Generation and Evolution of Dislocation at Seed Junctions of Mono-Like Crystalline Silicon**  
W. Chen, Q. Wang & X. Yang  
Jinko Solar, Shangrao, China
- 2AV.1.10 In-Situ Measurement of the Solid-Liquid-Interface during the Growth of Silicon Ingots by the Ultrasonic Sound Method**  
M. Trempa, C. Reimann & J. Friedrich  
Fraunhofer IISB, Erlangen, Germany  
M. Hinderer & P. Czurratis  
PVA TePla, Westhausen, Germany  
I. Kupka  
Fraunhofer THM, Freiberg, Germany
- 2AV.1.11 Cost Effective Growth of Silicon Mono Ingots by the Application of Increased Pull Speed in Cz-Puller**  
F. Mosel & A.V. Denisov  
PVA TePla, Wetztenberg, Germany  
R. Kunert & P. Dold  
Fraunhofer CSP, Halle, Germany
- 2AV.1.12 Distribution of Light Element Impurities in Si Crystals Grown by Seed-Casting Method**  
R. Nakayama, Y. Nakajima & A. Ogura  
Meiji University, Kawasaki, Japan  
K. Kutsukake  
Tohoku University, Sendai, Japan  
H. Ono  
Kanagawa Industry Technology Center, Ebina, Japan
- 2AV.1.13 Effects of Carbon Concentration on Oxygen Precipitation through Annealing Process in n-Type Cz-Si Evaluated by IR Laser Scattering Tomography**  
K. Kinoshita, T. Kojima, H. Kobayashi & A. Ogura  
Meiji University, Kawasaki, Japan  
Y. Ohshita  
TTI, Nagoya, Japan  
I. Masada & S. Tachibana  
Tokuyama, Yamaguchi, Japan
- 2AV.1.14 Study of Impurities Diffusion in Silicon Liquid Phase in Conditions of High Turbulence of Melt**  
S.M. Karabanov, D.V. Suvorov, D.Y. Tarabrin & E.V. Slivkin  
RSREU, Ryazan, Russia  
O.A. Belyakov & A.S. Karabanov  
Helios-Resource, Saransk, Russia  
V.L. Dshkhunyan  
Solar Consult, Ryazan, Russia

- 2AV.1.15 Thermomechanical Stress Modelling during Melting and Solidification of a Monolike Ingot Process**  
A. Lantreibecq, E. Pihan & D. Pelletier  
CEA, Le Bourget du Lac, France  
M. Legros & J.P. Monchoux  
CNRS, Toulouse, France
- 2AV.1.16 Silicon Powder Melting for Kerf Recycling**  
J. Altenberend & G. Chichignoud  
SIMaP, Grenoble, France
- 2AV.1.17 Reusable Si<sub>3</sub>N<sub>4</sub> Crucibles Made from Kerf-Loss Silicon for Multi-Crystalline Silicon Growth**  
C.Y. Lan, C.-F. Yang & C.-W. Lan  
NTU, Taipei, Taiwan  
W.C. Lan & W.C. Hsu  
SAS, Hsinchu, Taiwan  
A. Yang  
Solartech Energy, Hsinchu County, Taiwan
- 2AV.1.18 Si Wafer Manufacturing by Thermal Spray of Recycled Si Powders**  
M. Vardavoulias  
Pyrogenesis, Lavrion, Greece  
A.S. Azar, P.A. Carvalho & A. Ulyashin  
SINTEF, Oslo, Norway  
T. Halvorsen, M. Moen & K. Mork  
ReSiTec, Kristiansand, Norway  
O. Dahl  
SINTEF, Trondheim, Norway
- 2AV.1.19 Si Powder Based Ingots and Substrates, Processed by Spark Plasma Sintering**  
T. Kaden & H.-J. Möller  
Fraunhofer THM, Freiberg, Germany  
A.S. Azar, M. Syvertsen, M. Fleissner Sunding & A. Ulyashin  
SINTEF, Oslo, Norway  
N. Abrosimov  
IKZ Institute for Crystal Growth, Berlin, Germany  
J. Hennicke  
FCT Systeme, Rauenstein, Germany
- 2AV.1.20 Multiphysics Modeling of Silicon Ingot Growth Process into a Directional Solidification Furnace**  
D. Quadjaout, F. Kerkar & H. Rahab  
CRTSE, Algiers, Algeria  
A. Ahmanache  
CDTA, Algiers, Algeria
- 2AV.1.22 Advanced Analysis of Multi Wire Wafering Processes**  
R. Koepge, S. Brinnig, F. Kaule, S. Schoenfelder & H. Schwabe  
Fraunhofer CSP, Halle, Germany

- 2AV.1.23 Diamond Wire Process Monitoring during Monocrystalline Silicon Wafering**  
F. Coustier, M. Debourdeau, R. Riva & N. Velet  
CEA, Le Bourget du Lac, France
- 2AV.1.24 A Comprehensive Dynamic Model of the Diamond Wire Sawing Process**  
D. Treyer, S. Gaulocher & S. Niederberger  
FHNW, Windisch, Switzerland  
H. Rafael  
Meyer Burger, Gwatt, Switzerland  
A. Ams  
Freiberg University of Technology, Germany
- 2AV.1.25 Recycling of Kerf-Loss Silicon Powder from Diamond-Wire Cutting without Chemical Treatment**  
H. Hamza, F. Coustier, V. Brizé, A. Benayad,  
M. Benmansour & A. Chabli  
CEA, Le Bourget du Lac, France
- 2AV.1.26 Mechanical Viability of Metallurgical Silicon Substrates for the Use in Ultrathin Devices**  
M.E.O. de Zárate, C. Domergue, C. Alarcón Reyero &  
J. Barredo Egusquiza  
UPM, Madrid, Spain
- 2AV.1.27 Low Kerf Loss (<100 µm) High Quality Silicon Wafer Fabricated by Advanced Diamond Wire Saw**  
Y. Ohshita  
TTI, Nagoya, Japan  
T. Kojima, K. Kinoshita, K. Nakamura & A. Ogura  
Meiji University, Kawasaki, Japan  
T. Kawatsu  
Komatsu NTC, Toyama, Japan
- 2AV.1.28 The Study of Water-Based Slurry for Wafer Slicing and the Totally Recycling of Material in Slicing Process**  
T.Y. Wang  
ITRI, Hsinchu, Taiwan  
C.-Y. Cheng & P.-S. Huang  
Green Energy Technology, Taoyuan, Taiwan
- 2AV.1.29 A Novel Approach to Determine the Diamond Occupancy of Diamond Wires for Optimized Cutting Processes for Crystalline Silicon**  
L. Lottspeich, M. Fuchs, L. Theophil & T. Kaden  
Fraunhofer THM, Freiberg, Germany
- 2AV.1.30 The Impact of Diamond Wire Quality on the Mechanical Strength of Thin Silicon Wafers for PV Cells**  
T. Fukuda, N. Suzuki, K. Tanahashi, K. Shirasawa &  
H. Takato  
AIST, Koriyama, Japan

- 2AV.1.31 The Influence of Material Properties on the Wire Sawing Process of Multicrystalline Silicon**  
T. Kaden, E. Ershovaa, L. Lottspeich & M. Fuchs  
Fraunhofer THM, Freiberg, Germany
- 2AV.1.32 Correlation of Residual Stress in Silicon Wafers with Diamond Wire Sawing Marks**  
A. Kumar, R.G.R. Prasath, S.N. Melkote & S. Danyluk  
Georgia Institute of Technology, Atlanta, United States
- 2AV.1.33 Simple Model for the Calculation of Wire Tension Forces in the Multi Wire Sawing Process**  
K. Sunder, R. Rataj & O. Anspach  
PV Crystalox Solar, Erfurt, Germany
- 2AV.1.34 Impact of Residual Aluminium Contamination on the Determination of Boron and Phosphorus Densities Using Hall Effect in a Solar Grade Silicon Ingot – A Comparison to Other Characterization Techniques**  
A. Fauveau, B. Martel, J. Veirman, B. Drevet & H. Lignier  
CEA, Le Bourget du Lac, France  
A. Kaminski-Cachopo & F. Ducroquet  
Grenoble Alpes University, France
- 2AV.1.35 Study of H-Diffusion Mechanism from a-SiN:H Passivation Layer Towards Bulk-Silicon Within a High Temperature Annealing Process**  
S. Jafari, M. Gläser & D. Lausch  
Fraunhofer CSP, Halle, Germany  
N. Bernhard  
Anhalt University of Applied Sciences, Köthen, Germany
- 2AV.1.36 Eliminating B-O CID in Commercial Solar Cells with Industrial Hydrogenation Tools**  
B. Hallam, C. Chan, R. Chen, S. Wang, J. Ji, L. Mai,  
M. Abbott, M. Kim, D. Chen, C.M. Chong & S.R. Wenham  
UNSW Australia, Sydney, Australia
- 2AV.1.37 Regeneration of Boron-Oxygen Related Degradation in Cz-Si PERC-Type Solar Cells at High Temperatures**  
A. Herguth, C. Derricks & G. Hahn  
University of Konstanz, Germany  
M. Hentsche, M. Wagner & F. Wolny  
SolarWorld Innovations, Freiberg, Germany
- 2AV.1.38 Influence of Silicon Nitride and Its Hydrogen Content on Carrier-Induced Degradation in Multicrystalline Silicon**  
C. Vargas Castrillon, K. Kim, D. Payne, C. Chan,  
S.R. Wenham & Z. Hameiri  
UNSW Australia, Sydney, Australia  
G. Coletti  
ECN, Petten, The Netherlands

**2AV.1.39 Investigating Possible Causes of Light Induced Degradation in Boron-Doped Float-Zone Silicon**

D. Sperber, A. Herguth & G. Hahn  
University of Konstanz, Germany

**2AV.1.40 Impact of Temperature and Doping on LeTID and Regeneration in mc-Si**

J. Fritz, A. Zuschlag, D. Skoroka, A. Schmid & G. Hahn  
University of Konstanz, Germany

**2AV.1.41 Effects of Oxygen Precipitates on Stability of Metal Against Gettering in n-Type Cz Silicon**

T. Kojima, R. Suzuki, K. Kinoshita, K. Onishi, T. Nishihara & A. Ogura  
Meiji University, Kawasaki, Japan

**2AV.1.42 Investigation on the Phosphorus Diffusion Gettering Mechanism of Chromium in Multi-Crystalline Silicon**

N. Khelifati, D. Bouhafis & Y. Kouhlane  
CRTSE, Algiers, Algeria  
S.E.H. Abaidia  
Boumerdes University, Algeria

**2AV.1.43 How to Degrade Boron-Oxygen Related Defects in Silicon**

A. Herguth  
University of Konstanz, Germany

**2AV.1.44 Infrared Image Processing Algorithm for Solar Cell Defect Assessment**

A. Hovhannisyan  
National Polytechnic University of Armenia, Yerevan, Armenia  
A. Petrosyan  
NAS RA, Ashtarak, Armenia

NOTES

.....  
.....  
.....  
.....  
.....  
.....  
.....

**VISUAL PRESENTATIONS 2AV.2**

**15:15 - 16:45 Homojunction Solar Cells**

**2AV.2.1 22% Efficient n-Type Rear Junction PERT Solar Cell with 100µm-Thin Industrial Monocrystalline Silicon Wafers**

T. Kim, Y.S. Choi, J. Lee, J. Lee, M. Hwang & S. Lee  
Hyundai Heavy Industries, Yongin-si, Korea South

**2AV.2.2 Optimization and Application of a Single-Stage Co-Diffusion Process for Industrial n-Type Silicon Solar Cells**

N. Wehmeier, A. Nowack, S. Dorn, F. Kiefer, T. Brendemühl & S. Kajari-Schröder  
ISFH, Emmerthal, Germany

**2AV.2.3 N-Type Monolike Silicon Bifacial Solar Cell: An Alternative Way of High Efficiency and Low Cost**

C.-L. Lin, Y.-T. Cheng, Y.-H. Huang, C.-C. Wang, C.-P. Tsao & J.-W. Chien  
Inventec Solar Energy, Taoyuan, Taiwan

**2AV.2.5 Investigation of In-Situ Annealing during Physical Vapour Deposition of Al Rear Contacts on n-PERT Back-Junction Crystalline Silicon Solar Cells**

Z.-W. Peng, T. Buck & R. Kopecek  
ISC Konstanz, Germany  
M. Dörr, A. Hain & P. Wohlfart  
Singulus Technologies, Kahl am Main, Germany  
H. Nagel & P. Hartmann  
Fraunhofer ISE, Freiburg, Germany

**2AV.2.6 Selective Epitaxy as Contact Passivation Approach in Bifacial n-Type PERT Solar Cells**

M. Récaman Payo, I. Kuzma-Filipek, Y. Li, S. Singh, A. Sharma, E. Cornagliotti, S. Jambaldinni, J. John, F. Duerinckx, J. Szlufcik & J. Poortmans  
imec, Leuven, Belgium

**2AV.2.7 Gettering Efficacy of APCVD PSG and BSG Layers in mc-Si**

C. Fischer, A. Zuschlag & G. Hahn  
University of Konstanz, Germany

**2AV.2.8 Preclusion of Light Induced Degradation in Multi-Crystalline by Low Temperature Metallization**

N. Western & S.P. Bremner  
UNSW Australia, Sydney, Australia

**2AV.2.9 Enhancing Performance of Upgraded Metallurgical Grade Silicon Solar Cells Nano-Textured by Using Metal Catalyzed Chemical Etching**

V. Hoffmann & J.M. Míguez Novoa  
Silicio FerroSolar, Arteixo, Spain  
S. Zou & X. Su  
Soochow University, Suzhou, China

PROGRAMME

PROGRAMME

- 2AV.2.10 Impact of Glass Chemistry on Contact Formation for Silver Metallization Pastes**  
L. Karpowich, R. Mayberry & M. Hörteis  
Heraeus Precious Metals, West Conshohocken, United States
- 2AV.2.11 Industrially MCCE Textured Multicrystalline PERC with 19.8% Efficiency**  
Z. Xu, H. Wang, Y. Wang, F. Li, J. Shi & D. Song  
Yingli Green Energy, Baoding, China
- 2AV.2.12 Laser Ablation Induced Recombination Losses of nPERT-BJ Solar Cells**  
Z.-W. Peng, J. Theobald, V.D. Mihailetchi, T. Buck & R. Kopecek  
ISC Konstanz, Germany
- 2AV.2.13 Novel Wet Chemical Cleaning Concepts for High Efficiency Silicon Solar Cells**  
M. Haslinger, S. Robert, S. Jambaldinni, J. Szlufcik, J. Poortmans & J. John  
imec, Leuven, Belgium  
M. Soha  
University of Debrecen, Hungary  
A. Hajjiah  
Kuwait University, Safat, Kuwait
- 2AV.2.14 Suitability of Low Recombinative POC13 Diffusion Processes with In-Situ Oxidation for Forming Laser-Doped Selective Emitters**  
S. Werner, E. Lohmüller, J. Weber & A. Wolf  
Fraunhofer ISE, Freiburg, Germany
- 2AV.2.15 HNO<sub>3</sub>-Free Electrochemical Inline Approach for Diamond-Wire-Sawed Multi-Crystalline Material (DWS-mc) Texturing**  
B. Straub, J. Burschik, H. Kühnlein & S. Queißer  
RENA, Freiburg, Germany
- 2AV.2.16 Fully Ion Implanted n-Type Silicon Bifacial Solar Cell with 20.1% Efficiency**  
K. Tanahashi, M. Moriya, S. Simayi, Y. Kida, S. Utsunomiya, K. Shirasawa & H. Takato  
AIST, Koriyama, Japan
- 2AV.2.17 Rear-Surface Laser Contact Opening Design Optimization for PERC Solar Cells**  
E. Picard, M. Pirot & S. Dubois  
CEA, Le Bourget du Lac, France
- 2AV.2.18 Optimization of the Optoelectronic Properties of Maskless Inductively Coupled Plasma Textures by the FSTD Method**  
J. Hirsch, M. Gaudig, B. Köhler & N. Bernhard  
Anhalt University of Applied Sciences, Köthen, Germany  
D. Lausch  
Fraunhofer CSP, Halle, Germany

- 2AV.2.19 Double Side Cu-Plated Technology on Front Junction n-PERT Solar Cells**  
K.-C. Lai, Y.-L. Lee, M.-S. Lin, C.-C. Chuang & C.-H. Li  
Motech Industries, Tainan, Taiwan
- 2AV.2.20 Bifacial PERC+ Solar Cells and Modules: An Overview**  
T. Dullweber, H. Schulte-Huxel, C. Kranz, S. Blankemeyer, U. Baumann, R. Witteck, R. Peibst, M. Köntges & R. Brendel  
ISFH, Emmerthal, Germany
- 2AV.2.21 Integration of Epitaxially Grown Emitter Processed at Low Temperature (<300°C) by PECVD into n-PERT Architecture**  
R. Peyronnet & T. Blévin  
IPVF, Antony, France  
R. Léal, F. Lebreton, G. Poulain & E. Drahi  
TOTAL, Paris, France  
N. Vaissiere, F. Silva & P. Roca i Cabarrocas  
CNRS, Palaiseau, France  
S. Pouliquen, Y. Marot & A. Zauner  
Air Liquide, Jouy-en-Josas, France  
M. Lemiti  
INSA Lyon, Villeurbanne, France
- 2AV.2.23 Effects of Tellurium Oxide in Silver Paste on the Electrical Losses in Silicon Solar Cells**  
T. Aoyama & Y. Yoshino  
Noritake, Aichi, Japan  
M. Aoki, I. Sumita & Y. Ohshita  
TTI, Nagoya, Japan  
A. Ogura  
Meiji University, Kawasaki, Japan
- 2AV.2.24 Optimized Back Side Reflectance for Copper Electroplated Metallization p-Type Bifacial PERC Solar Cells**  
S.-Y. Chen, Y.-H. Lin, J.-F. Huang & C.-H. Du  
ITRI, Hsinchu, Taiwan
- 2AV.2.25 Al-BSF Solar Cell Properties Using Screen-Printed Cu Paste and a Diffusion Barrier Layer**  
T. Saito, H. Tri Hai, D. Ando, Y. Sutou, K. Shirasawa & J. Koike  
Tohoku University, Sendai, Japan  
T. Fukuda & Y. Kurimoto  
Material Concept, Sendai, Japan
- 2AV.2.26 Paste Development for Electrochemical Screen Printing to Structure Metal Layers of Back Contact Solar Cells**  
K. Gensowski, M. Kamp, R. Efinger, M. Klawitter, M. Pospischil, J. Eckert & J. Bartsch  
Fraunhofer ISE, Freiburg, Germany

- 2AV.2.27 nPERT Solar Cells with a High Bifaciality > 93%**  
P.-K. Chang, L.-T. Wang, S.-W. Chiu, Y.-J. Lin, W.-T. Chung,  
C. Kuo & C.-C. Li  
Motech Industries, Tainan, Taiwan
- 2AV.2.28 Full Area Emitter IBC Cells Fabricated with Point-Contacting by Localized Dielectric Breakdown**  
A. Liao, N.J. Western & S.P. Bremner  
UNSW Australia, Sydney, Australia
- 2AV.2.30 Study of Electrode-Silicon Interface with Low Fire-Through Paste for Crystalline Si Solar Cell**  
H. Hiyama, T. Kojima, K. Nakamura & A. Ogura  
Meiji University, Kawasaki, Japan  
K. Muramatsu & A. Tanaka  
Namics, Niigata, Japan
- 2AV.2.32 New Chemical Attack of Ag-Catalyzed on Si in HF-H<sub>2</sub>O<sub>2</sub>-AgNO<sub>3</sub> Medium. Application to Si Solar Cells Treatment**  
W. Bodian & D. Kobor  
UASZ, Ziguinchor, Senegal  
J.-M. Joubert & S. Bastide  
CNRS, Thiais, France
- 2AV.2.33 Silicon Surfaces Nanotextured Using Tailored Voltage Waveform- Plasmas: Impact of Ion Bombardment Energy on Etching Dynamics and Passivation**  
G. Fischer  
IPVF, Antony, France  
E. Drahi, F. Lebreton & G. Poulain  
Total, Paris, France  
P. Bulkin & E.V. Johnson  
CNRS, Palaiseau, France
- 2AV.2.34 Electroless-Plated Metallization for n-Type Silicon Solar Cells**  
Y.-L. Lee, M.-S. Lin, K.-C. Lai, C.-C. Chuang & C.-C. Li  
Motech Industries, Tainan City, Taiwan
- 2AV.2.36 Fashioning “Black” Silicon by Nickel-Film Assisted Chemical Etching**  
M. Treideris, A. Reza, M. Kamarauskas, V. Agafonov &  
A. Setkus  
FTMC, Vilnius, Lithuania

- 2AV.2.37 Low Temperature Process Flow for Bifacial n-PERT Monocrystalline Silicon Solar Cells**  
F. Lebreton, P. Bulkin & F. Silva  
CNRS, Palaiseau, France  
J. Couderc & P.P. Grand  
EDF, Chatou, France  
R. Peyronnet & T. Blévin  
IPVF, Antony, France  
E. Drahi & S. Filonovich  
TOTAL, Paris, France  
A. Zauner, Y. Marot & S. Pouliquen  
Air Liquide, Jouy-en-Josas, France  
H. El Belghiti & E. Delbos  
KMG Ultra Pure Chemicals, Versailles, France  
A. Etcheberry  
UVSQ, Versailles, France  
D. Lincot  
CNRS, Chatou, France
- 2AV.2.38 c-Si Surface Passivation Optimization of PECVD and ALD Al<sub>2</sub>O<sub>3</sub> Deposited Layers**  
R. Monna, C. Denis, A. Veau & S. Dubois  
CEA, Le Bourget du Lac, France  
B. Semmache, S. Tran & G. Lazzarelli  
SEMCO, Montpellier, France  
L. Bounaas  
ECM Greentech, Grenoble, France
- 2AV.2.40 19.75% Crystalline Silicon Solar Cells by Ceramic Roller Type Diffusion**  
W. Hu, X. Li, G. Dong, X.H. Zhao, Y. Mai & Y. Xu  
Hebei University, Baoding, China
- 2AV.2.41 Industrial Plasma-Less Dry Texturing Method for Diamond Wire Cut mc-Si Wafers**  
L. Clochard  
Nines Photovoltaics, Dublin, Ireland
- 2AV.2.42 Optimized PERC Ag Paste for High Efficiency Emitters**  
G. Scardera, R. Petres & S. Dugan  
DuPont, Sunnyvale, United States  
C.C. Torardi, P.D. VerNooy, Q. Guo & B.J. Laughlin  
DuPont, Wilmington, United States
- 2AV.2.43 Point Contact Formation Using Silicon Nanoparticle Dispersed SiO<sub>2</sub>**  
H. Nagayoshi & H. Demura  
TNCT, Tokyo, Japan  
A. Ulyashin  
SINTEF, Oslo, Norway

**2AV.2.44 Effect of Laser Ablation Process on High Efficiency Silicon Solar Cells**

M.-S. Lin, Y.-L. Lee, K.-C. Lai, C.C. Chuang & C.-C. Li  
Motech Industries, Tainan City, Taiwan

**2AV.2.45 Fine Line Cu Plated Silicon Solar Cells**

L.-Y. Li, C.-K. Peng & C.-H. Du  
ITRI, Hsinchu, Taiwan  
P. Yu

National Chiao Tung University, Hsinchu, Taiwan

**2AV.2.46 Maskless Texturing of Diamond Wire Sawn Multicrystalline Silicon Wafers by SF<sub>6</sub>/O<sub>2</sub> Inductively Coupled Plasma (ICP)**

B. Köhler, M. Gaudig & N. Bernhard  
Anhalt University of Applied Sciences, Köthen, Germany  
J. Hirsch  
Fraunhofer CSP, Köthen, Germany  
F. Kaule, S. Timmel, S. Meyer & D. Lausch  
Fraunhofer CSP, Halle, Germany

**2AV.2.47 Development of Mono and Bifacial Solar Cells from 100µm n-Type Silicon Wafers**

T. Blévin & R. Peyronnet  
IPVF, Antony, France  
Y. Marot, A. Zauner, F. Coeuret, J.-Y. Letellier & S. Pouliquen  
Air Liquide, Jouy-en-Josas, France  
E. Drahi  
TOTAL, Paris, France

**2AV.2.48 Investigation on Different Surface Modifications Using Laser Texturing**

B. Radfar, F. Es & R. Turan  
METU, Ankara, Turkey

**2AV.2.49 Impact of UV Exposure on the Anti-Reflection Coating of an Unencapsulated Silicon Solar Cell**

V. Guiheneuf, F. Delaleux, O. Riou, P.-O. Logerais & J.-F. Durastanti  
University Paris-Est Créteil, Lieusaint, France  
S. Pouliquen  
Air Liquide, Jouy en Josas, France

**2AV.2.50 Broadband Ultralow Reflectance of Hexagonal Arrays Consisting of Round-Head Silicon Nanopillars with Feature Size of 200 nm**

W. Yan, S. Dottermusch & B.S. Richards  
Karlsruhe Institute of Technology, Germany

**2AV.2.51 Selective Emitter Solar Cells with Anti-Reflection Coating Fabricated by PECVD Silicon Nitride and Silicon Oxynitride Stacks**

S. Park, H. Park, K.N. Kim, S.J. Park, S. Kim, D. Kim, H.-S. Lee & Y. Kang  
Korea University, Seoul, Korea South  
D.S. Kim, J. Nam & D. Lee  
Samsung SDI, Cheonan, Korea South  
J. Yang  
Kunsan National University, GunsanSi, Korea South  
B.K. Min  
KIST, Seoul, Korea South  
D. Suh  
Hoseo University, Asan, Korea South

**VISUAL PRESENTATIONS 2AV.3**

**17:00 - 18:30 Heterojunction Solar Cells**

**2AV.3.1 Low-Temperature Soldering for Silicon Heterojunction Solar Cells**

A. De Rose, D. Erath, A. Kraft & U. Eitner  
Fraunhofer ISE, Freiburg, Germany

**2AV.3.2 Excellent Silicon Surface Passivation by TiO<sub>x</sub>: Aiming for Electron Selectivity by Atomic Layer Deposition**

J. Melskens, R.W.H.S. Scheerder, W.-J.-H. Berghuis, B.W.H. van de Loo, B. Macco & W.M.M. Kessels  
Eindhoven University of Technology, The Netherlands  
P.C.P. Bronsveld & P. Spinelli  
ECN, Petten, The Netherlands

**2AV.3.3 Nanocrystalline vs. Amorphous n-Type Silicon Front Surface Field Layers in Silicon Heterojunction Solar Cells: Role of Thickness and Oxygen Content**

A.B. Morales-Vilches, L. Mazzarella, M. Hendrichs, L. Korte, R. Schlatmann & B. Stannowski  
HZB, Berlin, Germany

**2AV.3.4 Mixed-Phase Silicon Oxide Layers with Phosphorus and Boron Doping for Co-Annealed Transparent Passivating Front and Rear Contacts**

J. Stuckelberger, P. Wyss, I. Mack, G. Nogay, A. Ingenito, Q. Jeangros, F.-J. Haug, P. Löper & C. Ballif  
EPFL, Neuchâtel, Switzerland  
J. Horzel, C. Allebé & M. Despeisse  
CSEM, Neuchâtel, Switzerland



- 2AV.3.5 Design, Fabrication and Characterization of Si Tunnel Diode for c-Si Based Tandem Solar Cell**  
A. Fave, F. Mandorlo, F. Boyer & M. Lemiti  
INSA Lyon, Villeurbanne, France
- 2AV.3.6 Analysis of MF Sputtered Indium Tin Oxide Layers for Silicon Heterojunction Solar Cells**  
S. Bose, W. Wolke & J. Rentsch  
Fraunhofer ISE, Freiburg, Germany
- 2AV.3.7 Effective Surface Passivation of c-Si by Atomic Layer Deposited MoO<sub>x</sub> Layers for Hole-Selective Contacts**  
B. Macco, B.W.H. van de Loo, J. Melskens & W.M.M. Kessels  
Eindhoven University of Technology, The Netherlands  
P.C.P. Bronsveld & P. Spinelli  
ECN, Petten, The Netherlands
- 2AV.3.8 Sputter Deposition Induced Damage to a-Si:H / c-Si Passivation Quality**  
L. Tutsch, M. Bivour, M. Hermle & J. Rentsch  
Fraunhofer ISE, Freiburg, Germany
- 2AV.3.9 Development of Inline PECVD Deposition of a-Si Layers for Heterojunction Solar Cells on an Industrial Scale**  
J. Temmler, A. Moldovan, D. Putra, M. Bivour & J. Rentsch  
Fraunhofer ISE, Freiburg, Germany
- 2AV.3.10 Low-Cost Fabrication of Patterned Electrodes in Heterojunction Back-Contact Silicon Solar Cells by Plasma Ion-Implantation**  
K. Koyama, K. Ohdaira & H. Matsumura  
JAIST, Ishikawa, Japan
- 2AV.3.11 Effect of Sputtered a-Si on Effective Carrier Lifetime of c-Si with Ultra-Thin SiO<sub>2</sub> Structure**  
K. Gotoh, I. Takahashi, Y. Kurokawa & N. Usami  
Nagoya University, Japan
- 2AV.3.12 A Successful Conversion of Silicon Thin-Film Solar Module Production to High Efficiency Heterojunction Technology**  
D. Andronikov, A. Abramov, S. Abolmasov, K. Emtsev, G. Ivanov, I. Nyapshaev, D. Orekhov, A.V. Semenov, G. Shelopin, E. Terukova, E.I. Terukov & A. Titov  
TFTE, St-Petersburg, Russia  
N. Belkova, A. Dubrovskiy, P. Ishmuratov, A. Ivanov, D. Saykin, I. Shakhryaev, A. Smirnov, V. Tarasov, V. Timakov & A. Tomchinsky  
Hevel Solar, Novocheboksarsk, Russia  
G. Kekelidze  
Moscow Technological Institute, Russia

- 2AV.3.13 Improvement of Silicon Heterojunction Solar Cells with Argon Plasma Treatment**  
A. Neumüller, O.V. Sergeev, M. Vehse & C. Agert  
NEXT ENERGY, Oldenburg, Germany
- 2AV.3.14 Heterojunction IBC Solar Cells on Thin (< 50µm) Epitaxial Si Foils Produced from Kerfless Layer Transfer Process**  
H. Sivaramakrishnan Radhakrishnan, M. Xu, T. Bearda, M. Filipic, K. Van Nieuwenhuysen, V. Depauw, I. Gordon, M. Debucquoy, J. Szlufcik & J. Poortmans  
imec, Leuven, Belgium
- 2AV.3.15 Amorphous Silicon Deposited with Plasma Excitation Frequencies Larger Than 100 MHz for Heterojunction Solar Cells**  
C. Strobel, B. Leszczynska, S. Leszczynski, M. Albert & J.W. Bartha  
Technical University of Dresden, Germany  
F. Stahr & J. Kuske  
FAP, Dresden, Germany
- 2AV.3.16 MoO<sub>x</sub> as Dopant-Free Hole Collector in p-Type Si Heterojunction Solar Cells**  
L.V. Mercaldo, E. Bobeico, I. Usatii, M. Della Noce, L. Lancellotti & P. Delli Veneri  
ENEA, Portici, Italy
- 2AV.3.17 Dopant-Free Multilayer Back Contact Silicon Solar Cells Employing V<sub>2</sub>O<sub>5</sub>/Metal/V<sub>2</sub>O<sub>5</sub> as an Emitter**  
W. Wu, W. Lin, J. Bao, Z. Liu, Y. Zhao, K. Qiu, L. Cai, J. Zhou & H. Shen  
Sun Yat-sen University, Guangzhou, China
- 2AV.3.18 Effect of Nanocrystalline Si- and SiO<sub>x</sub>-Based Doped Layers on p-Type Si Heterojunction Solar Cells with AZO**  
L.V. Mercaldo, E. Bobeico, I. Usatii, M. Della Noce, L. Lancellotti & P. Delli Veneri  
ENEA, Portici, Italy  
L. Serenelli, M. Izzi & M. Tucci  
ENEA, Rome, Italy
- 2AV.3.19 Passivated Rear and Front Contacts (PeRFeCT) Solar Cells: The Poly-Poly and the Hybrid Approaches**  
G. Limodio, G. Yang, H. Ge, A. Weeber, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands
- 2AV.3.20 SiO<sub>x</sub>:H Passivation Layer Fabricated by Atomic Layer Deposition for Heterojunction Solar Cells**  
M. Lozach, S. Nunomura, H. Sai, T. Matsui & K. Matsubara  
AIST, Tsukuba, Japan

- 2AV.3.22 Copper Plating Chemistry for Solar Cells**  
A. Lachowicz, J. Geissbühler, A. Faes, J. Horzel,  
M. Despeisse & C. Ballif  
CSEM, Neuchâtel, Switzerland
- 2AV.3.23 ITO Sputtering Damage to Silicon Heterojunction Solar Cells with Cat-CVD a-Si Films and Its Recovery**  
T. Konishi & K. Ohdaira  
JAIST, Ishikawa, Japan
- 2AV.3.24 Fabrication and Simulation of ZnS/p-Si Heterojunction Solar Cells**  
K. Qiu & H. Shen  
Sun Yat-sen University, Guangzhou, China  
D. Qiu  
Sun Yat-sen University, Shunde, China
- 2AV.3.26 Fabrication of Silicon Heterojunction Cells on 50µm Epitaxial Substrates**  
T. Bearda, A. Umer, S. Jambaldinni, M. Filipic,  
K. Van Nieuwenhuysen, H. Sivaramakrishnan  
Radhakrishnan, V. Depauw, I. Gordon, M. Debucquoy,  
J. Szlufcik & J. Poortmans  
imec, Leuven, Belgium  
Y. Abdulraheem  
Kuwait University, Safat, Kuwait
- 2AV.3.27 Fabrication and Characterization of 20%+ Efficient Silicon Heterojunction Solar Cells with Direct Rear Aluminum Metallization**  
J. Bryan, Z.J. Yu, J. Shi, W. Weigand, M. Leilaieoun,  
K.C. Fisher & Z.C. Holman  
Arizona State University, Tempe, United States
- 2AV.3.28 Fundamental Constraints Imposed by Thermionic Emission Barrier at the Hetero-Interface and by pn Junction Diffusion Barrier on the Fill Factor and Efficiency of SHJ Cells**  
M.Y. Ghannam & Y. Abdulraheem  
Kuwait University, Safat, Kuwait
- 2AV.3.29 Silver Material for Next Generation Heterojunction Solar Cells**  
L. Serenelli, M. Izzì & M. Tucci  
ENEA, Rome, Italy  
M. Miliciani  
Chimet, Vicomaggio, Italy
- 2AV.3.30 Comparison between a-SiO<sub>x</sub>:H and a-Si:H as Passivation Buffer Layer for Heterojunction Solar Cells**  
L. Martini, L. Serenelli, F. Menchini, M. Izzì & M. Tucci  
ENEA, Rome, Italy  
R. Asquini  
University of Rome „La Sapienza“, Italy
- 2AV.3.31 The Performances of Heterojunction Interdigitated Back-Contact (HBC) Solar Cell with Intrinsic Amorphous Silicon as Front Surface Passivation Layer**  
R. Jia, K. Tao, Q. Li, C. Sun, X. Dai, X. Liu & Z. Jin  
CAS, Beijing, China
- 2AV.3.32 Performance of Encapsulated Reactive Silver Ink Metallized Solar Cells**  
A.M. Jeffries, A. Mamidanna, O. Hildreth & M.I. Bertoni  
Arizona State University, Tempe, United States
- 2AV.3.34 A Novel Bifacial c-Si Cell Structure and Process for High Efficiency and Low Cost**  
H. Huang, G. Tian, J. Yuan, W.R. Fahrner & L. Zhou  
Nanchang University, China  
W. Zhang & X. Li  
GCL System Integration Technology, Shanghai, China  
W. Chen & R. Liu  
Hareon Solar Technology, Taicang, China
- 2AV.3.36 Reducing Surface Defects and Absorption of Organic Material in High Performance Organic/Silicon Nanostructure Hybrid Solar Cells**  
Y. Lai, H.-J. Syu & C.-F. Lin  
NTU, Taipei, Taiwan
- 2AV.3.37 A Novel Procedure for Fabricating Sub-Micron Textures on Various Thick Crystalline-Silicon Solar Cells Down to 50 µm with Low-Reflectivity in Wide Wavelength**  
C.T. Nguyen, K. Koyama, T.C.T. Huynh, S. Terashima & H. Matsumura  
JAIST, Ishikawa, Japan
- 2AV.3.38 Fabrication of High Density Nano-Micro Hierarchical Subwavelength Structure for Enhancing Light Trapping Properties in a Few Seconds**  
H.A. Chaliyawala, A. Ray, R. Pati & I. Mukhopadhyay  
PDP University, Gandhinagar, India
- 2AV.3.39 Influence of DC-Sputtered ITO Layers on Performance of Silicon Heterojunction Solar Cells**  
A. Abramov, D. Andronikov, K. Emtsev, G. Ivanov,  
I. Nyapshaev, D. Orekhov, A. Semenov, G. Shelopin & E. Terukov  
RAS/ Ioffe, St. Petersburg, Russia



**6BV.1.10 Operational Fault-Mode Differentiation in a Large-Scale Photovoltaic Power Plant with Fault-Diagnostic Function**

T. Kohno, H. Shitanishi, M. Toyosaki, K. Gokita,  
T. Nakamura & Y. Nagayama  
Hitachi, Tokyo, Japan  
K. Morikawa  
TEPCO, Yokohama, Japan  
M. Hatano  
Tokyo Institute of Technology, Japan

**6BV.1.11 Innovative Simulation Tools for an Exhaustive and Synthetic Characterization of the Glare Occurrences for the Design and the Administrative Instruction of Large-Scale Photovoltaic Plants**

C. Vernay, A.M. Realpe, D. de Gabaï & S. Pitaval  
SOLAÏS, Sophia Antipolis, France

**6BV.1.12 Modeling and Experimental Validation of Power Estimation of a Multi-Crystalline Silicon Photovoltaic System Using Four and Five Parameter Solar Cell Models under Real Field Conditions**

M. Kumar & A. Kumar  
IIT Roorkee, India

**6BV.1.13 Performance Analysis of Multi-Photovoltaic (PV)-Grid Tied Plant in Malaysia**

L.M. Halabi & S. Mekhilef  
University of Malaya, Kuala Lumpur, Malaysia

**6BV.1.14 A Sensitivity Analysis and a Calibration of a Numerical Code for the Prediction of Power from a Photovoltaic Plant**

M. Carmassi, D. Binesti, H. Bouia, M. Chiodetti & A. Lindsay  
EDF R&D, Moret-sur-Loing, France  
E. Parent & P. Barbillon  
AgroParisTech, France  
M. Keller  
EDF R&D, Chatou, France

**6BV.1.15 PV-Battery and Diesel Hybrid System for Irrigation of a Farm in Patagonia**

R. Knecht & F.P. Baumgartner  
ZHAW, Winterthur, Switzerland

**6BV.1.16 Comparison of Performance and Degradation of Different PV Plant Configurations in Johannesburg, South Africa**

T. Serameng  
Eskom, Cleveland, South Africa  
K.T. Roro  
CSIR, Pretoria, South Africa  
E.E. van Dyk, J. Crozier & F. Vorster  
NMMU, Port Elizabeth, South Africa

**6BV.1.17 Economic Analysis of a Typical Photovoltaic Power Plant in Turkey**

A.B. Karaveli, B.G. Akinoglu & U. Soytaş  
METU, Ankara, Turkey

**6BV.1.19 Estimation of the Final Yield of Grid Connected PV System in the Eastern Africa Region**

F. Habyarimana  
University of Rwanda, Kigali, Rwanda  
H.G. Beyer  
University of the Faroe Islands, Torshavn, Faroe Islands

**6BV.1.21 Real-Life Performance of a 10-MW Single-Axis Tracking Photovoltaic Plant in Kuwait Oil Company for the Operation of Electric Submersible Pumps**

R.A. Sherif, A. Al-Qudaihi, L. Al-Bairami, A. Najaf & R. Al-Ajmi  
Kuwait Oil Company, Ahmadi, Kuwait

**6BV.1.22 Computational Tool for the Modelling and Simulation of Grid-Connected Photovoltaic Solar Systems**

A. Cardoso Ferreira, L.C. Macedo Blasques,  
M.A. Barros Galhardo & J. Tavares Pinho  
UFPA, Belém, Brazil

**6BV.1.23 PV Powered Battery-Less Reverse Osmosis Desalination System Operating at Variable Pressure Conditions and Controlled by a Multi-Agent Decentralized Energy Management System**

C.-S. Karavas, K.G. Arvanitis, G. Kyriakarakos & G. Papadakis  
Agricultural University of Athens, Greece  
D.D. Piromalis  
Piraeus University of Applied Sciences, Greece

**6BV.1.24 A 360 kWp PV Irrigation System to a Water Pool in Spain**

I.B. Carrêlo, R.H. Almeida, L.M. Carrasco,  
F. Martinez-Moreno & L. Narvarte  
UPM, Madrid, Spain

**6BV.1.25 A 160 kWp Constant Pressure PV Irrigation System in Spain**

I.B. Carrêlo, R.H. Almeida, F. Martinez-Moreno,  
L.M. Carrasco & L. Narvarte  
UPM, Madrid, Spain

**6BV.1.26 Large-Scale Hybrid PV-Grid Irrigation System**

R.H. Almeida, I.B. Carrêlo, L.M. Carrasco,  
F. Martinez-Moreno & L. Narvarte  
UPM, Madrid, Spain

**6BV.1.27 A 140 kW Hybrid PV-Diesel Pumping System for Constant-Pressure Irrigation**

R.H. Almeida, I.B. Carrêlo, F. Martinez-Moreno,  
L.M. Carrasco & L. Narvarte  
UPM, Madrid, Spain

**6BV.1.28 A New Metric for Assessing Local Mechanical Load Scenarios for PV Modules at Specific Locations**

C. Camus, P. Offermann, C. Buerhop-Lutz & J. Hauch  
ZAE Bayern, Erlangen, Germany  
M. Weissmann  
LMU Munich, Germany  
C.J. Brabec  
University of Erlangen-Nuremberg, Germany

**6BV.1.29 System Sizing for Residential PV and EES Systems**

T. Melloh, T. Fehling, G. Kleiss & B. Nacke  
University of Hannover, Germany

**6BV.1.30 Effect of Operational Parameters on the Production of a Solar Distiller Coupled to a Hybrid Photovoltaic Thermal Collector**

L. Maifi & T. Kerbache  
University Constantine, Algeria

**6BV.1.31 Energy Performance of a 1.2 MWp Photovoltaic System Distributed over Nine Buildings at Utrecht University Campus**

W.G.J.H.M. van Sark, A.C. de Waal, J. Uithol, N. Dols,  
F. Houben, R. Kuepers & M. Scherrenburg  
Utrecht University, The Netherlands  
B. van Lith  
BAM, Bunnik, The Netherlands  
F. Benjamin  
ProfiNRG, Harmelen, The Netherlands

**6BV.1.32 Automatic Technical and Economic Design Optimization of Photovoltaic Systems**

N. Ellermann & H. te Heesen  
Trier University of Applied Sciences, Neubrücke, Germany

**6BV.1.33 Evaluating the Performance of PV Module & System under Field Conditions**

J.-K. Lim, M. Kim, S. Yoon, J.H. Ahn, M.-I. Hwang & S. Lee  
Hyundai Heavy Industries, Yongin, Korea South

**6BV.1.34 The Practicability of Outdoor Measurement Methods for Photovoltaic Installations**

W. Mühleisen, L. Neumaier & C. Hirschl  
CTR, Villach, Austria  
M. Spielberger  
PVSV, Guttaring, Austria  
H. Sonnleitner  
ENcome, Klagenfurt, Austria  
Y. Voronko & G. Eder  
OFI, Vienna, Austria  
B. Kubicek & R. Ebner  
AIT, Vienna, Austria

**6BV.1.35 The Use of Logistic Regression for Evaluating Climate-Relevant PV Module Failures**

N. Vollert, L. Neumaier, W. Mühleisen & C. Hirschl  
CTR, Villach, Austria  
M. Halwachs  
AIT, Vienna, Austria  
L. Maul  
University of Applied Sciences Vienna, Austria  
Y. Voronko  
OFI, Vienna, Austria  
A. Mihaljevic  
PCCL, Leoben, Austria

**6BV.1.36 Outdoor Electroluminescence Imaging of Crystalline Photovoltaic Modules: Update of Technical Development in Imaging and Analysing Technique**

S. Koch & L. Podlowski  
PI Berlin, Germany  
A. Fladung  
Solartechnik-Fladung, Aachen, Germany  
P. Clemens  
Renution, Riegelsberg, Germany

**6BV.1.37 Fire Safety of PV Modules and Buildings: Overviews, Bottlenecks and Hints**

P. Bonomo, E. Saretta, F. Frontini, M. Caccivio & G. Bellenda  
SUPSI, Canobbio, Switzerland  
G. Manzini  
RSE, Milan, Italy  
P. Cancelliere  
Italian National Fire Services, Rome, Italy

**6BV.1.38 Building a Renewable Island System - a Simulation-Based Case Study for the Greek Island of Tilos**

S. Zurmühlen, G. Angenendt, J. Badeda & D.U. Sauer  
RWTH Aachen University, Germany

**6BV.1.40 Floating Photovoltaic Module Temperature Operation Characteristics**

W.C. Lawrence, C.-S. Won, D.-C. Kim, K.-W. Kim,  
B.-R. Kang & G.-H. Lee  
LSIS, Anyang-Si, Korea South  
O. Kwon & S. Lee  
K-water, Daejeon, Korea South

**6BV.1.41 Design, Implementation and Performance Analysis of an Efficient Sub-Degree Solar Tracker System**

M. Hesham, M. Taha, I.M. Mahmoud, A. Sahbel,  
S. Abdelatif & H. Ghali  
The British University in Egypt, Cairo, Egypt

**6BV.1.42 Performances of Grid-Connected PV Systems in Operation on the Island of Maui**

S. Busquet  
University of Hawaii, Honolulu, United States

**6BV.1.43 Investigating a Potential Linear Model for Prediction of Monthly Snow-Induced Production Losses for Rooftop PV**

M. van Noord & T. Berglund  
Esam AB, Stockholm, Sweden  
M. Murphy  
Umeå University, Sweden

**6BV.1.44 Statistical Analysis of Infrared-Inspections of PV-Plants**

C. Buerhop-Lutz, T. Pickel, H. Scheuerpflug, C. Camus &  
J. Hauch  
ZAE Bayern, Erlangen, Germany  
C.J. Brabec  
University of Erlangen-Nuremberg, Germany

**6BV.1.45 Reverse Voltage Simulation of Crystalline Silicon PV Module with Damaged Bypass Circuit**

N. Oka, Y. Takahashi, K. Fujiwara & Y. Ishihara  
Doshisha University, Kyotanabe, Japan  
S. Nishikawa  
Nihon University, Tokyo, Japan

**6BV.1.46 Potential Induced Degradation Occurrence in Photovoltaic Power Plant**

J. Hylsky, D. Strachala, J. Vanek & J. Mucha  
Brno University of Technology, Czech Republic

**6BV.1.47 Feasibility Evaluation of Installing Photovoltaic Mounting System on Recycling Water Reservoir in Iran: A Case Study in Petrochemical Industry**

M. Nazififard  
University of Kashan, Iran

**6BV.1.48 Soiling in the Atacama Desert: Characterisation of Soiling Rates and Their Geographic Variation**

P. Darez, C. Darr & J. Atkinson-Willes  
350renewables, Las Condes, Chile

**6BV.1.49 An Adaptive PSO-Based Approach for Optimal Energy Harvesting in PV Systems**

S.Z. Mirbagheri Golroodbari & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands

**6BV.1.51 A Computational Study for Enhancing the Output Power of a Photovoltaic Panel Based on Various Back Pipe Structures**

A. Bayoumi & S. Abdelatif  
BUE, Cairo, Egypt  
A.S.G. Khalil  
AASTMT, Giza, Egypt  
O.E. Abdellatif  
Banha University, Egypt  
M. Abdelrasheed & N.A. Mahmoud  
Ain Shams University, Cairo, Egypt

**VISUAL PRESENTATIONS 6BV.2**

**13:30 - 15:00 Design and Operation of PV Systems (II)**

**6BV.2.2 Comparison of Measured Field Performance of a Grid Connected CdTe Photovoltaic System to Expected Performance via PlantPredict Software**

A. Benazzouz, Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco  
J. Sorensen & K. Passow  
First Solar, Perrysburg, United States

**6BV.2.3 Web Application for Yield Optimization of Photovoltaic Systems**

H. te Heesen & M. Rimpler  
Trier University of Applied Science, Neubrücke, Germany

**6BV.2.4 Laboratory Infrastructure for Research and Capacity Building on Isolated and Grid-Connected Smart Micro-Grids**

A.R. Arrifano Manito, K. Novaes, A.R. Mocelin,  
T.A.F. Melendez & R. Zilles  
University of São Paulo, Brazil  
J.T. Tavares Pinho  
UFPA, Pará, Brazil

- 6BV.2.5 Deep Learning for Fleet Performance Monitoring**  
R. Dinyari  
Sunrun, San Francisco, United States
- 6BV.2.6 Defect Detection in Solar Cells Using Electroluminescence Imaging and Image Processing Algorithms**  
F. Farress, A. El Hassani El Alaoui, Z. Naimi & A. Bennouna  
IRESEN, Rabat, Morocco  
M.N. Saidi & A. Tamtaoui  
INPT, Rabat, Morocco
- 6BV.2.8 Analysis and Investigation of a Grid Connected Photovoltaic Installation Located in North of Morocco**  
I. Baghdadi, A. El Yaakoubi, K. Attari, Z. Leemrani & A. Asselman  
Abdelmalek Essaadi University, Tetouan, Morocco
- 6BV.2.9 Very Short-Term Solar Irradiation Forecasting Method Using State Estimation Based on Kalman Filters for PV-Diesel Hybrid Systems**  
J.A. Notholt  
Reutlingen University, Germany
- 6BV.2.10 Quick and Effective Plant Evaluation Using Dark IV String Curves**  
K. Mertens & A. Arnds  
Münster University of Applied Sciences, Steinfurt, Germany  
M. Diehl  
photovoltaikbuero, Rüsselsheim, Germany
- 6BV.2.11 Novel Soiling Detection System for Solar Panels**  
M. Korevaar, J. Mes & X. van Mechelen  
Kipp & Zonen, Delft, The Netherlands
- 6BV.2.12 Improvements of Photovoltaic Systems by Using Solar Tracking in Equatorial Regions**  
F. Ordóñez & C. Morales  
Escuela Politecnica Nacional, Quito, Ecuador
- 6BV.2.13 Advanced Failure Detection Algorithms and Performance Outlier Decision Classification for Grid-Connected PV Systems**  
A. Livera, G. Makrides & G.E. Georghiou  
University of Cyprus, Nicosia, Cyprus  
J. Sutterlueti  
Gantner Instruments, Schruns, Austria
- 6BV.2.14 Characterization of a Stand-Alone PV Cooling/Heating System**  
C. Lorenzo Navaro & L. Narvarte  
UPM, Madrid, Spain  
M.A. Bofill  
Domus Ingeniería Energética, Elda, Spain

- 6BV.2.15 Development and Integration of a PV Smart Home in Colombia**  
L.A. García Gutiérrez, M. Bressan, J.F. Jiménez Vargas & A.I. Cadena  
University of Los Andes, Bogotá, Colombia  
C. Alonso  
LAAS, Toulouse, France
- 6BV.2.16 Laboratory of Hybrid Systems and Mini-Grids**  
C. Barbosa & J. Correa  
UFPA, Ananindeua, Brazil  
J.T. Tavares Pinho, M.A. Barros Galhardo, J. Verissimo, I. Lemos & E.M.D. Pereira  
UFPA, Belém, Brazil
- 6BV.2.17 Solar Photovoltaic Panels Failures Causing Power Losses: A Review**  
G.-J.-P. Tevi, M.E. Faye, M. Sene & A. Seidou Maiga  
Gaston Berger University, Saint-Louis, Senegal
- 6BV.2.18 A Monitoring Architecture Proposition for Photovoltaic Plants**  
S. Sarikh, M. Raoufi & A. Bennouna  
Cadi Ayyad University, Marrakech, Morocco  
A. El Hassani El Alaoui & A. Benlarabi  
IRESEN, Rabat, Morocco
- 6BV.2.19 Solar Farm Cleaning Robot: Eco-Friendly Cleaning of Solar Farms with Reduced Energy and Water Consumption**  
K. Molnar, Z. Bilau & I. Bogar  
ProDSP Technologies, Budapest, Hungary  
M.P. Bellmann, B. Rynningen & W.R. Glomm  
SINTEF, Trondheim, Norway  
S. Arbab  
NTNU, Trondheim, Norway
- 6BV.2.20 Development of an RTC Based Multilevel Solar Panel System**  
T. Debnath, S.N. Imtiaz, S.F. Nawaz, A. Al Mahmud & M. Rahman  
BRAC University, Dhaka, Bangladesh
- 6BV.2.21 Descriptive Statistics on the Climate Related Performance and Reliability Issues from Global PV Installations**  
M. Halwachs, K.A. Berger, M. Schwark & R. Ebner  
AIT, Vienna, Austria  
L. Maul  
UAS Technikum, Vienna, Austria  
L. Neumaier, N. Vollert, W. Mühleisen & C. Hirschl  
CTR, Villach, Austria  
Y. Voronko  
OFI, Vienna, Austria  
A. Mihaljevic  
PCCL, Leoben, Austria

**6BV.2.22 The Development and Test of the PV Concentrator System With Electrical and Thermal Output**

A.V. Okhorzina & A.V. Yurchenko  
Tomsk Polytechnical University, Russia  
N. Bernhard  
Anhalt University of Applied Sciences, Köthen, Germany

**6BV.2.23 Harmonising Data Collection from the Field to Determine Long Term Reliability Trends**

L. Azpilicueta  
EVASA, Brussels, Belgium  
L. Garreau-Iles  
DuPont, Meyrin, Switzerland  
G. Masson  
Becquerel Institute, Brussels, Belgium

**6BV.2.24 Autonomous Solar-Wind Power Forecasting Systems**

A.V. Yurchenko, A. Bikbulatov & A.V. Okhorzina  
Tomsk Polytechnical University, Russia

**6BV.2.26 PHSO: A Graphic User Interface Optimizer for the Sizing Design of PV Hybrid Systems**

C.D. Rodríguez Gallegos, O. Gandhi, T. Reindl & S.K. Panda  
SERIS, Singapore

**6BV.2.27 Fault Diagnosis, Identification and Localization of Photovoltaic Plants through Infrared Thermography, Review of the International IEC 62446-3**

G. Vannier, C. El Mkadmi, L. Ha Duy & F. Al Shakarchi  
CEA, Le Bourget du Lac, France

**6BV.2.29 Luminescence Imaging Strategies for Drone-Based PV Array Inspection**

G.A. dos Reis Benatto, N. Riedel, S. Thorsteinsson, P.B. Poulsen, A. Thorseth, O. Bjarlin Jensen, C. Dam-Hansen, C. Mantel & S. Forchhammer  
Technical University of Denmark, Roskilde, Denmark  
K.H.B. Frederiksen  
Kenergy, Horsens, Denmark  
J. Vedde  
SiCon, Birkerød, Denmark  
M. Petersen  
Skive Kommune, Denmark  
H. Voss & M. Messerschmidt  
Sky-Watch, Nordjylland, Denmark  
H. Parikh, S.V. Spataru & D. Sera  
Aalborg University, Denmark

**6BV.2.30 Towards Automated Design of Optimal Photovoltaic Systems**

M. van Hoolwerff, J. Donker, J. Bronkhorst & J.P. Versluijs  
Solar Monkey, Delft, The Netherlands  
M. van Til & S. Briels  
Readaar, Amsterdam, The Netherlands  
O. Tsafarakis & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands  
O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands

**6BV.2.31 Influence of Small Defects on the Production and the Safety of PV Plants**

M. Pinho Almeida, A.R. Arrifano Manito, G. Figueiredo & R. Zilles  
University of São Paulo, Brazil

**6BV.2.32 A Comparative Study of Two Models for Evaluating the Power of Photovoltaic Modules in a Standalone Power Plant**

A. El Fathi, M. Akhsassi, A. Bennouna & A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco

**6BV.2.33 Experimental Yield Study of Bifacial PV Modules in Nordic Conditions**

E. Molin & E. Wäckelgård  
Dalarna University, Falun, Sweden  
B. Stridh  
Mälardalen University, Västerås, Sweden  
A. Molin  
PPAM Solkraft, Ljungsbro, Sweden

**6BV.2.34 Early Degradation of Photovoltaic Modules Based on n Type Solar Cells**

G. Figueiredo, R. Zilles & M. Pinho Almeida  
University of São Paulo, Brazil

**6BV.2.35 A Detailed Performance Model for Bifacial PV Modules**

C.W. Hansen, D.S. Riley, M. Lave & J.S. Stein  
Sandia National Laboratories, Albuquerque, United States  
C. Deline  
NREL, Golden, United States  
A. Asgharzadeh & F. Toor  
The University of Iowa, United States

**6BV.2.36 Detection of Premature Degradation in Utility Scale PV Plants Based on Advanced Monitoring Data Analysis**

G. Mütter, B. Eizinger & R. Vallavanti  
Alternative Energy Solutions, Vienna, Austria



- 6BV.2.37 Where Has All the Power Gone? A Health Check of Italian Solar Electricity in 2016**  
A. Virtuani, M. Marzoli & M. Pravettoni  
O'Sole, Milan, Italy  
A. Skoczek & J. Betak  
Solargis, Bratislava, Slovakia
- 6BV.2.38 Performance and Reliability of a Professional Small-Island Hybrid PV-System**  
H. Ossenbrink  
Band Gap, Bad Feilnbach, Germany
- 6BV.2.39 Improved Method of Levenberg-Marquardt Combined with Simulated Annealing for Parametric Identification of Solar Cell Double Diode Model**  
F. Dkhichi, B. Oukarfi, Y. El Kouari & A. Fakkar  
University of Hassan II, Mohammédia, Morocco
- 6BV.2.40 Design and Performance of a Real Scale Refrigerated Photovoltaic Plant Installed in a Hydroelectric Plant**  
V.O. Silva, A.L. Veiga Gimenes, S. Gomes Relva,  
M.E. Morales Udaeta & L.C. Ribeiro Galvão  
University of São Paulo, Brazil
- 6BV.2.41 Development of Robust Algorithm for Autonomous System Health Monitoring of Large-Scale Based Solar Farm**  
S. Arosh, K. Ghosh, S. Prakash & S.P. Duttagupta  
IIT Bombay, Mumbai, India
- 6BV.2.42 A Quantitative Study of Variable Orientation Methods for Enhancing Solar Power Generation on Tethered Aerostats**  
S. Gupta, S.P. Duttagupta, L. Vachhani & M. Mitra  
IIT Bombay, Mumbai, India
- 6BV.2.44 Agrovoltaic Solution: Benefits of Bifacial Modules in Greenhouses**  
L. Bothorel & L. Weiss  
Voltec Solar, Dinsheim sur Bruche, France
- 6BV.2.45 On the Calculation of the STC Power of PV Generators by Using Typical Monitoring System Data**  
M. Muñoz, M. García, I. de la Parra, J. Marcos & L. Marroyo  
UPNa, Pamplona, Spain
- 6BV.2.46 High-Fidelity Solar Power Income Modeling for Solar-Electric Aircraft: Development and Flight Test Based Verification**  
P. Oettershagen & R. Siegwart  
ETH Zurich, Switzerland
- 6BV.2.47 Consumer-Friendly Application for Off-Grid Solar Design**  
A. Gritzman, T. Kuriem, T. Chiewe & J. Ditsela  
IBM Research, Johannesburg, South Africa

- 6BV.2.48 Development of a Model-Based Control Application Compliant with IEC 61499 for Building Energy Systems with a Focus on Photovoltaics**  
M. Jakobi, T. Tjaden & V. Quaschnig  
Berlin University of Applied Sciences, Germany  
U. Stöckli & L. Meier  
Vela Solaris, Winterthur, Switzerland
- 6BV.2.49 Power Performance Analysis of Transparent DSSC BIPV Window Based on 2 Years Measurement Data in Full Scale Test Facility**  
J. Yoon, H. Lee, S. Kim, R. Lee & M.-J. Choi  
Hanbat National University, Daejeon, Korea South
- 6BV.2.50 Techno-Economical Analysis of Off-Grid Photovoltaic LED Road Lighting Systems for Turkey**  
A.C. Duman & O. Güler  
Istanbul Technical University, Turkey
- 6BV.2.51 Optimization of Solar PV Systems for Demand Profile Matching**  
J. Alshahrani & P. Boait  
De Montfort University, Leicester, United Kingdom
- 6BV.2.52 Solar Photovoltaic for Sustainable Use in Trituration Oil Olive Unit and Energy Efficiency in Cold and Hydric Storage**  
S. Mounir  
National School of Fez, Morocco  
S. Ladouy, A. Khabbazi & Y. Maaloufa  
University Mohammed V-Agdal, Rabat, Morocco  
K. Harrouni  
National School of Rabat, Morocco

#### VISUAL PRESENTATIONS 6BV.3

15:15 - 16:45 **Solar Resource and Forecasting / Building, Infrastructure and Landscape Applications / Grid and Energy System Integration**

- 6BV.3.1 Implementing Procedures for Building a Bankable Dataset and Smart Solar Resource Assessment**  
M.H. Bouhamidi & A. Amar  
Masen, Rabat, Morocco

**6BV.3.2 Solar Resource for High Penetration and Large Scale Applications – A New Joint Task of IEA PVPS and IEA SolarPACES**

J. Remund  
Meteotest, Bern, Switzerland  
L. Ramirez  
CIEMAT, Madrid, Spain  
S. Wilbert  
German Aerospace Center, Almeria, Spain  
P. Blanc  
MINES ParisTech, France  
E. Lorenz  
Fraunhofer ISE, Freiburg, Germany  
D. Renné  
Clean Power Research, Boulder, United States

**6BV.3.4 A Global Hourly Solar Radiation Data Set Using Satellite and Reanalysis Data**

T. Huld & A.M. Gracia Amillo  
European Commission JRC, Ispra, Italy  
J. Trentmann  
German Meteorological Service, Offenbach, Germany

**6BV.3.5 Assessment of the Optimal Data Sampling Criteria for a Sub Second ISO 9060 Secondary Standard Pyranometer**

J.M. da Costa Pó & K. Hoogendijk  
EKO Instruments, The Hague, The Netherlands  
W. Beuttell  
EKO Instruments, San Jose, United States  
A. Akiyama  
EKO Instruments, Tokyo, Japan

**6BV.3.6 Map of Atmospheric Clarity Index for Colombia**

D.J. Rodriguez Patarroyo, J. Hernández & A. Jaramillo  
District University of Bogotá, Colombia

**6BV.3.7 Comparison of Historical Satellite Based Estimates of Solar Radiation Resources with Radiometric Measures for Colombia Conditions**

D.J. Rodriguez Patarroyo, J. Hernández & F. Santamaría  
District University of Bogotá, Colombia

**6BV.3.8 Solar Irradiance Forecast Using Satellite Images: The Benefits of Autoregressive Algorithms**

S. Cros, M. Turpin, M. De Roubaix & N. Schmutz  
Reuniwatt, Sainte-Clotilde, Reunion

**6BV.3.10 Comprehensive Analysis of Solarimetry Elements for Primary Energy Forecasting Methodologies Related to Photovoltaic Power Plants**

S. Gomes Relva, M.E. Morales Udaeta, V.O. Silva,  
A.L. Veiga Gimenes & L.C. Ribeiro Galvão  
University of São Paulo, Brazil

**6BV.3.11 Best Practices Guide to Uncertainty Estimation for the National Solar Radiation Database (NSRDB 1998-2015)**

A. Habte & M. Sengupta  
NREL, Golden, United States

**6BV.3.12 A New Method of Segmentation and Classification of Global Solar Radiation Sequences**

T. Soubdhan  
University of Antilles Guyane, Pointe à Pitre, France

**6BV.3.13 Analytic Correlation Function for Clouds for the Analysis of PV System Power Fluctuations**

B. Elsinga & W.G.J.H.M. van Sark  
Utrecht University, The Netherlands

**6BV.3.14 Intra-Day Forecasts of PV Power with Numerical Weather Prediction Data and Machine Learning in Kyushu, Japan**

J.G.S. Fonseca Jr. & K. Ogimoto  
University of Tokyo, Japan  
F. Uno & T. Oozeki  
AIST, Tsukuba, Japan

**6BV.3.15 Statistical Techniques Used to Improve Solar Resource Assessments for Photovoltaic Plants Applications**

C.M. Clohessy, E.E. van Dyk, G.D. Sharp & J. Hugo  
NMMU, Port Elizabeth, South Africa

**6BV.3.16 A New Approach for Regional Photovoltaic Power Estimation and Forecast**

M. Pierro & C. Cornaro  
University of Rome II, Italy  
M. De Felice  
ENEA, Rome, Italy  
E. Maggioni, A. Perotto & F. Spada  
Ideam, Cinisello Balsamo, Italy  
D. Moser  
EURAC, Bolzano, Italy

**6BV.3.17 A Hybrid Solar Radiation Forecasting Based on Data Mining and Wavelet Analysis**

R. Kumar & V. Vijay  
IIT Jodhpur, India

**6BV.3.19 Forecasting PV Generation**

Y.F. Siew, J. Taylor, C. Allen, Q. Huxley, J. Briggs & A.R. Buckley  
University of Sheffield, United Kingdom

**6BV.3.20 SolTrack: A Free, Fast and Accurate C/C++ Routine to Compute the Position of the Sun**

M.V. van der Sluys & P.J.M. van Kan  
HAN University of Applied Sciences, Arnhem, The Netherlands

**6BV.3.21 A Multifunctional Low-Cost Scalable Field Monitoring System**

C. Montes, O. González, G. Moncho, M. Padrón,  
J. Fernández, J. Rodríguez, M. Friend & M. Cendagorta  
ITER, Granadilla de Abona, Spain  
S. González-Pérez, B. González-Díaz,  
C. Hernandez-Rodriguez, J. Sanchiz & R. Guerrero-Lemus  
ULL, La Laguna, Spain

**6BV.3.24 Evaluation and Comparisons of the Models to Calculate Solar Irradiation on Inclined Solar Panels for Ankara**

T. Özden, A.B. Karaveli & B.G. Akinoglu  
METU, Ankara, Turkey

**6BV.3.25 A Review of Daily Global Solar Radiation Modeling Using Different Statistical Methods Based on Sunshine Duration in Gran Canaria Island**

F. Díaz, L. Mazorra Aguiar & F. Déniz Quintana  
ULPGC, Las Palmas de Gran Canaria, Spain

**6BV.3.28 Site-Specific Evaluation of Errors and Uncertainty in Irradiance Measurements**

A. Driesse  
PV Performance Labs, Freiburg, Germany  
J.S. Stein  
Sandia National Laboratories, Albuquerque, United States

**6BV.3.29 Solar Energy Resource Anywhere in New Zealand**

B. Liley  
NIWA, Omakau, New Zealand

**6BV.3.32 Estimation of Rooftop Potentials for PV in the Education City of Qatar Foundation- Doha, Qatar**

Y.E. Mohieldeen, A. Elrayyah, M. Ayoub, A. Al Marri &  
H. Al Hajri  
Qatar Foundation, Doha, Qatar

**6BV.3.33 A Framework for Rating the Rooftop Solar PV Suitability of a Building Considering the Geographic and Technical Potential in Urban Areas**

T. Hong, M. Lee, K. Jeong, J. Oh & M. Kong  
Yonsei University, Seoul, Korea South

**6BV.3.34 Building Rooftops Photovoltaic Potential in Mountainous Regions: A Case Study from the Pyrenees**

O. Travasset-Baro, G. Francisco, M. Vilella & M. Pons  
OBSA, Sant Julià de Lòria, Andorra

**6BV.3.35 Performance Analysis of the Domestic Hot Water Production with PV Panels and a Heat Pump**

F.J. Aguilar Valero & P.G. Quiles  
University Miguel Hernández, Elche, Spain  
S. Aledo Vives  
Pronter, Elche, Spain

**6BV.3.36 Analysis of Past and Current BIPV and xIPV Policies and Competitiveness Situation in Key European Countries**

P. Macé, G. Masson & A. El Gammal  
Becquerel Institute, Brussels, Belgium  
F. Tilli  
GSE, Rome, Italy  
F. Frontini  
SUPSI, Canobbio, Switzerland  
F. Gérard  
EDORA, Brussels, Belgium

**6BV.3.39 Integration of Renewable Energy Technologies in the Community of the Agricultural University of Athens**

C.-S. Karavas & G. Papadakis  
Agricultural University of Athens, Greece

**6BV.3.40 Reliability and Durability of Complete Polymer Materials for BIPV Application**

S. Boddaert  
CSTB, Sophia Antipolis, France  
L. Bailly & C. Baguenard  
CANOE, Pessac, France  
M. Chaillou  
INNOVEOX, Paris, France  
S. Bourrigaud  
Arkema, Colombes, France

**6BV.3.41 Defining a Neighbourhood Profile to Prepare More Area for Integration of Photovoltaic in Residential Sector**

A. Rahmani & R. Wagner  
Karlsruhe Institute of Technology, Germany

**6BV.3.42 Graffiti on Solar Noise Barriers, a Case Study**

C. Tzikas, M.M. de Jong & W. Folkerts  
SEAC, Eindhoven, The Netherlands  
L.H. Slooff  
ECN, Petten, The Netherlands  
M.G. Debije  
Eindhoven University of Technology, The Netherlands  
S. Verkuilen  
Heijmans Wegen, Rosmalen, The Netherlands

**6BV.3.43 Photovoltaic Solar Urban Power Plants Integrated in Urban Furniture Allowing for Solar Communities within Urban Environments**

H.-J. Rodríguez San Segundo, A. Calo López &  
C. de Vicente Suso  
The South Oracle, Sevilla, Spain

**6BV.3.44 An Overview of Solar Noise Barriers in The Netherlands**

M.M. de Jong, M.N. van den Donker & W. Folkerts  
SEAC, Eindhoven, The Netherlands

**6BV.3.45 Assessing Façade-Integrated Photovoltaics: A Methodology for Their Preliminary Assessment**

S.P. Borg & Y. Zammit  
University of Malta, Msida, Malta

**6BV.3.46 Performance of a Building Integrated Semitransparent Photovoltaic Façade on a Residential House in Northern Europe**

A. Jagomägi & M. Thalfeldt  
Tallinn University of Technology, Estonia  
A. Wimmer  
University of Applied Sciences Upper Austria, Wels, Austria

**6BV.3.47 Introducing the Advanced Active Façade: Towards Near-Zero Buildings Incorporating Building Integrated Photovoltaics Expressive Issues**

A. Clua Longas, S. Lufkin & E. Rey  
EPFL, Lausanne, Switzerland

**6BV.3.48 Evaluation of Thermal Properties for BIPV in Glass Façade**

H. Ishii  
LIXIL, Tokyo, Japan

**6BV.3.49 An In-Depth Comparison of PV Modules in a BIPV Facade Test Setup**

J. Lehmann, W. Parys, J. Goncalves, K. Baert & D. Saelens  
KU Leuven, Heverlee, Belgium  
J. Govaerts & H. Goverde  
imec, Leuven, Belgium

**6BV.3.50 Experimental Investigation and Characterization of Building Integrated Photovoltaic/Thermal Envelope System with Thermal Enhancements, for Roof and Curtain Wall Applications**

E.D. Rounis, Z. Ioannidis, K. Kapsis, R. Dumoulin &  
A. Athienitis  
Concordia University, Montreal, Canada

**6BV.3.51 Transmittance-Tunable Photovoltaic Window Based on Thin-Film Solar Cells and Polymer Dispersed Liquid Crystal Films**

Y. Gao, F.T. Si, O. Isabella, R. Santbergen, G. Yang,  
G. Zhang & M. Zeman  
Delft University of Technology, The Netherlands  
J. Dong  
CAS, Suzhou, China

**6BV.3.52 Energy Performance of a Building with Split Tandem Photovoltaic Windows**

M. Jobin & B. Grandjean  
HES-SO, Geneva, Switzerland

**6BV.3.53 Smart Windows Based on Nanoparticles Solar Concentrators**

A. Zapico, P. Sánchez-Friera & B. Puerto  
Fundación PRODINTEC, Gijón, Spain  
J. Alarcón & R. Garcia Alvarado  
Universidad del Bío-Bío, Concepcion, Chile  
H. Aguilar  
Nanolayer Coating Technologies, Vila Nova de Famalicão,  
Portugal  
C. Silva, J. Gomes, M. Gonçalves, M. Ornelas, D. Sousa &  
A. Barros  
CeNTI, Vila Nova de Famalicão, Portugal  
C. García  
UNEV, Santo Domingo, Dominican Republic

**6BV.3.54 Assessment of Smart PV-Windows for Nzeb in Santiago of Chile**

J. Alarcón & R. Garcia Alvarado  
Universidad del Bío-Bío, Concepción, Chile  
A. Zapico & P. Sánchez-Friera  
Fundación PRODINTEC, Gijón, Spain  
H. Aguilar  
Nanolayer Coating Technologies, Vila Nova de Famalicão,  
Portugal  
C. Silva  
CeNTI, Vila Nova de Famalicão, Portugal  
C. García  
UNEV, Santo Domingo, Dominican Republic

**6BV.3.55 Photovoltaic Electrochromic Module with Uniform Color Change**

L.-M. Huang, C.-Y. Peng, C.-H. Chen, H.-C. Liu &  
C.-J. Huang  
ITRI, Hsinchu, Taiwan

**6BV.3.56 Design, Fabrication and Evaluation of Solar Energy Conversion System Based on Flexible Solar Panels**

M. Esmaeili Shayan, G. Najafi & A. Banakar  
Tarbiat Modares University, Tehran, Iran

**6BV.3.57 Designed BIPV-Elements with Printed Front-Glass: Simulation and Experimental Evaluation of the Effect of Printing on the Electrical Performance**

G.C. Eder  
OFI, Vienna, Austria  
K. Knöbl & L. Maul  
UAS Technikum, Vienna, Austria  
M. Aichinger  
Ertex-Solartechnik, Amstetten, Austria  
G. Peharz & W. Nemitz  
JOANNEUM RESEARCH, Weiz, Austria  
K.A. Berger  
AIT, Vienna, Austria

**6BV.3.58 Performance Assessment of a New Air-Based Building-Integrated Photovoltaic Thermal Solar Collector**

V. Delisle, A. Gagne & J. Ayoub  
Natural Resources Canada, Varennes, Canada  
J.T. Kim & J.H. Kim  
National University of Kongju, Cheonan, Korea South

**6BV.3.59 Thermal Properties of Photovoltaic Modules: The Double Function of BIPV Systems**

C.A. Toledo Arias, R. López Vicente, J. Abad & A. Urbina  
UPCT, Cartagena, Spain

**6BV.3.60 Temperature and Performance Monitoring of White Panels in Facade Configuration**

K. Söderström, V. Musolino & L.-E. Perret-Aebi  
CSEM, Neuchâtel, Switzerland

**6BV.3.61 A Building-Integrated Semi-Transparent PV-Generator Endowed with a Mono-Axial Solar Traker**

R. Carbone  
University „Mediterranea“ of Reggio Calabria, Italy

**6BV.3.62 Hail Resistance of BIPV Composite-Based Lightweight Modules**

A.C. Oliveira Martins, V. Chapuis, A. Virtuani & C. Ballif  
EPFL, Neuchâtel, Switzerland  
L.-E. Perret-Aebi  
CSEM, Neuchâtel, Switzerland

**6BV.3.63 Power Loss through Decorative Elements in the Front Glazing of BIPV Modules: A Systematic Approach**

M. Ebert, M. Wiese, H.R. Wilson & U. Eitner  
Fraunhofer ISE, Freiburg, Germany

**6BV.3.64 Performance Evaluation of Different Architectural Forms and Electrical Topologies for BIPV Parking Lots**

C. Biasi de Moura, S. Shimura, R. Silva Simplicio, R. Herrero Alonso & M. Knörich Zuffo  
University of São Paulo, Brazil

**6BV.3.65 BIPV Affordability**

L. Maturi, J. Adami, M. Lovati & D. Moser  
EURAC, Bolzano, Italy

**6BV.3.67 The Contribution of Façades to the PV Potential for Sites with High Diffuse Fraction**

S.R. Freitas & M. Brito  
University of Lisbon, Portugal

**6BV.3.69 Analysis of the Impact Resolution Has on Load Matching in the Norwegian Context**

K. Sørnes, I. Sartori, K. Tunheim & E. Fredriksen  
SINTEF, Oslo, Norway

**6BV.3.70 Morpho Butterfly Inspired Coloured BIPV Modules**

B. Bläsi, T. Kroyer, O. Höhn & T.E. Kuhn  
Fraunhofer ISE, Freiburg, Germany

**6BV.3.71 Use of the Slopes of the Cirsures Sanitary Landfill for Installation of Photovoltaic Panels: A Preliminary Analysis of Initial Parameters to be Evaluated**

V. De Brida, F. Soares dos Reis & A.C. Pan  
PUCRS, Porto Alegre, Brazil

**6BV.3.74 From PV Systems to Energy Solutions Part II - From the Concept to Reality**

T. Nordmann, R. Lingel & S. Fehling  
TNC Consulting, Feldmeilen, Switzerland

**6BV.3.75 Improve Distribution Grid Hosting Capacity with Optimised PV Deployment**

M. Bledzinska  
Warsaw University of Technology, Poland  
G. Barchi & D. Moser  
EURAC, Bolzano, Italy

**6BV.3.77 Mapping of the Potential Capacity of Grid-Connected PV Systems in Indonesia: A Comparison of Two Methods**

K. Kunaifi & A.H.M.E. Reinders  
University of Twente, Enschede, The Netherlands

**6BV.3.78 On the Development of Long-Term PV Generation Time Series Using PVGIS Model for European Power System Analysis**

I. Moustafelou, I. Gonzalez-Aparicio, P. Alves Dias & A. Zucker  
European Commission JRC, Petten, The Netherlands  
T. Huld  
European Commission JRC, Ispra, Italy

**6BV.3.79 Application of Battery Energy Storage System to Facilitate and Improve the LV Distribution Network in a Community with Photovoltaic Systems for a Future Load Scenario**

A.H. Zenan, E. Christopher & M. Sumner  
University of Nottingham, United Kingdom

**6BV.3.80 Study and Estimation of the Photovoltaics Optimum Share in Microgrid Based on Renewable Energy Sources for Small Rural Settlements in Central European Part of Russia**

P.P. Bezrukikh  
JSC ENIN, Moscow, Russia  
S.M. Karabanov & D.V. Suvorov  
RSREU, Ryazan, Russia  
P.P.jr. Bezrukikh  
LUCOIL JSC, Moscow, Russia  
A.S. Karabanov  
Helios-Resource, Saransk, Russia

**6BV.3.81 Demand Side Management Using PV, Heat Pumps and Batteries – Effects on Community and Building Level**

R. Luthander & J. Widén  
Uppsala University, Sweden  
E. Psimopoulos & C. Bales  
Dalarna University, Borlänge, Sweden

**6BV.3.82 Modelling of PV Prosumers Using a Stationary Battery, Heat Pump, Thermal Energy Storage and Electric Vehicle for Optimizing Self-Consumption Ratio and Total Cost of Energy**

D. Keiner  
OTH Regensburg, Germany  
C. Breyer  
Lappeenranta University of Technology, Finland

**6BV.3.83 Design, Construction and Testing of a Hybrid Grid-Photovoltaic Thermoelectric Device for Cooling, Heating and Dehumidication**

K. Daoudi, N. Mbodji, T.A.A. Arisily & A. Hajji  
Agronomic and Veterinary Institute Hassan II, Rabat, Morocco

**6BV.3.84 Integration of Self-Supply Rooftop Solar Systems (PV & Hot Water) with Battery Storage to Reduce Grid-Buy Electricity by >80% and Eliminate Evening & Morning Energy Peaks: A Case Study for Residential Hawaii**

J. Borland  
J.O.B. Technologies, Aiea, United States  
J. Moore & C. Poncho  
Poncho's Solar, Honolulu, United States  
T. Tanaka & H. McClure  
Tabuchi Electric, San Jose, United States

**6BV.3.86 A Comparison of Strategies for Net Demand Forecasting in Case of PV Power Production and Electricity Consumption**

D. van der Meer, J. Widén & J. Munkhammar  
Uppsala University, Sweden

**6BV.3.87 Online and Offline PV Power Forecasts for Optimal Control of Storage Systems**

J. Barry & J. Thomas  
Karlsruhe Institute of Technology, Eggenstein-Leopoldshafen, Germany

**6BV.3.88 Computationally Inexpensive PV System Model as a Simulation Agent for Large Scale Integration Analysis**

C. Levis & M. Hill  
Cork Institute of Technology, Ireland

**6BV.3.89 Balance of Electric Energy in Brazil and the ARIMA Method Applied to Solar Predictability**

M.A.F.B. Lima, R.R. Melo, P.C.M. de Carvalho, F.L.M. Antunes & D.M. Freitas  
UFC, Fortaleza, Brazil  
J.R. Leite & G.K.L. Rodrigues  
IFCE, Limoeiro do Norte, Brazil

**6BV.3.90 Use of Load Profiles to Optimize Micro Grids of Non-Residential Environments**

J. da Costa Fernandes & M. Schmidt  
University of Applied Sciences Offenburg, Germany

**6BV.3.92 Bidirectional Electric Vehicles Stores PV Energy and Creates New Business Cases for PV - Can This Replace the Stationary Batteries?**

U. Muntwyler & B. Ulrich  
BUAS, Burgdorf, Switzerland

**6BV.3.93 Potential Applications of a Load-Managing Photovoltaic System**

J.A. Azzolini & M. Tao  
Arizona State University, Tempe, United States

**6BV.3.94 Compensation of Forecast Error in Large PV Plants with Battery Storage: Associated Strategies**

J. Marcos, I. de la Parra, M. Muñoz, M. García & L. Marroyo  
UPNa, Pamplona, Spain

**6BV.3.95 Sizing of Urban Distribution Transformers in a Neighbourhood with PV Generation and Energy Storage**

S.R. Freitas & M. Brito  
University of Lisbon, Portugal

**6BV.3.96 PV as Major Energy Source for the Energy Supply of Urban Residential Districts in Central Europe**

J.-S. Telle, R. Völker, T. Kilper & K. von Maydell  
NEXT ENERGY, Oldenburg, Germany

**6BV.3.98 Intelligent Distributed Energy Production System Using Photovoltaic's with Storage of Energy in Hydrogen**

G. Mantescu, N. Olariu & A. Oprea  
Valahia University of Targoviste, Romania  
H.M. Schuster  
ARENA INNOVATION, Stuttgart, Germany  
V.T. Petcu  
GCI Management & Advisory, Bucharest, Romania

**6BV.3.99 Renewable Hydrogen: The Missing Link between the Power, Gas and Mobility Systems**

D. Thomas  
Hydrogenics, Oevel, Belgium

**6BV.3.100 Operation of the High Temperature NaNiCl<sub>2</sub> Batteries Storage System for Management of Photovoltaic Production**

T. Delaplagne, F. Bourry, M. Jung & A. Plissonnier  
CEA, Le Bourget du Lac, France  
S. Darivon, L. Bellemare & C.-E. Baltide  
AME, Ducos, Martinique  
X. Le Pivert  
Steadysun, Le Bourget du Lac, France

**6BV.3.101 Comparative Experimental Investigation of Photovoltaic Panels with and without Thermal Management System Using Phase Change Material**

S. Preet  
BCET, Gurdaspur, India

**6BV.3.102 Influence of PV Battery and Thermal Storage Systems Using Heterogeneous Demand Patterns**

G.B.M.A. Litjens, W.G.J.H.M. van Sark & E. Worrell  
Utrecht University, The Netherlands

**6BV.3.104 Experimental Study of a BIPVT Air System Used for Direct Space Heating / Cooling of a House in Sydney**

M. Farshchimonfared, J.I. Bilbao & A.B. Sproul  
UNSW Australia, Sydney, Australia

**VISUAL PRESENTATIONS 5BV.4**

**17:00 - 18:30 PV Module Performance and Reliability (I)**

**5BV.4.1 A Review of Semi Emerging Photovoltaic Standards: 2013–2017**

S.-T. Hsu, Y.-S. Long & T.-C. Wu  
ITRI, Hsinchu, Taiwan

**5BV.4.2 Modelling and Parameter Identification Using Reduced I-V Data**

H.C.S. Tay  
ST Kinetics, Singapore  
I. Lim  
University of Glasgow, Singapore  
Z. Ye  
REC Solar, Singapore

**5BV.4.3 Note on Cole-Cole Diagrams of Photovoltaic Modules Evaluation**

L. Cerná, T. Finsterle, P. Hrzina & V. Benda  
Czech Technical University of Prague, Czech Republic

**5BV.4.4 Concept of a Photoluminescence Measurement System**

R. Ebner, G. Újvári & B. Kubicek  
AIT, Vienna, Austria

**5BV.4.5 Comparison and Combination of Primary and Secondary Solar Cell Calibration Methods in Order to Reduce the Uncertainties for Photovoltaic Reference Solar Cells**

T. Fey, I. Kröger & S. Winter  
PTB, Braunschweig, Germany  
T.R. Betts  
Loughborough University, United Kingdom  
W. Zaaiman & D. Pavanello  
European Solar Test Installation, Ispra, Italy  
H. Müllejjans  
European Commission JRC, Ispra, Italy

**5BV.4.6 Feasibility Study for PV Measurements at Varying Irradiances on a Large-Area Steady-State Solar Simulator**

I. Sharlandzhiev, M. Field & E. Salis  
European Commission JRC, Ispra, Italy

**5BV.4.7 A Camera-Based Characterization Method for Solar Simulators**

S. Riechelmann & F. Plag  
PTB, Braunschweig, Germany

- 5BV.4.8 Multifunctional LED-Based Facility: Integral and Spectral Characterization of Solar Cells**  
A. Schweitzer, F. Witt, S. Riechelmann & S. Winter  
PTB, Braunschweig, Germany  
T. Schulze-Bubert  
Newport Spectra-Physics, Stahnsdorf, Germany
- 5BV.4.9 Towards Accurate, High-Frequency I-V Curve Measurements of Photovoltaic Modules Applying Electronic Loads**  
K. Spiliotis, G. Van den Broeck, G.H. Yordanov, K. Baert & J. Driesen  
KU Leuven, Belgium  
H. Goverde  
imec, Leuven, Belgium
- 5BV.4.10 Evaluation of a Comprehensive I-V Outdoor-Characterization Method for Photovoltaic Modules**  
L. Gottschalk & B. Hüttl  
University of Applied Sciences Coburg, Germany  
A. Schulze  
Rosenheim University of Applied Sciences, Germany  
F. Becker & M. Queck  
Calyxo, Bitterfeld-Wolfen, Germany
- 5BV.4.11 Wind Speed's Effect on the Temperature of Photovoltaic Panels**  
L. Martin-Carron, A. Macq & N. Cristi  
SUNIBRAIN, Toulouse, France  
R. Becker, D. Graebing & R. Luce  
CNRS, Pau, France
- 5BV.4.13 Proposal and Investigation of Novel Portable Degradation Diagnosis System for PV Module in Actual Operation**  
T. Tanaka, T. Nagayama, T. Hayashi & T. Yanagidaira  
Ibaraki University, Hitachi, Japan  
Y. Inui  
University of Shiga Prefecture, Hikone, Japan
- 5BV.4.14 Outdoor Characterization of CdTe Technology and Seasonal Performance Analysis at Different Latitudes in Europe**  
C. Cornaro & M. Pierro  
University of Rome Tor Vergata, Italy  
D. Moser  
EURAC, Bolzano, Italy  
G. Nofuentes Garrido  
University of Jaén, Spain  
C.A. Gueymard  
Solar Consulting, Colebrook, United States

- 5BV.4.15 Light-Soaking Effects on the Electrical Characteristics of Multicrystalline PV Devices**  
A.T. Alasfour & F.G. Alzubi  
KISR, Safat, Kuwait
- 5BV.4.16 Web-Based Analysis and Management of Monitoring and Meta Data from Outdoor and Laboratory Tests of Solar Energy Systems**  
S. Wiesmeier, M. Köhl & K.-A. Weiß  
Fraunhofer ISE, Freiburg, Germany
- 5BV.4.17 An Inexpensive and Accurate Solar Irradiance Sensor Based on a Small Calibrated PV Module**  
N. Erraissi, N. Aarich, M. Akhsassi, M. Raoufi & A. Bennouna  
Cadi Ayyad University, Marrakech, Morocco
- 5BV.4.18 Filtering Outdoor Current-Voltage Data by Shape**  
B.E. Pieters  
Forschungszentrum Jülich, Germany
- 5BV.4.20 Performance Prediction of PVT Modules – The Link between Thermal and Electrical Operation**  
U. Fritzsche, M. Schweiger & F. Reil  
TÜV Rheinland Energy, Cologne, Germany
- 5BV.4.21 Do Thin Film PV Modules Offer an Advantage under Partial Shading Conditions?**  
C. Tzikas, M. van den Donker & W. Folkerts  
SEAC, Eindhoven, The Netherlands  
E. Gomez & A.H.M. Smets  
Delft University of Technology, The Netherlands
- 5BV.4.22 Quantification of Shading Tolerability for Photovoltaic Modules**  
H. Ziar, B. Asaei & S. Farhangi  
University of Tehran, Iran  
M. Korevaar  
Kipp & Zonen, Delft, The Netherlands  
O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands
- 5BV.4.23 Analysis of PV Module Output Characteristic Based on Laboratory Simulation under Partial Shading Condition**  
R. Chen, Y. Sun & Z. Jie  
ShunDe SYSU Institute, Foshan, China
- 5BV.4.24 Estimation of Local Deterioration Factor in Crystalline Si PV Module by Partial Shading**  
T. Tanase, Y. Takahashi & K. Fujiwara  
Doshisha University, Kyotanabe, Japan



**5BV.4.25 Energy Yield Field Data of Heterojunction – Smartwire PV Modules**

H. Colin, D.R. Heslinga, L. Sicot & G. Razongles  
CEA, Le Bourget du Lac, France

**5BV.4.26 A Comparative Study of PV Modules Performance between Prediction Models and Experience in the Green Energy Park: Crystalline Technology**

A. Benlarabi, B. Ikken, Z. Naimi & A. Ghennioui  
IRESEN, Rabat, Morocco  
M. Akhsassi & A. Bennouna  
Cadi Ayyad University, Marrakech, Morocco  
M. Maaroufi  
University Mohammed V-Agdal, Rabat, Morocco  
C. Hajjaj  
University of Chouaib Doukkali, El Jadida, Morocco

**5BV.4.27 Techno-Commercial Performance Evaluation of 5 Different PV Technologies in Same Weather Conditions - A One Year Practical Case Study**

R. Bohra, R.G. Gowda & M.R. Krishnan  
Infosys, Bangalore, India

**5BV.4.28 Illumination Homogeneity of Bifacial Systems – Outdoor Measurements with Systematically Varied Installation Conditions**

T. Baumann, M. Klenk, N. Keller, F.P. Baumgartner & H. Nussbaumer  
ZHAW, Winterthur, Switzerland

**5BV.4.29 Potential for Photo-Generated Current for Bifacial PV Modules in the Atacama Desert**

P. Ferrada, F. Araya & A. Marzo  
University of Antofagasta, Chile  
P. Besson  
Fraunhofer Chile, Santiago, Chile  
E. Cabrera  
ISC Konstanz, Germany

**5BV.4.30 Shading Effects of the Mounting Structure of Bifacial PV Modules and Impact to the Bypass Diode Lifetime**

S. Voswinkel, V. Wesselak, S. Münter & L. Gerstenberg  
Nordhausen University of Applied Sciences, Germany

**5BV.4.31 Impact of Inhomogeneous Irradiance at the Rear of Panels on Modelled Bifacial Energy Yield**

G.J.M. Janssen, R.S.R. Gali, K. de Groot, A.J. Carr, B.B. Van Aken & I.G. Romijn  
ECN, Petten, The Netherlands

**5BV.4.32 IV Measurement of Bifacial Modules: Bifacial vs. Monofacial Illumination**

A. Schmid, G. Baarah, G. Dülger & U. Kräling  
Fraunhofer ISE, Freiburg, Germany

**5BV.4.33 Outdoor Performance Analysis of the Si-Heterojunction Modules with Different Cell and Module Designs**

K. Emtsev, D. Malevskiy, D. Andronikov, A. Abramov, A. Titov, E. Terukov & D. Orekhov  
RAS/ Ioffe, St. Petersburg, Russia  
B. Bulygin & A. Dubrovskiy  
Hevel Solar, Novocheboksarsk, Russia

**5BV.4.34 The Features of Using Two-Way Sensitivity Solar Modules FSM 280-30D in Central Kazakhstan**

A.D. Mehtiyev & F.N. Bulatbaev  
Karaganda State Technical University, Kazakhstan  
A.D. Daulethanova & E.G. Neshina  
Tomsk Polytechnical University, Russia

**5BV.4.35 Development of Characterization Techniques and Applications of Bifacial Solar Cells and Modules**

S. Dittmann, S. Krause & J. Bagdahn  
Anhalt University of Applied Sciences, Köthen, Germany  
H. Park, M.-S. Kim, W.-S. So, S.-Y. Oh, W.K. Kim & C. Park  
Yeungnam University, Gyeongsan, Korea South  
T. Brammer  
Wavelabs Solar Metrology Systems, Leipzig, Germany  
B.S. Kim & S. Chang  
LG Electronics, Gumi, Korea South

**5BV.4.36 Influence of Optical Characteristics at Rear Side on Performance of Bifacial PV Modules**

Y. Min, I.-A. Kim, J.-H. Chio, C.-H. Kim, E.-J. Lee, S. Ryu & D.-S. Kim  
Shinsung Solar Energy, Eumseong-gun, Korea South

**5BV.4.39 Comparison of Bifacial Module Laboratory Testing Methods**

B. Newman, A.J. Carr, K.M. de Groot, N.J.J. Dekker & B.B. Van Aken  
ECN, Petten, The Netherlands  
A.H.G. Vlooswijk  
Tempres, Vaassen, The Netherlands

**5BV.4.40 Innovative and Robust PV Module Frame Provides Reduction of Harmful Mechanical Tensions, Lower Module Weight and Lower Module Stacking Heights and New Mounting Options**

M. Scherff  
Dortmund, Germany  
H. Busse  
Leipzig, Germany

**5BV.4.41 Increased Energy Yield with Innovative and Robust PV Module Frame by Passive Cooling**

M. Scherff  
Dortmund, Germany  
H. Busse  
Leipzig, Germany

**5BV.4.42 A Novel Heat Dissipating Material for Enhancing the Performance of Photovoltaic Panels**

M.-A. Tsai, H.-S. Wu & T.-C. Wu  
ITRI, Hsinchu, Taiwan  
C.-Y. Chen, L.-C. Chen, Y.-T. Chen & C.-H. Liu  
Big Green Environmental Technology, New Taipei City, Taiwan

**5BV.4.43 Performance of Multi Busbar PV Modules**

Y. Xie, S. Zhang, H. Huang, J. Xu, Z. Feng & P.J. Verlinden  
Trina Solar Energy, Changzhou, China

**5BV.4.45 Accurately Simulating PV Energy Production: Exploring the Impact of Module Build Up**

H. Goverde, D.G. Anagnostos, J. Govaerts, P. Manganiello, E. Voroshazi, J. Szlufcik, F. Catthoor & J. Poortmans  
imec, Leuven, Belgium  
K. Baert & J. Driesen  
KU Leuven, Belgium

**5BV.4.46 Monitoring Temperature and Yield through Numerical Simulations and Experiments for Commercial Photovoltaics in Desert Environment**

S. Ahzi, N. Barth, S.P. Aly, B.W. Figgis, A.A. Abdallah & A. Ennaoui  
QEERI, Doha, Qatar  
Z.S. Al-Otaibi  
KACST, Riyadh, Saudi Arabia

**5BV.4.48 The Effect of Non-Uniform Temperature Distribution in PV Cells and Their Interconnections**

P. Wolf & V. Benda  
Czech Technical University of Prague, Czech Republic

**5BV.4.49 Comparison of Optical Gains and Electrical Losses in Modules with Different Designs of Partial Cells in Desert Regions**

H. Hanifi, J. Schneider & M. Turek  
Fraunhofer CSP, Halle, Germany  
J. Bagdahn  
Anhalt University of Applied Sciences, Koethen, Germany

**5BV.4.50 Cell to Module Gains for High Efficiency Back Contact Cells**

N. Guillevin, B. Newman, E.E. Bende, L.A.G. Okel, M.J. Jansen & N.J.J. Dekker  
ECN, Petten, The Netherlands  
W. Eerenstein  
Exasun, The Hague, The Netherlands

**5BV.4.51 The Study on the Impact of the WVTR of the Backsheet to the Anti-PID Performance of the Module**

G. Chen, Z. Ni, C. Huang, X. Cai, W. Zhang & Z. Mou  
Talesun Solar Technologies, Changshu, China

**5BV.4.52 Accelerated on-Site PID Testing of c-Si PV Modules in Solar Power Plants**

V. Naumann, D. Lausch & C. Hagendorf  
Fraunhofer CSP, Halle, Germany  
N. Schüler  
Freiberg Instruments, Germany

**5BV.4.53 Exploring Suitable Conditions for PID Testing of CIGS PV Modules**

K. Sakurai, K. Ogawa, H. Shibata & A. Masuda  
AIST, Ibaraki, Japan  
H. Tomita, D. Schmitz & S. Tokuda  
Solar Frontier, Atsugi, Japan

**5BV.4.54 A Comparison of Potential-Induced Degradation Recovery Methods in Mono-Crystalline Modules**

A. El Hassani El Alaoui & A. Bouaichi  
IRESEN, Rabat, Morocco  
M. Maaroufi  
University Mohammed V-Agdal, Rabat, Morocco

**5BV.4.55 Electrical Performance Evaluation of c-Si Solar Cell Subjected to Potential Induced Degradation**

Z. Purohit, M. Kumar & B. Tripathi  
PDPU, Gandhinagar, India

**5BV.4.56 Forecasting Power Losses due to Potential-Induced Degradation (PID)**

J. Slamberger & M. Schwark  
AIT, Vienna, Austria

**5BV.4.57 PV Silicon Module Degradation under High Positive Voltage Bias**

K. Brecl, M. Bokalic & M. Topic  
University of Ljubljana, Slovenia

**5BV.4.58 Potential Induced Degradation Effect and Reversibility for Crystalline Based PV System under Outdoor Climate of Mid-South Western–Morocco**

A. Bouaichi, C. Messaoudi & A. El Amrani  
OATE, Errachidia, Morocco  
A. Benazzouz, A. El Hassani El Alaoui, Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco  
A. Bennouna  
Cadi Ayyad University, Marrakech, Morocco

**5BV.4.59 A Review of Potential Induced Degradation in Thin-Film Plants**

T. Weber, C. Hinz, S. Koch & L. Podlowski  
PI Berlin, Germany

**5BV.4.60 Field Detection of Potential Induced Degradation for Crystalline Silicon Photovoltaic Modules Using Dark Current**

W. Oh & N. Park  
KETI, Seongnam, Korea South

**5BV.4.61 Early Potential Induced Degradation (PID) Detection in the Field: Open Circuit Voltage Method**

M. Florides, G. Makrides & G.E. Georghiou  
University of Cyprus, Nicosia, Cyprus

**5BV.4.63 Imaging Inspection System and Methodology for Evaluation of Inhomogeneities in PV Modules – A Case of Multicrystalline Silicon**

M. Bokalic, K. Brecl & M. Topic  
University of Ljubljana, Slovenia

**5BV.4.64 Digital Image Processing Algorithms for Quality-Enhancement of Electroluminescence Picturing in PV-Fields**

G. Behrens & A. Domnik  
University of Applied Sciences Bielefeld, Minden, Germany  
K. Mertens & A. Arnds  
Münster University of Applied Sciences, Steinfurt, Germany  
M. Diehl  
photovoltaikbüro, Rüsselsheim, Germany

**5BV.4.65 Efficient Detection of Finger Interruptions from Photoluminescence Images**

I. Zafirovska, M.K. Juhl & T. Trupke  
UNSW Australia, Sydney, Australia

**5BV.4.67 Long Term Reliability Evaluation for Silicon Photovoltaic Modules through Novel Sequential Tests**

C. Lien, Y.-H. Lee, C.-F. Hsieh, K.-W. Lu, W.-L. Yang,  
H.-S. Wu & T.-C. Wu  
ITRI, Hsinchu, Taiwan

**5BV.4.68 Applicability of Highly Accelerated Thermal Cycling Testing for Multiple Types of Polycrystalline Silicon Photovoltaic Modules**

M. Fujimori & T. Kohno  
Hitachi, Tokyo, Japan  
Y. Tsuno & K. Morita  
TÜV Rheinland, Yokohama, Japan

**5BV.4.69 Non-Uniform Mechanical Loads due to Wind Effect on Photovoltaic Module**

S.-T. Hsu  
ITRI, Hsinchu, Taiwan

**5BV.4.70 Effect of Light Irradiation Treatment on Hygrothermal Degradation of Crystalline Silicon Photovoltaic Modules**

Y. Kobayashi, H. Morita & K. Mori  
Toray Industries, Otsu, Japan  
A. Masuda  
AIST, Tsukuba, Japan

**5BV.4.71 Reliability Investigation of the Rear Side Metallization of PERC Cells**

T. Urban & J. Heitmann  
Freiberg University of Technology, Germany  
S. Großer & M. Turek  
Fraunhofer CSP, Halle, Germany

**5BV.4.72 Long Term Development of Photovoltaic Module Failures during Accelerated Aging Tests**

C. Hirschl, L. Neumaier & W. Mühleisen  
CTR, Villach, Austria  
G.C. Eder & Y. Voronko  
OFI, Vienna, Austria  
R. Ebner, B. Kubicek & K.A. Berger  
AIT, Vienna, Austria

**5BV.4.73 Monitoring of Moisture Ingress in PV Module Laminates during Accelerated Aging Tests**

L. Neumaier, W. Mühleisen & C. Hirschl  
CTR, Villach, Austria  
G.C. Eder  
OFI, Vienna, Austria  
M. Aichinger  
Ertex Solar, Amstetten, Austria  
L. Plessing  
Crystalsol, Vienna, Austria  
A. Zimmermann  
Sunplugged, Wildermieming, Austria

**5BV.4.74 Damp-Heat Test Analysis of Flexible Amorphous Silicon Thin-Film Solar Mini-Modules**

N. Reininghaus, A. Leon, M. Vehse & C. Agert  
NEXT ENERGY, Oldenburg, Germany



Wednesday, 27 September 2017

**VISUAL PRESENTATIONS 3CV.1**

**08:30 - 10:00 CI(G)S, CdTe and Related Thin Film Solar Cells and Modules (I)**

**3CV.1.1 Study of Micro-Structural Properties of ZnO and WO<sub>3</sub> Thin Films Grown by Spin Coating**

G. Gordillo, J. Estrada, C.A. Otálora & L.C. Luis  
National University of Colombia, Bogotá, Colombia

**3CV.1.2 Stability of Cu(In,Ga)Se<sub>2</sub> Solar Cells: A Literature Review**

M. Theelen  
TNO, Eindhoven, The Netherlands

**3CV.1.3 Effects of Sulfurization Conditions on Crystallization of Cu(In,Ga)S<sub>2</sub> Thin Films Prepared by Deposition of Cu-In-Ga Stacked Metallic Precursor**

C.-W. Chang, W.-S. Lin, Y.-T. Liu, C.-C. Li, S.-W. Chan,  
T.-P. Hsieh, S.-Y. Tsai & F.-M. Lin  
ITRI, Hsinchu, Taiwan

**3CV.1.5 First Principles Study of Defect Control in CdTe as Solar Cell Absorbers**

S.-H. Wei  
CSRC, Beijing, China

**3CV.1.6 Cost-Benefit Balances of Innovation Strategies**

J. van Deelen  
Solliance/TNO, Eindhoven, The Netherlands

**3CV.1.7 Reduced Reflection with Front and Back Textured CIGS Cells**

J. van Deelen, M. Burghoorn, M. Simor, K. van der Werf,  
M. Barink, Z. Vroon & P. Buskens  
TNO, Eindhoven, The Netherlands

**3CV.1.8 CIGS Thin-Film Solar Cell with a Conversion Efficiency of 15% Grown by Coevaporation Method**

H. Li, F. Qu, H. Gu & W. Wang  
CAS, Beijing, China  
H. Yao  
CAS, Lanzhou, China

**3CV.1.9 Performance Evaluation of Zn(O,S) Buffer Layer Deposited by CFR-Spin Process on CIGS Solar Cells**

D.H. Park, H.Y. Jun & S.O. Ryu  
Yeungnam University, Gyeongsan, Korea South

**3CV.1.11 Overview of Inkjet Printed Compound Semiconductors for Photovoltaics: An Example of Inkjet Printing for CIGS and CZTS Solar Cells**

A. Ennaoui  
QEERI, Doha, Qatar  
X. Lin  
Sun Yat-sen University, Guangzhou, China  
L. Wang & M.C. Lux-Steiner  
HZB, Berlin, Germany

**3CV.1.12 Thin Film CdTe Solar Cell on Cerium Doped Ultra-Thin Glass - Flight Test Performance Data**

D. Lamb & S.J.C. Irvine  
Swansea University, St. Asaph, United Kingdom  
C.I. Underwood & A. Dyer  
University of Surrey, Guildford, United Kingdom  
J. Hall  
Qioptiq, St. Asaph, United Kingdom

**3CV.1.13 Plasma Enhanced CSS-Deposition of CdS Window Layers for CdTe Solar Cells**

D. Hirsch, O. Zywitzki, T. Modes, T. Kopte & C. Metzner  
Fraunhofer FEP, Dresden, Germany  
B. Späth, B. Siepchen, C. Kraft, C. Drost & K. Krishnakumar  
CTF Solar, Dresden, Germany

**3CV.1.14 Optimization of CdTe Solar Cells with Oxygenated CdS Window Layers**

C. Kraft, C. Drost, V. Krishnakumar, B. Siepchen & B. Späth  
CTF Solar, Dresden, Germany  
S. Peng  
Triumph International Engineering, Shanghai, China

**3CV.1.15 Earth-Abundant Thin Film Solar Cells Based on Cu<sub>2</sub>MnSnS<sub>4</sub>**

A. Le Donne, S. Binetti & M. Acciarri  
University of Milan, Italy  
S. Marchionna  
RSE, Milan, Italy

**3CV.1.16 Investigation of Diffusion Profiles in CdTe Thin Film Solar Cells by Glow Discharge Optical Emission Spectrometry**

O. Zywitzki, T. Modes, D. Hirsch, C. Metzner & T. Kopte  
Fraunhofer FEP, Dresden, Germany  
B. Siepchen, B. Späth, C. Kraft, C. Drost & V. Krishnakumar  
CTF Solar, Dresden, Germany

**3CV.1.17 Influence of Different Prepared Electron Reflectors on the Performance and Stability of CdTe Thin Film Solar Cells**

B. Späth, C. Drost, C. Kraft, V. Krishnakumar & B. Siepchen  
CTF Solar, Dresden, Germany  
O. Zywitzki, T. Modes, D. Hirsch, T. Kopte & C. Metzner  
Fraunhofer FEP, Dresden, Germany  
S. Peng  
CTIEC, Shanghai, China

**3CV.1.19 Improving the Efficiencies and the Properties of Impurity-Doped ZnO Electrode Layers for CIGS Solar Cells via Structural Correlation with the Transparent Buffer Window Layers**

W.M. Kim, S.Y. Kim & J.-H. Jeong  
KIST, Seoul, Korea South  
I.-G. Lee  
Korea Aerospace University, Goyang, Korea South

**3CV.1.21 Vacancy Migration and Associated Charge-Transfer at the ZnS/CZTS Interface**

F. Bahrani, J. Goss, P. Briddon & M. Rayson  
Newcastle University, United Kingdom

**3CV.1.22 Emitter Formation (a-Si: H (p Type)/c-Si (n Type) by AIC Method: Effect of Al Film Thickness**

K. Faouzi & K. Naima  
CRTSE, Algiers, Algeria

**3CV.1.25 Effect of Thickness and Position of Sb-Doping Layer on the Properties of CIGS Thin Films by e-Beam Evaporation**

J. Chen, H. Shen, Z. Zhai, J. Li & Y. Li  
NUAA, Nanjing, China

**3CV.1.26 1D Mathematical CIGS Selenization Model**

J. Emmelkamp, J. de Cloet, A. Mannheim & O. van der Heide  
TNO/Solliance, Eindhoven, The Netherlands

**3CV.1.27 Organic Poly(9,9-di-n-octylfluorenyl-2,7-diyl) Contact Layers for CdTe Solar Cells**

T.P. Shalvey, L.J. Phillips, K. Durose & J.D. Major  
University of Liverpool, United Kingdom

**3CV.1.28 Role of Na in Solution-Processed CuInSe<sub>2</sub> Devices: A Different Story for Efficiency Improvement**

S. Rehan, J. Moon, Y.-J. Eo, A. Cho, J. Gwak, S.K. Ahn & S.J. Ahn  
KIER, Daejeon, Korea South

**3CV.1.29 Fabrication and Characteristics of CuO Thin Films as an Absorber Layer in Solar Cells Applications**

A. Moumen, B. Hartiti & S. Fadili  
University Hassan II, Mohammedia, Morocco  
M. Siadat & P. Thevenin  
University of Lorraine, Metz, France

**3CV.1.30 The Influence of Na Incorporation on Nanoscopic Electrical Characteristics of Cu(In,Ga)Se<sub>2</sub> Surfaces**

F. Qu, H. Li, H. Gu, W. Wang, H. Zhang & F. Ding  
CAS, Beijing, China

**3CV.1.31 Microstructural, Electrical and Optical Properties of Bifacial CIGS-Based Solar Cells Prepared on Transparent Conducting Oxide Back Contacts by Co-Evaporation**

J.H. Jo, K. Kim, J. Gwak, J.H. Yun, J.S. Yoo, S.K. Ahn, A. Cho, J.H. Park & J.-S. Cho  
KIER, Daejeon, Korea South

**3CV.1.32 Characterization of MoOx and WOx Thin Films Deposited by Magnetron Sputter Deposition from Oxide Targets**

E. Franzke, J. Winkler, C. Linke & C. Adelhelm  
PLANSEE, Reutte, Austria  
J. Pachlhofer, R. Franz & C. Mitterer  
University of Leoben, Austria

**3CV.1.34 Enhanced Performance in Cu(In,Ga)Se<sub>2</sub> Solar Cell Fabricated by Sputtering Quaternary Targets due to Potassium Fluoride Post Deposition Treatment**

X. Lyu, D. Zhuang, M. Zhao, L. Ouyang, R. Sun, L. Guo, L. Zhang, Y. Wei & X. Peng  
Tsinghua University, Beijing, China

**3CV.1.35 Physical Property Improvement of One Step RF Sputtered CZTSe Films through Annealing in Se Atmosphere**

T. Guo, Z. Yu, L. Liu & Y. Zhao  
Southwest Jiaotong University, Chendu, China

**3CV.1.36 Compositional Control of Indium and Tin Sulfide Growing Films by Sulfur Partial Pressure Regulation and Optical Monitoring**

J.F. Trigo, V. Robles, C. Guillén & J. Herrero  
CIEMAT, Madrid, Spain

**3CV.1.37 Chemically Deposited Earth-Abundant Cu<sub>2</sub>ZnSn(S,Se)<sub>4</sub> Solar Cell Absorber**

D.S. Dhawale & A. Ennaoui  
QEERI, Doha, Qatar  
N.M. Shinde & C.D. Lokhande  
Shivaji University, Kolhapur, India

**3CV.1.38 Dynamics of Alkali-Metals Diffusion in CuInSe<sub>2</sub>**

E. Ghorbani  
Technical University of Darmstadt, Germany  
J. Kiss  
IST Austria, Klosterneuburg, Austria  
H. Mirhosseini & C. Felser  
MPI CPFS, Dresden, Germany  
T. Kühne  
University of Paderborn, Germany

**3CV.1.39 Influence of Reversed Bias Voltages on CIGS Solar Cells**

K. Bakker & A.W. Weeber  
ECN, Eindhoven, The Netherlands  
S. Mortazavi & M. Theelen  
TNO/Solliance, Eindhoven, The Netherlands

**3CV.1.41 (AgxCu<sub>1-X</sub>)<sub>2</sub>ZnSnS<sub>4</sub> Thin-Films Prepared by Spray Pyrolysis**

L. Dermenji, M. Guc, N. Curmei, L. Bruc, D.A. Sherban,  
A.V. Simashkevich & E. Arushanov  
Academy of Sciences of Moldova, Chisinau, Moldova  
G. Gurieva, S. Levchenko & S. Schorr  
HZB, Berlin, Germany

**3CV.1.42 The Effects of Impurity Phase Marcasite on the Properties of Pyrite Thin Films**

D.G. Moon, S. Rehan, Y.-J. Eo, A. Cho, J. Gwak & S.J. Ahn  
KIER, Daejeon, Korea South  
S.Y. Lim, D. Nam & H. Cheong  
Sogang University, Seoul, Korea South  
I. Seo & Y. Lee  
Soongsil University, Seoul, Korea South  
Y.S. Cho  
Yonsei University, Seoul, Korea South

**3CV.1.43 Fabrication of Beyond 10% Efficient CZTS<sub>Se</sub> Solar Cells by Two-Step CdS Deposition Process**

Y. Wei, D. Zhuang, M. Zhao, L. Ouyang, L. Guo, R. Sun,  
L. Zhang, S. Zhan, X. Lyu & X. Peng  
Tsinghua University, Beijing, China

**3CV.1.45 Swift Heavy Ion Irradiation Induced Modification in CuInSe<sub>2</sub> Thin Films**

K. Rawat, G. Shishodia & P.K. Shishodia  
University of Delhi, India  
F. Singh  
Inter University Accelerator Center, Delhi, India

**3CV.1.46 Preliminary Results on a Novel In-Situ XRD Setup Mimicking Industrial-Scale Fast Chalcogenisation Furnaces**

R. Aninat, J.J. Schermer & E. Vlieg  
Radboud University, Nijmegen, The Netherlands  
F. van den Bruele, J. Emmelkamp & M. Theelen  
TNO/Solliance, Eindhoven, The Netherlands

**3CV.1.47 Effect of the Chemical Composition Ratio Cu/(Zn+Sn) and Cu/Zn onto the Structural, Morphological and Optical Properties of Cu<sub>2</sub>ZnSnS<sub>4</sub> (CZTS) Thin Films for PV Applications**

K. Abouabassi, H. Kirou, L. Atourki, A. Elfanaoui,  
K. Bouabid, M. Nya & A. Ihlal  
University of Agadir, Morocco  
M.Y. Messous  
CNESTEN, Rabat, Morocco  
A. Al Magoussi  
Cadi Ayyad University, Marrakech, Morocco  
X. Portier  
CNRS, Chatou, France

**3CV.1.48 Micro Concentrator Concept for Cost Reduction and Efficiency Enhancement of Thin-Film Chalcopyrite Photovoltaics: Results from EU Joint Research Program CHEETAH**

M. Schmid, X. Lin, L. Wang, R. Klenk, B. Heidmann,  
T. Köhler, D. Sancho-Martinez & M.C. Lux-Steiner  
HZB, Berlin, Germany  
E. Lotter  
ZSW, Stuttgart, Germany  
K. Eylers, F. Ringleb & T. Boeck  
IKZ Institute for Crystal Growth, Berlin, Germany  
G. Nenna, F. Loffredo & F. Villani  
ENEA, Portici, Italy  
T. Raadik, J. Krustok & M. Grossberg  
Tallinn University of Technology, Estonia

**3CV.1.49 AZO Deposition by Reactive Sputtering from Metallic Zn:Al Target Further Improved by Means of FLA Post-Treatment**

C. David, P. Prunici, J. Weber, L. Behnke, A. Panckow &  
F. Schwarz  
Solayer, Kesselsdorf, Germany

**3CV.1.50 Growth and Properties of Cu<sub>2</sub>ZnSnSe<sub>4</sub> Films on Flexible Metallic Substrates**

V.F. Gremenok, A.V. Stanchik & S.A. Bashkirov  
NASB, Minsk, Belarus  
R. Juskenas  
Center for Physical Sciences and Technology, Vilnius,  
Lithuania  
T.V. Petlitskaya, A.N. Piatlitski & V.A. Solodukha  
JSC "INTEGRAL", Minsk, Belarus

**3CV.1.51 Influence of Alkali Treatment on Kesterite Solar Cells**

E. Ahlsweide, F. Huber, W. Kogler & T. Schnabel  
ZSW, Stuttgart, Germany

**3CV.1.52 100 MW Production of CdTe Thin Film Solar Modules in Chengdu, China**

B. Siepchen, B. Späth, J.P. Heimfarth, C. Drost,  
K. Krishnakumar, C. Kraft, S. Frauenstein & M. Harr  
CTF Solar, Dresden, Germany  
S. Peng  
Triumph International Engineering, Shanghai, China

**3CV.1.53 Growth of p-Type CdZnTe Thin Films as an Prospective Absorber Layer for Photovoltaic Application**

F.M. Tahzib Enam, K.S. Rahman, M. Akhtaruzzaman,  
K. Sopian, N. Amin & M.A. Islam  
National University of Malaysia, Bangi, Malaysia

**3CV.1.55 Fabrication of Sputtered Cu<sub>2</sub>ZnSnSe<sub>4</sub> Solar Cell by Selenisation with Novel Precursors**

F.-I. Lai  
Yuan Ze University, Taoyuan, Taiwan  
J.-F. Yang & S.-Y. Kuo  
Chang Gung University, Taoyuan, Taiwan

**3CV.1.56 Simulation of Chalcopyrite-Based Dual-Junction Tandem Solar Cells Using SCAPES-1D**

K. Kim, J.S. Yoo, J.-S. Cho, J. Gwak, S.K. Ahn, Y.-J. Eo,  
J.H. Park, S.J. Ahn, A. Cho, K.S. Shin, K.H. Yoon & J.H. Yun  
KIER, Daejeon, Korea South

**3CV.1.57 Effect of Copper Concentration on Photovoltaic Characteristics of High Efficiency Cu<sub>2</sub>ZnSnSe<sub>4</sub> Solar Cells**

F.-I. Lai  
Yuan-Ze University, Taoyuan, Taiwan  
J.-F. Yang & S.-Y. Kuo  
Chang Gung University, Taoyuan, Taiwan

**3CV.1.58 Lab-Scale Vacuum Equipment for HJT Solar Cell Production**

E. Khokhlov, S. Nastochkin, A. Yasunas, V.Y. Shiripov &  
K. Miasnikov  
Izovac Technologies, Minsk, Belarus  
S.Y. Herasimenka & M. Reginevich  
Regher Solar, Tempe, United States

**3CV.1.59 Monolithic Integration Scheme for CIGS Micro Concentration Solar Cells**

G. Fariás Basulto, T. Köhler, B. Stannowski,  
C.A. Kaufmann & R. Klenk  
HZB, Berlin, Germany

**3CV.1.60 On the Electronic Properties of CdTe<sub>1-x</sub>Sex Absorber Layers with Substitutional Doping on Cd or Te Site**

M. Lingg, S. Buecheler & A.N. Tiwari  
EMPA, Duebendorf, Switzerland

**3CV.1.61 Light Induced Degradation of Cu(In,Ga)Se<sub>2</sub> Thin Films and Solar Cells**

T. Hölscher, T. Schneider, S. Förster, M. Maiberg,  
W. Widdra & R. Scheer  
Martin Luther University, Halle, Germany

**3CV.1.62 Analysis of the Local Composition of CIGS after Laser Processing**

A. Deswaziere, N. Debernardi, M. Le Ster & M. Theelen  
TNO/Solliance, Eindhoven, The Netherlands  
B. Vermang  
imec, Leuven, Belgium  
B. Dunne  
NEXCIS, Rousset, France  
J. Bosman  
ECN, Eindhoven, The Netherlands

**VISUAL PRESENTATIONS 2CV.2**

**13:30 - 15:00 Thin Film and Foil-Based Solar Cells / Characterisation & Simulation Methods / Manufacturing & Production**

**2CV.2.1 Optimal Surface Texturing in Highly Dilute KOH Solution: A Comparison with Plasma Texturing for Thin Silicon Solar Cells with Light Trapping**

A.T. Hajjiah & O.T. Hamdan  
Kuwait University, Safat, Kuwait

**2CV.2.2 Formation of Poly-Si Films by the Crystallization of Silicon Oxide Films**

J.-H. Yoon  
Kangwon National University, Chuncheon, Korea South

**2CV.2.3 Effect of ITO Embedded Electrode on the Micro and Nano-Textured Crystalline Si Solar Cells**

H.Y. Ji, S.G. Ryu, M.J. Kim & J.H. Peck  
KITECH, Cheonan, Korea South  
K. Kim  
Chonbuk National University, Jeonju, Korea South

**2CV.2.5 Kerf-Less Silicon Wafers by Spalling Method from Ni Electrodeposition**

H.-S. Yang, J. Kim & J.-H. Lim  
KIMS, Changwon, Korea South  
S.H. Park  
Pukyong National University, Pusan, Korea South



**2CV.2.6 Thin IBC c-Si Solar Cells Based on Conventional Technologies**

C. Jin, I. Martín, E. Calle, P. Ortega, G. López & R. Alcubilla González  
UPC, Barcelona, Spain

**2CV.2.7 In-Situ Characterization of the Proton Irradiation Induced Degradation of Thin Film Liquid Phase Crystallized Silicon on Glass Based Heterojunction Solar Cells with Interdigitated Back Contacts**

H.C. Neitzert, C. Pellegrino & G. Landi  
University of Salerno, Fisciano, Italy  
J. Bundesmann, S. Seidel, A. Denker, T. Frijnts & S. Gall  
HZB, Berlin, Germany

**2CV.2.8 Achieving Extremely High Reflectance Haze in Chemically Textured AZO Based Back Reflectors for Thin Film Solar Cells**

Z. Demircioglu, H. Nasser, E. Özkol & R. Turan  
METU, Ankara, Turkey

**2CV.2.9 Bifacial, Colored, Transparent Thin-Film a-Si:H Solar Cells for Round-the-Clock Power Generation**

G. Kim, J.-W. Lim, S.H. Lee & S.J. Yun  
ETRI, Daejeon, Korea South  
M. Shin, G. Lee & J. Jo  
Korea Aerospace University, Goyang, Korea South

**2CV.2.10 Preparation of Highly Efficient Semi-Transparent Silicon Thin-Film Solar Cells by Plasma-Enhanced Chemical Vapor Deposition**

E. Jang, J.S. Yoo, S.K. Ahn, J.H. Park, G.-S. Shin & J.-S. Cho  
KIER, Daejeon, Korea South

**2CV.2.11 Laser-Induced Crystallization of Sputtered Unhydrogenated Silicon at Low Temperatures**

E. Saugar Gotor, J.P. González, S. Fernández, J.J. Gandía, J. Cárabe, F. García-Pérez & M.B. Gómez-Mancebo  
CIEMAT, Madrid, Spain  
D. Canteli, M. Morales & C. Molpeceres  
UPM, Madrid, Spain

**2CV.2.12 Large Area Deposition of Amorphous Silicon Thin Films Solar Cells Prepared by PECVD Technique**

K. Belrhiti Alaoui, S. Laalioui, Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco  
A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco

**2CV.2.13 Improvement of Bifacial Performance of Multicrystalline Si Thin-Film Solar Cells**

G. Jia, A. Gawlik, J. Plentz & G. Andrä  
IPHT, Jena, Germany

**2CV.2.14 Top Cell Analysis for Micromorph Silicon Solar Cell Optimisation**

R.S. van Schie, R.A.C.M.M. van Swaaij, F.T. Si, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands

**2CV.2.15 Growth of Silicon on Reorganized Porous Silicon Substrates by Steady-State Solution Growth for Photovoltaic Applications**

C. Ehlers, R. Bansen, D. Uebel, T. Teubner & T. Boeck  
IKZ Institute for Crystal Growth, Berlin, Germany

**2CV.2.16 A Lightweight Flexible Amorphous Silicon Photovoltaic Module**

Y. Vygranenko  
CTS-UNINOVA, Caparica, Portugal  
M. Fernandes, P. Louro & M. Vieira  
ISEL, Lisbon, Portugal

**2CV.2.19 Interdigitated Laser-Contacted Solar Cell on Liquid-Phase Crystallized Silicon on Glass**

M. Vetter & G. Andrä  
IPHT, Jena, Germany  
G. López, P. Ortega & I. Martín  
UPC, Barcelona, Spain

**2CV.2.23 Understanding Contact Formation on n-PERT Back Junction Solar Cells**

C. Comparotto, J. Theobald, J. Lossen & V.D. Mihailetchi  
ISC Konstanz, Germany

**2CV.2.24 Impact of the Infrared Response of Crystalline Silicon Solar Cells on Temperature Coefficient and Energy Yield**

J. Haschke, J. Cattin, O. Dupré, M. Boccard & C. Ballif  
EPFL, Neuchâtel, Switzerland  
L. Barraud & M. Despeisse  
CSEM, Neuchâtel, Switzerland  
A.A. Abdallah, B. Aissa & N. Tabet  
QEERI, Doha, Qatar

**2CV.2.25 Evaluations of Passivated Silicon Surfaces with Laser Terahertz Emission Microscope (LTEM) and Corona Charging**

T. Mochizuki, J. Mitchell, K. Tanahashi, M. Moriya, Y. Kida, K. Shirasawa & H. Takato  
AIST, Koriyama, Japan  
A. Ito & H. Nakanishi  
SCREEN, Kyoto, Japan  
I. Kawayama & M. Tonouchi  
Osaka University, Japan

**2CV.2.26 Cross Characterization Methodology for the Optimization of Passivation Layers and their Interfaces in c-Si Solar Cells**

A. Loubat, M. Bouttemy, M. Frégnaux, D. Aureau & A. Etcheberry  
CNRS-UVSQ, Versailles, France  
T. Blévin  
IPVF, Antony, France  
Y. Marot, A. Zauner & S. Pouliquen  
Air Liquide, Jouy-en-Josas, France  
C. Eypert  
HORIBA, Palaiseau, France  
S. Gaiaschi & P. Chapon  
HORIBA, Longjumeau, France

**2CV.2.27 Dry Etch Black Silicon with Low Surface Damage: Effect of Low Capacitively Coupled Plasma Power**

B. Iandolo, M. Plakhotnyuk, R. Schmidt Davidsen & O. Hansen  
Technical University of Denmark, Lyngby, Denmark  
M. Gaudig  
Anhalt University of Applied Sciences, Köthen, Germany  
D. Lausch  
Fraunhofer CSP, Halle, Germany

**2CV.2.28 Simulation on Silicon Solar Cell with Polysilicon Tunneling Oxide Emitters**

Y.-W. Peng & J.-Y. Gan  
NTHU, Hsinchu, Taiwan

**2CV.2.29 Characterization of the Silicon Surface Quality for PV Applications Based on Minority Carrier Lifetime Measurements**

N. Schüler, K. Dornich & J.R. Niklas  
Freiberg Instruments, Germany

**2CV.2.30 Oxygen-Related Defect Characterization Using Correlative Microscopy**

A. Youssef, E.E. Looney, M.A. Jensen, A.E. Morishige, S. Wiegold, J.R. Poindexter & T. Buonassisi  
MIT, Cambridge, United States  
S. Mack  
Fraunhofer ISE, Freiburg, Germany  
H.S. Laine & H. Savin  
Aalto University, Espoo, Finland  
B. Lai  
Argonne National Laboratory, United States

**2CV.2.31 Elucidating Phosphorus Inactivation by Precipitation during Low Temperature Anneal Using Atom Probe Tomography**

A. Youssef, I.M. Peters & T. Buonassisi  
MIT, Cambridge, United States  
A. Peral Boiza & C. del Cañizo  
UPM, Madrid, Spain  
A. Akey  
Harvard University, Cambridge, United States  
A. Dastgheib-Shirazi & G. Hahn  
University of Konstanz, Germany

**2CV.2.32 Stabilization of Copper Deposited by Electroless Plating on Si-Solar Cells**

A. Moussi, S. Meziani, A. Djelloul, S. Chaouchi & L. Benharrat  
CRTSE, Algiers, Algeria

**2CV.2.33 The SPEER Solar Cell – Simulation Study of Shingled Bifacial PERC Technology Based Stripe Cells**

N. Wöhrle, T. Fellmeth, E. Lohmüller, A. Fell, J. Greulich & R. Preu  
Fraunhofer ISE, Freiburg, Germany

**2CV.2.34 Auger Recombination Impact for Limiting Efficiency of Silicon Solar Cells**

J. Lee, M.K. Cotton, Y. Zou & C.B. Honsberg  
Arizona State University, Tempe, United States

**2CV.2.36 A Detailed Analysis of Edge-Related Losses in Half-Cells**

A. Fell, H. Steinkemper, J. Schön, M. Hermle, M.C. Schubert & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany  
H. Sträter, M. Müller, R. Schiepe & D.H. Neuhaus  
SolarWorld Innovations, Freiberg, Germany

- 2CV.2.37 2D/3D Simulations of Black-Silicon Interdigitated Back-Contacted c-Si(n) Solar Cells**  
E. Calle, D. Carrió, P. Ortega, I. Martín & R. Alcubilla  
González  
UPC, Barcelona, Spain  
G. von Gastrow & H. Savin  
Aalto University, Espoo, Finland
- 2CV.2.38 Simulating the Effect of Partial Rear Contacts on Si Solar Cells by a Finite Element Circuit Simulator**  
Y.-H. Lin & H.-Y. Chen  
Motech Industries, Tainan, Taiwan
- 2CV.2.39 The PC1D Diffusion Model in Thin-Film Solar Cells**  
L. Abenante  
ENEA, Rome, Italy
- 2CV.2.40 Impact of Different Treatment Technology and Highly Accelerated Stress Test for the Mono Silicon PERC Solar Cells**  
C.-W. Kuo, T.-M. Kuan, L.-G. Wu, C.C. Huang & C.-Y. Yu  
TSEC, Hsinchu, Taiwan
- 2CV.2.41 Review of Tools and Approaches for In-Line Quality Control in High Efficiency Silicon Solar Cell Production**  
J. Haunschild, J. Greulich, H. Höffler, S. Wasmer, G. Emanuel, A. Krieg, L. Friedrich & S. Rein  
Fraunhofer ISE, Freiburg, Germany
- 2CV.2.43 Comparison of Inline Hot Spot Detection and Evaluation Algorithms for Crystalline Silicon Solar Cells**  
S. Wasmer, I. Geisemeyer, J.M. Greulich & S. Rein  
Fraunhofer ISE, Freiburg, Germany  
D. Pfengler  
InfraTec, Dresden, Germany
- 2CV.2.44 Cell Design Optimization for Shingled Modules**  
D. Rudolph, J. Rabanal-Arabach, I. Ullmann, A. Halm & A. Schneider  
ISC Konstanz, Germany  
T. Fischer  
Teamtechnik, Freiberg, Germany
- 2CV.2.45 Optical Simulation of Bifacial Silicon Solar Cells at Module Level**  
F. Duerinckx, M. Aleman, E. Voroshazi & J. Szlufcik  
imec, Leuven, Belgium
- 2CV.2.46 A One-Sun Spectrum-Splitting Minimodule Using Prismatic Encapsulation: Simulation and Outdoor Testing**  
B. Concha-Ramon, M.J. Keevers, Y. Jiang & M.A. Green  
UNSW Australia, Sydney, Australia

- 2CV.2.47 Rapid Testing of Optical Quality and Internal Quantum Efficiency Using LED Solar Simulators**  
K. Sporleder, T. Luka & M. Turek  
Fraunhofer CSP, Halle, Germany
- 2CV.2.48 Rapid Optical Modelling of Plasma Textured Silicon**  
D. Payne, A. Claville Lopez, Y. Zeng & D.M. Bagnall  
UNSW Australia, Sydney, Australia  
M.D. Abbott & K.R. McIntosh  
PV Lighthouse, Coledale, Australia  
J. Cruz-Campa  
1366 Technologies, Bedford, United States  
R. Schmidt Davidsen & M. Plakhotnyuk  
University of Denmark, Lyngby, Denmark
- 2CV.2.49 Fast Optical Measurement System: Enabling Ultrafast External Quantum Efficiency Measurements on Crystalline Silicon Solar Cells**  
J. Melskens, S.G.M. Heirman, R. Koornneef & M. Schouten  
Delft Spectral Technologies, The Netherlands
- 2CV.2.50 Emissivity Control in Textured Silicon Solar Cells**  
D. Alonso-Álvarez, A. Mellor & N.J. Ekins-Daukes  
Imperial College London, United Kingdom  
L. Ferre-Llin & D.J. Paul  
University of Glasgow, United Kingdom  
A. Riverola & D. Chemisana  
UDL, Lleida, Spain
- 2CV.2.51 Lambertian Optics in Textured Si Solar Cells with Not-Randomizing Front Surface**  
L. Abenante  
ENEA, Rome, Italy
- 2CV.2.52 Development of an AFM/KFM System Capable of Cross-Sectional Workfunction Measuring of Solar Cell Structures under Light Illumination**  
F. Yamada, T. Kamioka, Y. Ohshita & I. Kamiya  
TTI, Nagoya, Japan
- 2CV.2.54 Sub-Micrometer Resolved Light-Coupling Efficiency and Charge-Carrier Generation in Silicon-Based Thin-Film Solar Cells**  
K. Bittkau, Z. Cao, M. Hermes & R. Carius  
Forschungszentrum Jülich, Germany  
G. Köppel & C. Becker  
HZB, Berlin, Germany

**2CV.2.55 Screen Printed Mono-Crystalline Si Solar Cells: Assessing the Microstructure and Dopant Concentration at the Front Side Metallization Interface by Electron Microscopy and NanoSIMS**

P. Kumar, M. Pfeffer & O. Eibl  
University of Tübingen, Germany  
S. Eswara, L. Yedra, J.N. Audinot & T. Wirtz  
LIST, Belvaux, Luxembourg

**2CV.2.56 Measurement Setup for In-Situ Quantum Yield Characterization of Solar Cells during High Energy Particle Irradiation**

H.-C. Neitzert, V. Carrano & G. Landi  
University of Salerno, Fisciano, Italy  
L. Gialanella  
INFN, Napoli, Italy

**2CV.2.57 Capacitance-Voltage and Current-Voltage Characterization to Determine Carrier Concentrations in Quantum Dot Embedded Solar Cells**

M. Elborg, T. Noda & Y. Sakuma  
NIMS, Tsukuba, Japan

**2CV.2.59 A Study of Critical Stresses Developed during the Manufacturing Cycle of Silicon Wafer-Based Solar Photovoltaic Laminates**

W.R.J. Song, S.K. Tippabhotla, A.A.O. Tay & A.S. Budiman  
Singapore University of Technology and Design, Singapore

**2CV.2.61 Electrical and Optical Characterization of Crystalline Silicon Solar Cells Using Luminescent Down-Shifting of MAPbBr<sub>3</sub> Perovskite Nanophosphors Deposited by Spin-on Film Technique**

Z.-X. Lin, W.-J. Ho, G.-Y. Li, B.-J. You & J.-J. Liu  
NTUT, Taipei, Taiwan

**2CV.2.63 Validation of Analytic Modelling of Local Rear Contacts in PERC/PERL Solar Cells**

P. Saint-Cast, N. Wöhrle & J. Greulich  
Fraunhofer ISE, Freiburg, Germany

**2CV.2.64 Front Side Metallization of p- and n-Type Si Solar Cells: Microstructure of the Glass Layer**

P. Kumar, M. Pfeffer & O. Eibl  
University of Tübingen, Germany

**2CV.2.65 Increasing the Efficiency of Industrial Multicrystalline Silicon PERC Solar Cells from Currently 19 to 20%**

J. Greulich, E. Lohmüller, P. Saint-Cast, S. Werner, S. Wasmer, A.J.C. van der Horst & R. Preu  
Fraunhofer ISE, Freiburg, Germany

**2CV.2.66 Numerical Analysis of Silicon Heterojunction Solar Cell Based on Molybdenum Oxide as a Back Surface Field (BSF)**

H. Mehmood  
NUST, Islamabad, Pakistan  
H. Nasser, E. Özkol & R. Turan  
METU, Ankara, Turkey  
T. Tauqeer  
Information and Technology University, Lahore, Pakistan

**2CV.2.70 A Cost-Driven Research Strategy towards Industrially Feasible High-Efficiency Back-Contact Back-Junction Silicon Solar Cells**

J.D. Huyeng, A. Spribille, R. Efinger, R. Keding & F. Clement  
Fraunhofer ISE, Freiburg, Germany  
O. Doll  
Merck, Darmstadt, Germany

**2CV.2.71 p-Si Based Bifacial Solar Cell with Improved PERT Structure**

Y. Eisenberg, L. Kreinin, N. Bordin & N. Eisenberg  
Sol-Around, Jerusalem, Israel  
J. Arumughan  
ISC Konstanz, Germany

**2CV.2.72 AMPERE: A New Project for Innovative Heterojunction Manufacturing Solutions to Improve Competitiveness of the European PV Manufacturing Industry**

A. Battaglia  
3SUN, Catania, Italy  
C. Gerardi, S. Scaliari & F. Bizzarri  
ENEL Green Power, Rome, Italy  
B. Strahm  
Meyer Burger, Hauterive, Switzerland  
T. Söderström  
Meyer Burger, Gwatt, Switzerland  
D. Muñoz & P.J. Ribeyron  
CEA, Le Bourget du Lac, France  
M. Izzi, M. Tucci & P. Delli Veneri  
ENEA, Rome, Italy  
M. Despeisse & L.-E. Perret-Aebi  
CSEM, Neuchâtel, Switzerland  
C. Ballif  
EPFL, Neuchâtel, Switzerland  
O. Nielsen  
NorSun, Oslo, Norway  
B. Hartlin & C. Aquino  
ERM, London, United Kingdom  
O. Zink & B. Melzer  
Jonas & Redmann, Berlin, Germany  
M. Tallián  
Semilab, Budapest, Hungary

S. Lombardo  
CNR, Catania, Italy  
M. Balucani  
RISE TECHNOLOGY, San Martino di Lupari, Italy  
J. Rentsch  
Fraunhofer ISE, Freiburg, Germany

**2CV.2.73 A Micro-Droplet Etching Approach for Texturization of Diamond Wire Sawn Multi-Crystalline Silicon Wafers**

L. Zhou, Z. Xiao, Z. Yue, H. Huang & W. Chen  
Nanchang University, China  
S. Jin & L. Gong  
GCL Photovoltaic Technology, Suzhou, China

**2CV.2.74 Fast Alkaline Texturing Process for High Throughput PERC Solar Cell Manufacturing**

F. Strinitz, F. Schoerg, M. Fuerst & A. El Jaouhari  
RENA, Berg, Germany  
H. Kühnlein  
RENA, Freiburg im Breisgau, Germany

**2CV.2.76 High Quality Industrial Phosphorus Emitter Doping Obtained with Innovative Plasma Immersion Ion Implantation (PIII) Processes**

T. Desrues, J.-F. Lerat, A. Veau, A. Lanterne & S. Dubois  
CEA, Le Bourget du Lac, France  
T. Michel & L. Roux  
Ion Beam Services, Peynier, France  
M. Coig, F. Milesi & F. Mazen  
CEA, Grenoble, France

**2CV.2.77 Low Recombination Emitter Profile with In-Situ Oxide Passivation for Multi-Crystalline Solar Cells**

F. Buchholz, P. Preis, S. Eisert & E. Wefringhaus  
ISC Konstanz, Germany  
J. Denafas & V. Cyras  
Soli Tek R&D, Vilnius, Lithuania  
M.P. Bellmann  
SINTEF, Trondheim, Norway

**2CV.2.78 A New Direct Parallel-Plate PECVD for AlOx and SiNx Passivation Layer**

C. Zhou  
CAS, Beijing, China  
X. Cao, C. Chen & X. Deng  
Xunlight, Kunshan, China

**2CV.2.79 Upgrade of an Industrial Al-BSF Solar Cell Line into PERC Using '3600 Wafers/Hour ALD Al<sub>2</sub>O<sub>3</sub>+SiNx Solution Ramp-Up'**

F. Souren, B. Dielissen, X. Gay & R. Görtzen  
SoLayTec, Eindhoven, The Netherlands  
P.R. Venema & M.R. Renes  
Tempress, Vaassen, The Netherlands  
J.R.M. Luchies  
Amtech, Vaassen, The Netherlands

**2CV.2.80 High Power Impulse Magnetron Sputtering for Photovoltaic Applications**

W. Gajewski, P. Rozanski, P. Lesiuk & P. Ozimek  
TRUMPF Huettinger, Zielonka, Poland

**2CV.2.81 Practical Guide for Boosting the Efficiency of an Industrial-Scale Production Line**

J. Denafas  
Soli „Tek R&D“, Vilnius, Lithuania  
T. Bathon, M. Deckelmann & M. König  
Heraeus, Hanau, Germany

**2CV.2.82 Easy Plating – Study on Contact Interface Properties of Parasitic Plating-Free Ni/Cu Plated Solar Cells**

B. Grübel, A. Büchler, S. Kluska, J. Bartsch, G. Cimiotti,  
A.B. Brand & M. Glatthaar  
Fraunhofer ISE, Freiburg, Germany

**2CV.2.84 Industrial Solutions for Light Induced Degradation in p-Type mc-Si PERC Solar Cell**

J. Dong, J. Lv, W. Wang, Q. Ye, Y. Yang, W. Cai, H. Zhang,  
Z. Shen, G. Chen, W. Gu, X. Chen, J. Sheng, J. Yang,  
C. Zhang, X. Zhou & J. Zheng  
GCL, Suzhou, China

**2CV.2.85 Development of an Accelerated Light-Induced Degradation (LID) Test for Silicon Solar Cells**

C.-M. Lin, M. Gläser & N. Bernhard  
Anhalt University of Applied Sciences, Köthen, Germany  
E. Malguth & S. Uredat  
LayTec in-line, Berlin, Germany  
D. Lausch  
Fraunhofer CSP, Halle, Germany

**2CV.2.86 Accelerated Electrical Regeneration of Silicon Solar Cells for Mass Production**

D. Lausch & J. Dwan  
Fraunhofer CSP, Halle, Germany  
M. Gläser, C.-M. Lin, S. Jafari & N. Bernhard  
Anhalt University of Applied Science, Köthen, Germany

**2CV.2.87 Comparison of Industrial Solutions to Light Induced Degradation of High Efficiency Cz PERC Cells**

H. Li, J. Xu, K. Chen, H. Fan, S. Ma, C. Yu, C. Xu, Q. Xu & X. Ruan  
Dongfang Huansheng Photovoltaic, Yixing, China

**2CV.2.88 Yield Maximization by Early Process Control: Automatic Optical Inspection for Interdigitated Back Contact Solar Cells**

C. Berge & E. Rüländ  
ISRA VISION, Konstanz, Germany  
H. Chu  
ISC Konstanz, Germany

**2CV.2.90 Thermal Simulation of the Thermal Laser Separation Process in Relation to the Crack Propagation at the Wafer Edge**

J. Röth  
Anhalt University of Applied Sciences, Köthen, Germany  
C. Belgardt  
3D-Micromac, Chemnitz, Germany

**2CV.2.91 Method to Counter Warpage due to Stringing for Back Contact Solar Cells**

A. Halm, E. Lemp, R. Farneda, J. Theobald & R. Harney  
ISC Konstanz, Germany

**2CV.2.92 New Module Safety Standards and Silicone Encapsulant Properties: Opportunities for Improved PV Modules**

G. Beaucarne & H. Meynen  
Dow Corning, Seneffe, Belgium

**2CV.2.93 Achieving Faster Lamination Process for Crystalline Photovoltaic Modules by Using Latest Lamination Technologies**

S. Sraisth  
Robert Bürkle, Freudenstadt, Germany

**VISUAL PRESENTATIONS 1CV.3**

**15:15 - 16:45 Fundamental Studies / New Materials and Concepts for Cells and Modules**

**1CV.3.1 Accurate Model of Photovoltaic Module According to Experimental Data**

M. Bahrami  
University of Lorraine, Vandoeuvre-lès-Nancy, France  
S. Eslami & M. Zandi  
Shahid Beheshti University, Tehran, Iran

**1CV.3.3 3D Cylindrical Approach to Determine the Excess Minority Carriers' Density of an n+-p Solar Cell under Constant Monochromatic Illumination**

A. Diouf, A. Diao & G. Sissoko  
UCAD, Dakar, Senegal  
S.N. Leye & S. Mbodji  
University of Alioune DIOP, Bambey, Senegal

**1CV.3.4 Using a 3D Cylindrical Model for the Solar Cell's Diffusion Capacitance Study**

S.N. Leye & S. Mbodji  
University of Alioune DIOP, Bambey, Senegal  
A. Diouf & G. Sissoko  
UCAD, Dakar, Senegal

**1CV.3.5 Parameter Extraction of Oxidized Ni/Au and Ni-Only Transparent Conducting Oxides (TCOs) on n-Type GaN Schottky Barrier Diode with Bias Dependence Barrier Height and Ideality Factor at Different Temperatures**

A. Hajjiah & A.A. Alkhabbaz  
Kuwait University, Safat, Kuwait  
N.P. Allen & L.J. Guido  
Virginia Tech, Blacksburg, United States

**1CV.3.6 Photovoltaics: Upconversion Configurations Versus Tandem Cells**

J. van Deelen  
Solliance/TNO, Eindhoven, The Netherlands

**1CV.3.7 Nanoscience and Nanophotonics for Improved Solar Energy Conversion**

E.C. Garnett  
AMOLF, Amsterdam, The Netherlands

**1CV.3.9 Dielectric and Electric Modulus Studies of the Cu<sub>2</sub>SnS<sub>3</sub> Nanopowder Synthesized by Hydrothermal Technique for Photovoltaic Application**

S. Lahlali, L. Essaleh, M. Belaqziz & H. Chehouani  
Cadi Ayyad University, Marrakech, Morocco  
K. Djessas  
University of Perpignan, France

**1CV.3.10 Self-Consistent Evaluation of Optical Path Length Factor, Z, in Si Solar Cells**

L. Abenante  
ENEA, Rome, Italy

**1CV.3.11 On the Effect of In, P Surfactants on the GaAs PV Cell Formation**

A. Vlasov, L.B. Karlina, B. Ber, D.Y. Kazantsev,  
N.K. Timoshina, M.M. Kulagina & A. Smirnov  
RAS/ Ioffe, St. Petersburg, Russia  
F. Komissarenko  
ITMO University, St. Petersburg, Russia

**1CV.3.12 Sequential GD-OES/XPS Profiling of III-V Based Solar Cells: Study of the GD-OES Crater Chemistry for XPS Analyses Reliability**

A. Loubat, M. Bouttemy, M. Frégnaux & A. Etcheberry  
UVSQ, Versailles, France  
C. Eyfert  
HORIBA, Palaiseau, France  
S. Gaiaschi & P. Chapon  
HORIBA, Longjumeau, France

**1CV.3.13 Improved Electronic Transport Properties of Tin-Halide Perovskites**

G. Berdiyrov, M. El-Amine Madjet & F. El-Mellouhi  
QEERI, Doha, Qatar

**1CV.3.14 FTIR and Raman Study of Rapid Thermal Annealing Effects on Carbon-Rich SixC1-X Thin Films Deposited by R.F Co-Sputtering**

A.-I. El Khalfi, E.M. Ech-Chamikh, Y. Ijdiyaou, M. Azizan, A. Essafti, L. Nkhaili, A. El Kissani & A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco  
E. Tomasella  
CNRS, Aubière, France

**1CV.3.15 Origin of the Rashba Effect in Lead-Iodide Based Perovskites**

B. Daiber, T. Wang & B. Ehrler  
AMOLF, Amsterdam, The Netherlands  
D. McMeekin & H. Snaith  
University of Oxford, United Kingdom

**1CV.3.16 Structural and Optical Analysis of Sputtered BaSi<sub>2</sub> Thin Films**

Y. Tian, R. Vismara, S. van Doorene, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands  
P. Sutta  
University of West Bohemia, Plzen, Czech Republic

**1CV.3.17 Growth and Characterization of Cu<sub>2</sub>ZnSnS<sub>4</sub> Nanoparticles for Photovoltaic Applications**

K. Rawat & P.K. Shishodia  
University of Delhi, New Delhi, India

**1CV.3.18 Effect of Annealing Temperatures on Transmittance of SiO<sub>2</sub> Antireflection Coating**

W. Zhang, J. Tu, W. Long, W. Lai, Y. Sheng & T. Guo  
Yunnan Normal University, Kunming, China

**1CV.3.19 The SPARC Cathodoluminescence System: A Platform for Nanoscale Semiconductor Studies**

T. Coenen  
DELMIC, Delft, The Netherlands

**1CV.3.20 Material Selection for Delafossite Crystal based Window Layer of Thin Film Solar Cells**

S. Mitra & N. Gupta  
Birla Institute of Technology & Science, Pilani, India

**1CV.3.21 Effect of Cu Deficiency on the Optical Properties of Dual Ion Beam Sputtered CZTSSe Thin Film**

B.S. Sengar, V. Garg, V. Awasthi & S. Mukherjee  
IIT Indore, India  
S. Kumar  
RRCAT, Indore, India

**1CV.3.22 An Alternative Methodology to Investigate Properties of Minority Carriers: Effects of n-Dopant Species**

H. Sodabanlu, A. Delamarre, K. Watanabe, M. Sugiyama & Y. Nakano  
University of Tokyo, Japan

**1CV.3.23 Waveguide-Based Spectrum-Splitting Concept for Parallel-Stacked Tandem Solar Cells**

T.P.N. Veeken, M.W. Knight & A. Polman  
AMOLF, Amsterdam, The Netherlands  
J. van de Groep  
Stanford University, Palo Alto, United States

**1CV.3.24 Efficiency Gains Enabled by Nanophotonic Angle Restriction Filters under Realistic Illumination Conditions**

P. Khoram, S.A. Mann & E.C. Garnett  
AMOLF, Amsterdam, The Netherlands

**1CV.3.25 Comparative Study of the Performances of Biomimetic Antireflective Structures Designed for Crystalline Silicon Solar Cells**

D. Dieng, M. Beye, M.E. Faye & A. Seidou Maiga  
Gaston Berger University, Saint-Louis, Senegal

**1CV.3.26 Light Trapping Simulated by Fast and Accurate Transfer Matrix Approach**

J. Holovsky  
ASCR, Prague, Czech Republic  
R. Nevyhosteny  
CTU, Prague, Czech Republic

**1CV.3.27 Study of the SPR Tunability of Graphene Coated Metal Nano-Spheres Utilizing Graphene-Perovskite Interaction: Application in Photovoltaic**

S. Bhardwaj, R. Uma & R.P. Sharma  
IIT Dehli, New Dehli, India

**1CV.3.28 The Mechanism and Damage of Snail Trails**

S. Zhou  
Guangzhou Bothleader Electrical Material, China

- 1CV.3.29 Indirect to Direct Bandgap Transition in Methylammonium Lead Halide Perovskite**  
T. Wang, B. Daiber, S.A. Mann, E.C. Garnett & B. Ehrler  
AMOLF, Amsterdam, The Netherlands  
J.M. Frost & A. Walsh  
Imperial College London, United Kingdom
- 1CV.3.35 DSM Light Trapping Technology for Optimised Output of Bifacial PV Technology**  
M. Mrcarica & P. Pasmans  
DSM, Geleen, The Netherlands  
J. Rabanal-Arabach, A. Halm & A. Schneider  
ISC Konstanz, Germany
- 1CV.3.38 Silicon Quantum Dot Nanostructures as Passivating Contacts for Carrier Selective Contact Cells**  
G.J. Conibeer, I. Perez-Wurfl & B. Puthen-Veetil  
UNSW Australia, Sydney, Australia
- 1CV.3.39 Sputter-Instigated Plasmonic Features in TCO for Ultrathin Photovoltaics: A Case Study for Ga-Doped ZnO**  
V. Garg, B.S. Sengar, V. Awasthi & S. Mukherjee  
IIT Indore, India  
S. Kumar  
RRCAT, Indore, India
- 1CV.3.40 50-Layer Stacked InGaAs/GaAs Quantum Dot Solar Cell with Light Scattering Structure**  
Y. Shoji, K. Watanabe, A. Ogura & Y. Okada  
University of Tokyo, Japan
- 1CV.3.41 Effect of Sputtering and Annealing Parameters on Properties of Silicon Quantum Dot Matrix**  
M.K. Sahoo, J.P. Kar & P.G. Kale  
NIT Rourkela, India
- 1CV.3.42 ZnO Nanorods Based Inorganic Core-Shell Solar Cells with an Extremely Thin Absorber**  
G. Kartopu, A.K. Gürlek & S.J.C. Irvine  
Swansea University, St. Asaph, United Kingdom  
W. Hadibrata, S. Yerci, H.E. Ünalan & R. Turan  
METU, Ankara, Turkey  
V. Barrioz, Y. Qu & P. Maiello  
Northumbria University, Newcastle upon Tyne, United Kingdom  
L. Bowen  
Durham University, United Kingdom
- 1CV.3.44 Low Temperature Solution-Based Process for Silver Nanowire as Potential Replacement for Indium Tin Oxide**  
A. Teymouri, S. Pillai, Z. Ouyang, X. Hao & M.A. Green  
UNSW Australia, Sydney, Australia

- 1CV.3.45 Advance in Development of Hot Carrier Solar Cell with Semi-Infinite Energy Filtering**  
I. Konovalov & V. Emelianov  
University of Applied Sciences Jena, Germany
- 1CV.3.46 Self-Organization of Metal-Semiconductor Microstructures for Plasmonic Photovoltaics**  
I.M. Dmitruk, N.I. Berezovska, K.O. Maiko & O.A. Yeshchenko  
Taras Shevchenko National University of Kiev, Ukraine  
N.L. Dmitruk, I.B. Mamontova, S.V. Mamykin & I.V. Blonskiy  
NAS ISP, Kiev, Ukraine
- 1CV.3.47 BaBiO<sub>3</sub>: Novel Absorber for All-Oxide Photovoltaic**  
A.S. Chouhan, E. Athresh, R. Ranjan, S. Raghavan & S. Avasthi  
Indian Institute of Science, Bangalore, India
- 1CV.3.50 Effective SiC–SiO<sub>2</sub> Nanocomposite Anti-Reflection Layer for Crystalline Silicon Solar Cells**  
A. Jannat, Z.Y. Li, M.S. Akhtar, D.-H. Lee & O.-B. Yang  
Chonbuk National University, Jeonju, Korea South
- 1CV.3.51 A New POLYOLEFIN BACKSHEET Concept Meeting Future Demands**  
M. Edler, W. Krumlacher & M. Plank  
ISOVOLTAIC, Lebring, Austria  
K. Bernreitner & M. Sandholzer  
Boralis Polyolefine, Linz, Austria
- 1CV.3.52 Both Surface Textured Glass: A New, Innovative and Effective Approach to Improve the Performances of Superstrate Type Thin Film Solar Cells**  
G. Das, J. Roy Sharma, S. Bose, S. Dhar, S. Mandal, S. Mukhopadhyay & A.K. Barua  
IEST Shibpur, Howrah, India  
C. Banerjee  
NISE, Gurgaon, India
- 1CV.3.53 All Acrylic-Based Solar Panels: A New Photocurable Material and Associated Process**  
L. Bailly & C. Baguenard  
CANOE, Pessac, France  
S. Boddaert  
CSTB, Sophia Antipolis, France  
S. Bourrigaud  
Arkema, Lacq, France
- 1CV.3.54 Nearly 1.8 eV Top Cells Design on Si for Tropical Region Efficient Solar Cell**  
B.K. Ghosh  
University Malaysia Sabah, Kota Kinabalu, Malaysia



**1CV.3.55 Efficient Light Harvesting in Surface Barrier Solar Cells with Quasiperiodical Microrelief and Metal Nanowires**  
N.L. Dmitruk, A.V. Korovin, O.Y. Borkovskaya,  
I.B. Mamontova, S.V. Mamykin, N. Kotova & V. Romanyuk  
NAS ISP, Kiev, Ukraine

**1CV.3.56 Solight®: A New Lightweight PV Module Complying IEC Standards**  
J. Gaume, F. Quesnel & S. Guillerez  
CEA, Le Bourget du Lac, France  
N. Le Quang, S. Williatte & G. Goer  
EDF ENR PWT, Bourgoin Jallieu, France

**1CV.3.57 Features of Si+ Implanted n-GaSb (100) Photosensitive Structure**  
R.V. Ghita, C. Logofatu & C.C. Negrila  
NIMP-Bucharest, Romania  
D. Pantelica & P. Ionescu  
IFIN HH, Bucharest, Romania  
P. Cristea  
University of Bucharest, Romania

**1CV.3.59 Quantum Dot Luminescent Solar Concentrator: Optimization of Concentration and Thickness**  
M. Rafiee, S. Chandra, H. Ahmed & S.J. McCormack  
Trinity College Dublin, Ireland

**1CV.3.60 Thickness Effect on the Structural, Morphological and Optical Properties of Al<sub>2</sub>O<sub>3</sub>, TiO<sub>2</sub> and ZnO Nanocoating Films for an Enhanced Self Cleaning Effect of PV Surfaces**  
A. Khaldoun & H. Ennaceri  
Al Akhawayn University, Ifrane, Morocco  
A. Benyoussef  
University Mohammed V-Agdal, Rabat, Morocco  
A. Taleb  
CNRS, Paris, France  
A. Ennaoui  
QEERI, Doha, Qatar

**1CV.3.61 Performance Characterization of Crystalline Silicon Solar Cells Based on Combination of Plasmonics Silver Nanoparticles and Luminescent Downshifting Eu-Doped Phosphor-Particles**  
B.-J. You, W.-J. Ho, S.-K. Feng, Z.-X. Lin & J.-J. Liu  
NTUT, Taipei, Taiwan

**1CV.3.62 Phosphorescent Passive Layer of Polysiloxane Material and Rare-Earth Complexes for the Enhancement of Photovoltaic Cell Performance**  
M. Gomes de Oliveira, S. Chandra, H. Ahmed & S.J. McCormack  
Trinity College Dublin, Ireland

**1CV.3.63 Graphene Based Materials and Composites for Hybrid Solar Cells**  
B.M. Mothudi, F.V. Molefe, M. Khenfouch & M.S. Dhlamini  
University of South Africa, Johannesburg, South Africa

**1CV.3.64 Enhancement of Photoelectrochemical Water Splitting Using Au Nanoparticle Decorated TiO<sub>2</sub> Nano-Tube**  
J.-Y. Choi, H.-J. Choi, Y.D. Kim, M. Byun, D. Huh & H. Lee  
Korea University, Seoul, Korea South

**1CV.3.65 Effects of Sulfurization Time on MoS<sub>2</sub> Absorber Layer for Thin Films Solar Cells Applications**  
H. Rashid, K.S. Rahman, N. Amin & M.A. Islam  
National University of Malaysia, Bangi, Malaysia  
M.I. Hossain, F.H. Alharbi & N. Tabet  
QEERI, Doha, Qatar

**1CV.3.67 Investigation of the Effect of Phase Change Material on the Performance of Photovoltaic Cell in Natural Mode**  
N. Choubineh  
Shahid Beheshti University, Teharn, Iran  
A. Kasaeian  
University of Tehran, Iran

**1CV.3.68 Novel Zn<sub>x</sub>Sn<sub>1-x</sub>Se Absorber for Use in Thin-Film Solar Cells**  
T.M. Razykov, B. Ergashev, K.M. Kouchkarov & R. Yuldashev  
Academy of Sciences of Uzbekistan, Tashkent, Uzbekistan  
E. Artegiani & A. Romeo  
University of Verona, Italy  
A. Bosio & N. Romeo  
University of Parma, Italy

**1CV.3.69 Record-Light Weight c-Si Modules Based on the Small Unit Compound Approach – Mechanical Load Tests and General Results**  
H. Nussbaumer, M. Klenk, N. Keller, P. Ammann & J. Thurnheer  
ZHAW, Winterthur, Switzerland

**1CV.3.70 With a Maximum of Flexibility - Customized PV-Panels with Silicon Interlayer**  
C. Erban & H. Ley  
Sunovation, Aschaffenburg, Germany

**1CV.3.71 Next Generation Interconnection by Cost Effective Conductive Adhesives**  
D. Holzmann, M. König, J. Strueben & S. Fritzsche  
Heraeus, Hanau, Germany  
D. Eberlein & A. Kraft  
Fraunhofer ISE, Freiburg, Germany

**1CV.3.72 Outdoor and Indoor Testing of Transparent Antisoiling Coating Based Fluorine-Doped Tin Oxide for Solar Energy Applications**

K. Belrhiti Alaoui, A. Alami Merrouni, Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco  
A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco  
B. Kharbouch  
Abdelmalek Essaadi University, Tetouan, Morocco

**1CV.3.73 Effect of Multiple Organic Dyes in a Polymer Thin Film for Luminescent Down-Shifting Layers Application**

S. Gilligan, H. Ahmed, S. Chandra & S.J. McCormack  
Trinity College Dublin, Ireland

**1CV.3.74 Improving Mathematical Model of Luminescent Down-Shifting Layers by Counting Matrix Material's Loss Mechanisms**

M. Rafiee, H. Ahmed, S. Chandra & S.J. McCormack  
Trinity College Dublin, Ireland

**1CV.3.75 Enhanced Photovoltaic Performances of Inverted Polymer Solar Cells Utilizing MoS<sub>2</sub> Interlayer**

C.H. Lee, H.I. Lim & D.I. Son  
KIST, Wanju-gun, Korea South  
J.Y. Lee  
O-sung, Jeollabuk-do, Korea South  
H.Y. Kim  
Chonbuk National University, Jeonju, Korea South

**1CV.3.76 Low Temperature Deposition of Conductive Indium Oxide Films for Solar Cell Applications**

Y. Vygranenko, M. Fernandes, M. Vieira, G. Lavareda & C. Nunes de Carvalho  
UNINOVA, Caparica, Portugal  
P. Brogueira & A. Amaral  
University of Lisbon, Portugal

**1CV.3.77 Anti-Soiling Coatings for PV Applications**

C. Carcouet, G. Draaisma, P. Tummers, I.J. Bennett, N. Voicu & Y. Li  
DSM, Geleen, The Netherlands

**1CV.3.78 Process Method and Tool for Lamination of BIPV Modules**

G. Cattaneo, C. Antonin, L.-E. Perret-Aebi & C. Ballif  
CSEM, Neuchâtel, Switzerland  
C. Biba  
SPF, Rapperswil, Switzerland  
M. Gisler  
Megasol Energie, Deitingen, Switzerland

**1CV.3.80 Investigation of Different Back-Sheet Materials in Terms of PV-Module Reliability, Safety and Performance**

P. Hülsmann  
Bischof + Klein, Lengerich, Germany

**1CV.3.81 Investigation of Enhancement of Fluorescence Emission of Different Luminescent Species due to Au and Ag NRs for LSC and LDS Application**

A. Sethi, S. Chandra, H. Ahmed & S.J. McCormack  
Trinity College Dublin, Ireland

**1CV.3.83 Device Characterization of Heterojunction Solar Cells Using Rare-Metal-Free Compound ZnSnP<sub>2</sub>**

S. Nakatsuka & Y. Nose  
Kyoto University, Japan  
S. Akari, J. Chantana & T. Minemoto  
Ritsumeikan University, Shiga, Japan

**1CV.3.85 Electro-Optical Modeling of a ZnO/Cu<sub>2</sub>O Subcell in a Silicon-Based Tandem Heterojunction Solar Cell**

O. Nordseth, S.E. Foss & H. Haug  
Institute for Energy Technology, Kjeller, Norway  
L. Fara, C. Dumitru, V.-F. Muscurel, F. Dragan, D. Craciunescu & P. Sterian  
University Politehnica of Bucharest, Romania  
R. Kumar, K. Bergum, E. Monakhov & B.G. Svensson  
University of Oslo, Norway  
I. Chilibon, C. Vasiliu, L. Baschir & D. Savastru  
INOE-2000, Magurele, Romania

**1CV.3.87 Electrically Conductive Adhesives for Photovoltaic (PV) Applications**

P. Feng, J. Mo, M. Mu, B. Xiang, D. Ju & L Wu  
DuPont, Shanghai, China

**1CV.3.88 Extended Optical Response of Two-Step Photoexcitation in InAs/GaAs Quantum-dot Superlattice Intermediate Band Solar Cells**

K. Hiraio, S. Asahi, T. Kaizu & T. Kita  
Kobe University, Japan

**1CV.3.89 Photon Up-Converted Photocurrent in a Single Junction Solar Cell with a Hetero-Interface**

K. Kusaki, S. Asahi, T. Kaizu & T. Kita  
Kobe University, Japan

**1CV.3.90 Cell-to-Module Conversion Loss Simulation for Shingled-Cell Concept**

J. Rabanal-Arabach, D. Rudolph, A. Halm, I. Ullmann & A. Schneider  
ISC Konstanz, Germany  
T. Fischer  
Teamtechnik, Freiberg, Germany

**1CV.3.91 Correlation of Peel and Shear Forces with Temperature Cycle Test for Electrical Conductive Adhesive Interconnections**

S. Hoffmann, T. Geipel, M. Meinert & A. Kraft  
Fraunhofer ISE, Freiburg, Germany

**1CV.3.92 Polymeric Microlenses for Photovoltaic Microconcentrator Applications: Prototype Characterization and Simulation**

F. Loffredo, F. Villani, G. Nenna, R. Miscioscia,  
C. Minarini & F. Roca  
ENEA, Portici, Italy

**1CV.3.93 >32% Efficient III-V/Si Multi-Junction Solar Cells**

S. Essig & C. Ballif  
EPFL, Neuchâtel, Switzerland  
C. Allebé, L. Barraud, A. Descoeurdes & M. Despeisse  
CSEM, Neuchâtel, Switzerland  
J.F. Geisz, T. Remo, M. Steiner, J.S. Ward, M. Schnabel,  
K. Horowitz, D.L. Young, P. Woodhouse & A. Tamboli  
NREL, Golden, United States

**1CV.3.95 Analysis for Different Materials Used as Up Converters When Incorporated in Bifacial Silicon Solar Cells Using the Program PC1-D**

A.C. Pan, L.S. Grassi Cardoso & F. Soares dos Reis  
PUCRS, Porto Alegre, Brazil

**1CV.3.97 Hard and Transparent DLC Coating as a Protective Layer for Solar Cells**

A. Dehbi-Alaoui  
USMBA, Fez, Morocco

**1CV.3.98 Stress-Free Fabrication of Photovoltaic Modules Using Room Temperature Interconnection**

H.W. Chung, E.H. Park & D.-Y. Shin  
Pukyong National University, Busan, Korea South  
H. Song & J.I. Lee  
KIER, Daejeon, Korea South

**VISUAL PRESENTATIONS 4CV.4**

**17:00 - 18:30 III-V-Based Devices for Terrestrial and Space Applications**

**4CV.4.1 Fabrication of GaInP/GaAs on InGaAs Solar Cells by Wire Bonding and Mechanical Stacking Technology**

R.-H. Horng  
NCTU, Hsinchu, Taiwan  
Y.-C. Kao, C.-H. Tien & Y.-H. Fu  
National Chung Hsing University, Taichung, Taiwan

**4CV.4.2 Detailed Investigation of a GaInP/GaAs/Ge Up-Conversion System: Efficiency Loss Analysis and Possible Route to Improvement**

D. Lan & M.A. Green  
UNSW Australia, Sydney, Australia

**4CV.4.3 Comparison of Novel Optimization Techniques with Application in Maximizing Tandem Solar Cells Performances**

S. Michael & M. Tsutagawa  
Naval Postgraduate School, Monterey, United States

**4CV.4.4 Temperature-Dependent Properties of an Inverted Metamorphic Four-Junction (IMM-4J) Solar Cell**

H. Zhang, L. Wang, R. Liu, Q. Sun, Z. Xiao, Q. Zhang,  
P. Peng, C. Xue, M. Jiang, L. Shi, Y. Tang, L. Yao & H. Wang  
Tianjin Institute of Power Sources, China

**4CV.4.5 III-V Multi-Junction Solar Cells Utilising Group IV SiGeSn Alloys as a 1.0eV Component Sub-Cell**

P. Pearce, T. Wilson & N.J. Ekins-Daukes  
Imperial College London, United Kingdom  
A.D. Johnson  
IQE, Cardiff, United Kingdom

**4CV.4.6 Development of GaSb Solar Cells on GaAs via Interface Misfit Technique**

G.T. Nelson, M.A. Slocum, Z.S. Bittner & S.M. Hubbard  
Rochester Institute of Technology, United States  
B.-C. Juang, R.B. Lagumavarapu & D. Huffaker  
UCLA, Los Angeles, United States  
S.W. Johnson  
NREL, Golden, United States

**4CV.4.7 Pseudomorphic and Metamorphic (Al)GaAsSb/(Al)InGaAs Tunnel Junctions for GaAs Based Multi-Junction Solar Cells**

K. Louarn, A. Arnoult, C. Fontaine, J. Colin, C. Cornille & G. Almuneau  
LAAS CNRS, Toulouse, France  
Y. Claveau & N. Cavassilas  
CNRS, Marseille, France  
F. Piquemal  
LNE, Trappes, France  
A. Bounouh  
CEA, Gif sur Yvette, France

**4CV.4.8 High-Quality GaAs (100) Thin Films on Silicon (100) Using Epitaxial Germanium (100) Buffer for Low-Cost III-V Solar Cells**

S. Chaurasia, S. Raghavan, S. Avasthi & A.S. Chouhan  
Indian Institute of Science, Bangalore, India  
J. Lohani & R. Tyagi  
Solid State Physics Laboratory, New Delhi, India

**4CV.4.9 Internal-Stress-Assisted Epitaxial Lift-off Process for Thin Film Gallium Arsenide Solar Cells on Metal Foil**

Y. Kim, S.H. Jung, K. Kim, C.Z. Kim, H.-B. Shin, K.H. Park, W.-K. Park & H.K. Kang  
KANC, Suwon, Korea South

**4CV.4.10 Rapidly Deposited GaAs Epitaxial Thin Films by MOCVD for Solar Cells**

S.-T. Hwang, J. Kim, T. Kwon, D.J. You & H.-M. Lee  
LG Electronics, Seoul, Korea South

**4CV.4.11 The Effects of Short-Range Alloy Disorder on the Potential Voltage Performance in GaAsBi Based Solar Cells**

T. Wilson, A. Mellor, N.P. Hylton & N.J. Ekins-Daukes  
Imperial College London, United Kingdom

**4CV.4.12 Passivation of GaInP and AlInP Surfaces for III-V Solar Cells**

M. Raappana, V. Polojärvi, T. Aho, A. Aho, R. Isoaho, A. Tukiainen & M. Guina  
Tampere University of Technology, Finland

**4CV.4.13 A Full Transparent Electrode Application in III-V Compound Solar Cell**

P. Dai, M. Tan, J. Lu, L. Ji, L. Bian, S. Lu & H. Yang  
CAS, Suzhou, China

**4CV.4.14 Design of Broadband and Omnidirectional Antireflection Coatings for III-V Concentrating Multijunction Solar Cells**

L.C. Andreani, M. Liscidini, M. Passoni & M. Patrizi  
University of Pavia, Italy  
G. Timò & F. Trespici  
RSE, Piacenza, Italy

**4CV.4.15 Enhanced Photon Utilization in Ultrathin 1.0eV GaInAs Sub-Cell by SiO<sub>2</sub>/Au Reflector**

L. Yao, L. Liu, Q. Zhang, H. Wang, H. Zhang, P. Peng & Q. Sun  
Tianjin Institute of Power Sources, China

**4CV.4.16 Counteracting Photovoltaic Effect in Multi-Junction Solar Cells**

M.A. Mintairov, V.V. Evstropov, S.A. Mintairov, M.Z. Shvarts, S.A. Kozhukhovskaia & N.A. Kalyuzhnyy  
RAS/ Ioffe, St. Petersburg, Russia

**4CV.4.17 Optical Characterization of a Red Dye Luminescent Solar Concentrator**

P. Bernardoni, M. Tonezzer, D. Vincenzi, S. Fugattini, M. Boschetti & V. Guidi  
University of Ferrara, Italy

**4CV.4.18 Overview of Different Characterization Techniques Used in Studying the Radiation Effect of Multijunction Solar Cells**

B.R. Uma, M. Ravindra, M. Sankaran & N. Raghu  
ISRO Satellite Centre, Bangalore, India  
S. Krishnan  
Shreedevi Institute of Technology, Mangalore, India  
R. Campesato  
CESI, Milan, Italy

**4CV.4.20 Simulation of InGaN Solar Cell**

N. Hanan & B. Smail  
University of Bejaia, Algeria

**4CV.4.22 Performance Assessment of Dense Array CPV Receiver Cooled by a Matrix of Microfluidic Cells under Non-Uniform Radiation**

G. Laguna, M. Vilarrubi, J. Barrau, J.I. Rosell, Y. Betancourt, A. Fernandez, G. Sisó, M. Ibañez, J. Illa & F. Badia  
UDL, Lleida, Spain  
L. Fréchette  
University of Sherbrooke, Canada

**4CV.4.23 Transmittance and Reflectance Maps in 3D-CPCs**

A. Parretta & E. Cavallari  
University of Ferrara, Italy  
M. Tucci  
ENEA, S. Maria di Galeria, Italy

**4CV.4.24 Soiling Effects on HCPV Energy Productivity in Morocco**

A. Barhdadi, M.A. Sebbar, W. Anana, F. Chaouki, B. Laarabi & D. Dahlioui  
University Mohammed V, Rabat, Morocco  
V. Gilioli & D. Verdilio  
Becar, Bologna, Italy

**4CV.4.25 High-Performance Photovoltaic Receiver of Laser Radiation for Wireless Power Transfer System**

A. Razuvaev, V. Tugaenko, V. Kapranov & N. Sukhareva  
RSC „Energy“, Korolev, Russia  
V.P. Khvostikov, M.Z. Shvarts, N.A. Kalyuzhnyy & S.A. Mintairov  
RAS/ Ioffe, St. Petersburg, Russia  
M. Perales & M.-H. Yang  
MH GoPower, Kaohsiung, Taiwan

**4CV.4.26 Evaluation of Outdoor Performance and Techno-Financial Analysis of a Stationary High Concentrating PVT System**

C. de Keizer & W. Folkerts  
SEAC, Eindhoven, The Netherlands  
M. van de Zande & P. Penning  
SunCycle Technology, Eindhoven, The Netherlands

**4CV.4.27 High Temperature Solar Cells for Venus Exploration**

J. Grandidier  
NASA, Pasadena, United States  
M.L. Osowski  
MicroLink Devices, Niles, United States  
M.L. Lee  
UIUC, Urbana, United States  
H.A. Atwater  
Caltech, Pasadena, United States

**4CV.4.28 Novel Epitaxial GaAs Lift-Off Approach via van der Waals Interface in In<sub>2</sub>Se<sub>3</sub> Buffer Layer**

N. Kojima, L. Wang, Y. Ohshita & M. Yamaguchi  
TTI, Nagoya, Japan

**4CV.4.29 Numerical Simulation of the Effect of High Energy Electrons on a n<sup>+</sup>-p-p<sup>+</sup> Space Solar Cell**

S. Babae & S.B. Ghozati  
Shahid Beheshti University, Tehran, Iran

**4CV.4.30 DEGRADE-CPV: A New Initiative on the Degradation Analysis of CPV Systems in Spain and Cyprus**

M. Theristis, G. Makrides & G.E. Georghiou  
University of Cyprus, Nicosia, Cyprus  
E. F. Fernández, J.P. Ferrer Rodríguez, J. Montes-Romero,  
F. Almonacid & P.J. Pérez-Higueras  
University of Jaén, Spain

NOTES

.....  
.....  
.....  
.....  
.....  
.....  
.....

**Thursday, 28 September 2017**

**VISUAL PRESENTATIONS 7DV.1**

**13:30 - 15:00 PV Economics and Markets / PV-Related Policies, Strategies and Societal Issues**

**7DV.1.1 Forecast of Global Long-Term PV Installations – Analysis of 190 Individual Countries**

A. Gerlach  
Gerlach New Energy Consulting, Ellrich, Germany  
C. Werner  
Chris Werner Energy Consulting, Dessau, Germany  
M. Fischer  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany

**7DV.1.2 The PV Market Developments in Greece, Self-Consumption Study Cases for Public Hospitals**

S. Tselepis & I. Nikolettatos  
CRES, Pikerimi, Greece

**7DV.1.3 PV Economics, Markets and Policies**

H. Maleeha, M. Reshme & A. Bhuiyan  
Innoel Renewable Energy, Narayanganj, Bangladesh  
A. Rahman  
Dhaka University, Bangladesh  
K. Ali & J. Mollick  
Innoel Renewable Energy, Dhaka, Bangladesh  
K. Alam  
NCC Bank, Dhaka, Bangladesh  
T.I.M.R. Zadeed  
IFIC Bank, Dhaka, Bangladesh

**7DV.1.4 Cabriss: Market Analysis and Business Models for a Circular Economy in PV**

R. Thomas  
CEA, Grenoble, France  
D. Pelletier, J.P. Rakotoniaina & L. Federzoni  
CEA, Le Bourget du Lac, France  
M.-C. Hoffmann  
PROJEKTkompetenz, Salzburg, Austria

**7DV.1.5 Scenario of Photovoltaics in Power Situation in India**

A. Kumar  
Georgia Institute of Technology, Atlanta, United States

**7DV.1.6 Solar Future in Turkey and Development Capacity in the Municipalities in Turkey**

A. Olgun  
Iller Bankasi, Ankara, Turkey

**7DV.1.7 Economic Assessment Study of Photovoltaic Energy Generation under Incentive Policies in Grid Connected Homes within Urban Area in Development Countries: The Brazilian Case**

L.C. Ribeiro Galvão, M.E. Morales Udaeta,  
A.L.V. Veiga Gimenes & B. da Silva Junior  
University of São Paulo, Brazil

**7DV.1.8 On the Economics of Grid-Tied Residential Solar PV Generation in Pakistan: Policies, Realities and the Way Forward**

M. Arsalan  
Institute of Business Management, Karachi, Pakistan  
F. Shehzad & A. Tahir  
NUCES, Karachi, Pakistan

**7DV.1.9 Value Added by PV Installations In The Netherlands**

C. Olson, F. Lenzmann, L. Beurskens & M. Sonne  
ECN, Petten, The Netherlands  
K. Heinbach, B. Hirsch & S. Salecki  
IÖW, Berlin, Germany

**7DV.1.10 Impacts of Solar Energy Integration on Fuel-Mix Strategies**

A. Sanfilippo & M. Khraishah  
QEERI, Doha, Qatar  
M. Bohra  
Imperial College London, United Kingdom  
N. El Dehaibi  
Stanford University, United States

**7DV.1.11 Business Models for Energy Delivery**

C.S. Mutubuki-Makuyana  
SNV, Harare, Zimbabwe

**7DV.1.12 A Systemic Economic Analysis of Residential PV Systems: A Strategic Utilization of Residential Battery Systems to Address Systemic Effects of PV Integration**

H.J.J. Yu  
CEA, Gif sur Yvette, France

**7DV.1.15 Collective Prosumerism: Assessing the Opportunity for Embedded Networks, Distributed Solar and Storage in Australian Apartment Buildings**

M.B. Roberts, A. Bruce & I.F. MacGill  
UNSW Australia, Sydney, Australia

**7DV.1.16 A Methodology to Evaluate the Potential of Using PVRO Desalinated Brackish Water in Irrigation on Large Farming Scale: Application to Saline Area in Rhamna Region (Morocco)**

Y. Ettayeb, N. Mbodji, T.A.A. Arisily & A. Hajji  
Agronomic and Veterinary Institute Hassan II, Rabat,  
Morocco

**7DV.1.17 Photovoltaic System and Components Price Development in The Netherlands**

W.G.J.H.M. van Sark  
Utrecht University, The Netherlands  
T. Schoen  
New-Energy-Works, Utrecht, The Netherlands

**7DV.1.18 Innovative Business Model for Photovoltaic Power Plants on Multiple Dwellings in Austria**

S. Woess-Gallasch & D. Frieden  
JOANNEUM RESEARCH, Graz, Austria  
H. Rest-Hinterseer  
Arbeitsgemeinschaft Erneuerbare Energie Salzburg, Austria  
G. Korpitsch & M. Auer  
KW Solartechnik, Graz, Austria  
W. Aichinger  
EAG, Salzburg, Austria

**7DV.1.19 On Flexibility, Variability and Value**

B. O'Donnell  
Heliocentric Solutions, London, United Kingdom  
H.S. Nguyen  
Centrale Lyon, Ecully, France

**7DV.1.20 Cherry-Picking Buildings for PV Self-Consumption**

B. O'Donnell  
Heliocentric Solutions, London, United Kingdom  
H.S. Nguyen  
CNRS, Ecully, France  
E. Warcoin  
Prometeruse, Berlin, Germany

**7DV.1.21 Evaluating the Factors Affecting the Break-Even Cost of On-Site PV Generation at Industrial Units**

M. Papapetrou  
WIP - Renewable Energies, Munich, Germany  
M. Vallés, T. Gómez & P. Frías  
Comillas Pontifical University, Madrid, Spain  
A. Cipollina & G. Micale  
University of Palermo, Italy

**7DV.1.22 Rapid Energy Mix Transformation LED by Economic Solar PV Solutions**

S. Zawaydeh  
University of Jordan, Amman, Jordan

**7DV.1.23 Comparison and Performance Analysis Strategies of Photovoltaic Technologies: A Systematic Literature Review**

H. Sellak & B. Ouhbi  
University Moulay Ismail, Meknes, Morocco  
B. Frikh  
USMBA, Fez, Morocco  
A. Bennouna  
Cadi Ayyad University, Marrakech, Morocco  
Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco

**7DV.1.24 An Overview of Patent Application Data in the Field of Photovoltaics**

A. Visentin & B.E. Sagol  
European Patent Office, Berlin, Germany  
M. Boero & C. Königstein  
European Patent Office, Rijswijk, The Netherlands

**7DV.1.25 Current and Future Estimates of the LCOE for a 10-MW Ground-Mount Solar Plant According to Different Technologies and Local Specificities**

J. Cren & R. Thomas  
CEA, Grenoble, France

**7DV.1.26 Borneo Eiland Prosumer Community: Towards More Energy Independent Neighbourhoods in Amsterdam**

H. Niesing, C. Varela & A. Van der Giessen  
Resourcefully, Amsterdam, Netherlands  
T. AISkaif  
Utrecht University, Netherlands

**7DV.1.29 PVSITES Project – Building Integrated Photovoltaic Technologies and Systems for Large-Scale Market Deployment**

M. Machado & R. Alonso  
Tecnalia Research & Innovation, San Sebastián, Spain  
S. Challet & I. Weiss  
WIP - Renewable Energies, Munich, Germany  
P. Alamy & V.K. Nguyen  
CADCAMation, Onex, Switzerland  
J.M. Espeche & F. Noris  
R2M Solution, Pavia, Italy  
E. Rico  
Onyx Solar Energy, Avila, Spain  
T. Reijenga  
BEAR-iD, Gouda, The Netherlands  
P. Brassier  
Nobatek, Anglet, France  
P. Surguy  
Film Optics, Watchfield, United Kingdom  
V. Francisco  
CTCV, Coimbra, Portugal

S. Stutterheim  
Filsom, Dübendorf, Switzerland  
H. Delgado  
CRICURSA, Barcelona, Spain  
F. Burgun  
CEA, Le Bourget du Lac, France  
J.C. Esteban  
Acciona Infraestructuras, Alcobendas, Spain  
D. Déramaix  
Bureau d'Architectes Format D2, Sirault, Belgium  
A. Bogucka  
Vilogia, Paris, France

**7DV.1.30 FP7-CHEETAH Knowledge Exchange Platform: Results and their Exploitation**

F. Roca, D. Casaburi, F. Beone, C. Diletto, I. Falcone, A. De Girolamo & R. Miscioscia  
ENEA, Portici, Italy  
K. Bittkau  
Forschungszentrum Jülich, Germany  
I. Lauermaun & M. Schmid  
HZB, Berlin, Germany  
S.A. Gevorgyan  
DTU, Roskilde, Denmark  
I. Gordon & K. Van Nieuwenhuysen  
imec, Leuven, Belgium  
A. Roesch  
SolarPower Europe, Brussels, Belgium  
A. Danel  
CEA, Le Bourget du Lac, France  
P. Sommeling, J. Kroon & S.C. Veenstra  
ECN, Petten, The Netherlands  
S. Binetti  
University of Milan, Italy  
T. Boeck & F. Ringleb  
IKZ Institute for Crystal Growth, Berlin, Germany  
F. Brunetti & A. Di Carlo  
University of Rome II, Italy  
J. Bowers  
Loughborough University, United Kingdom  
S. Buecheler  
EMPA, Dübendorf, Switzerland  
J. Cárame & J.F. Trigo  
CIEMAT, Madrid, Spain  
C. del Cañizo  
UPM, Madrid, Spain  
M. Grossberg  
Tallinn University of Technology, Estonia  
G. Halambalakis  
CRES, Athens, Greece  
J. Hast  
VTT, Oulu, Finland  
A. Joyce  
INETI, Lisboa, Portugal  
R. Kvande  
SINTEF, Trondheim, Norway

E. Lotter  
ZSW, Stuttgart, Germany  
E. Román  
Tecnalia, Derio, Spain  
R. Turan  
METU, Ankara, Turkey  
G. Sánchez-Plaza  
UPV, Valencia, Spain  
N. Wyrsh  
EPFL, Neuchâtel, Switzerland  
S. Zamini  
AIT, Vienna, Austria

**7DV.1.31 Really Building with BIPV - Putting the Foundation in Place for a Successful Dutch BIPV Sector (the 'Werkelijk Bouwen Aan BIPV' Project)**

A. De Vries  
Stichting Monitoring Zonnestroom, Utrecht, The Netherlands  
A. Kahn  
4WWWIE, Ouderkerk aan de Amstel, The Netherlands  
R. Comuth  
Adviesbureau Comuth, Maastricht, The Netherlands  
A. van Deursen  
HD Solar, Someren, The Netherlands  
M. Arninkhof  
Holland Solar, Utrecht, The Netherlands  
G. Verpaalen  
Kameleon Solar Specials, Roosendaal, The Netherlands  
C. Maas  
Chatim, Heerlen, The Netherlands  
S. Kin  
SolarSwing, Delft, The Netherlands  
P. de Jong  
Solinso, Kessel, The Netherlands  
W. van de Wall  
Wallvision, Heeze, The Netherlands  
Z. Vroon  
Zuyd University of Applied Sciences, Heerlen, The Netherlands  
A. Kuypers  
TNO, Delft, The Netherlands  
J. Kester  
ECN, Petten, The Netherlands  
R.M.E. Valckenborg  
SEAC, Eindhoven, The Netherlands  
W.G.J.H.M. van Sark  
Utrecht University, The Netherlands  
R. Loonen  
Eindhoven University of Technology, The Netherlands  
L. van den Hurk & E. Teunissen  
Berenschot, Utrecht, The Netherlands

**7DV.1.32 Development of BIPV Courseware for Students and Professionals**

M. Tabakovic & H. Fechner  
University of Applied Sciences, Vienna, Austria  
W.G.J.H.M. van Sark & A. Louwen  
Utrecht University, The Netherlands  
I. Weiss & S. Arancón  
WIP - Renewable Energies, Munich, Germany  
G. Georghiou, G. Makrides & M. Hadjipanayi  
University of Cyprus, Nicosia, Cyprus  
E. Loucaidou & M. Ioannidou  
Deloitte, Limassol, Cyprus

**7DV.1.35 The Pilot Tender for PV in Greece within 2016. Results and Conclusions**

D. Papachristou, P. Kapetana & P. Daliouris  
RAE, Athens, Greece  
T. Petmezas  
cosmoONE, Athens, Greece

**7DV.1.36 Photovoltaic Power Production in Greece: History, Current Status and New Policies for Future Deployment**

J.S. Anagnostopoulos  
NTUA, Athens, Greece

**7DV.1.37 Project to Achieve Israel Energy Independence by 2050**

D. Dov  
ECS, Rishon Lezion, Israel

**7DV.1.38 Moroccan PV Energy Policy Assessment on Economic Growth and Social Issue**

Z. Zaoui, O. Ghriach & C. Benqlilou  
ENIM, Rabat, Morocco

**7DV.1.39 Solar PV Sustainability Benefits; Decentralized vs Utility Scale**

S. Zawaydeh  
University of Jordan, Amman, Jordan

**7DV.1.41 Promoting a Sustainable Diffusion of Solar PV Electricity in Africa: Results of the CODEV Project**

E. Annigoni, A. Virtuani, N. Wyrsh & C. Ballif  
EPFL, Neuchâtel, Switzerland  
A. Ndiaye, M.L. Ndiaye & C.M.F. Kebe  
Polytechnical University of Dakar, Dakar Fann, Senegal

**7DV.1.43 Impacts of Socio-Economic Policies on Temporal Diffusion of PV-Based Communal Grids in a Rural Developing Community**

N. Opiyo  
University of Leeds, United Kingdom



**7DV.1.44 Prospects of PV Deployment in Japan under the Revised FIT Law**  
I. Kaizuka, H. Matsukawa, H. Yamaya, T. Ohigashi & O. Ikki  
RTS, Tokyo, Japan

**7DV.1.45 Policy Statement of Certified PV Module Registration and Management in Taiwan**  
C.-C. Chou  
ITRI, Hsinchu, Taiwan

**7DV.1.46 Distributed Photovoltaic Generation: Challenges and Solutions for Its Expansion and Integration in the Brazilian Grid with Case Study of the Impact of the White Tariff**  
V.O. Silva, D.B. Bernhard, S. Gomes Relva,  
M.E. Morales Udaeta, A.L. Veiga Gimenés & M.B.C. Salles  
University of São Paulo, Brazil

**7DV.1.47 R&D Strategy for Solar PV Cells in Brazil**  
J.A. Martinez Buitrago, E. Venâncio Camillo & A. Tosi Furtado  
University of Campinas, Brazil

**7DV.1.48 Training the Next Generation of PV Reliability Experts – New Marie-Sklodowska Curie (MSCA) Project SOLAR-TRAIN**  
K.-A. Weiß, S. Saile, A. Keiner & L. Pitta Bauermann  
Fraunhofer ISE, Freiburg, Germany  
G. Oreski  
PCCL, Leoben, Austria  
R. Gottschalg  
Loughborough University, United Kingdom  
D. Moser  
Eurac Research, Bolzano, Italy  
M. Topic  
University of Ljubljana, Slovenia  
A.R. Lagunas  
CENER, Sarriguren, Spain  
P. Chiantore  
BayWa, Rome, Italy  
M. Van Iseghem  
EDF R&D, Moret-sur-Loing, France

**7DV.1.49 Engaging Young Minds in the Energy Transition**  
B. O'Donnell  
Heliocentric Solutions, London, United Kingdom  
E. Warcoin  
Prometeruse, Berlin, Germany  
N. Landry  
MINES ParisTech, Etalans, France

**7DV.1.50 School Sustainable: Ecological Farming, Solar Energy and Rainwater Capture as Element Educator in County Gravataí / RS - Brazil**  
A.C. Pan, A. Machado Golembieski, L.P. Menna de Oliveira,  
L. Alves Schmitt, A. Antunes De Paulo & R. Souza da Silva  
PUCRS, Porto Alegre, Brazil  
L.F. Ribeiro Gomes  
EEEEPM, Gravataí, Brazil

**7DV.1.51 Economic Assessment of Photovoltaic Installations in Multi-Apartment Buildings**  
B. Fina, J. Auer, A. Fleischhacker & G. Lettner  
Vienna University of Technology, Austria

### VISUAL PRESENTATIONS 3DV.2

**15:15 - 16:45 CI(G)S, CdTe and Related Thin Film Solar Cells and Modules (II) / Perovskite, Organic and Dye-Sensitised Devices**

**3DV.2.2 Structural and Optical Properties of RF-Sputtered ZnS:Cr Thin Films**  
O.M. Cheikh & M. Aggour  
Ibn Tofail University, Kenitra, Morocco  
L. Nkhaili, A. El Kissani, M. Chaik & A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco

**3DV.2.4 Optimization of Monolithic Two-Terminal Hybrid a-Si:H-CIGS Tandem Devices**  
A.J. Blanker, Y.H. Liu, P. Berendsen, N. Phung, M. Zeman & A.H.M. Smets  
Delft University of Technology, The Netherlands  
Z. Vroon  
TNO/Solliance, Eindhoven, The Netherlands

**3DV.2.5 HPMF Process of Al-Doped Zinc Oxide Films from Rotatable Targets**  
V. Sittinger, S. Jung, C. Britze, H. Gerdes & G. Bräuer  
Fraunhofer IST, Braunschweig, Germany  
D. Schorn  
MAGPULS, Sinzheim, Germany  
T. Wallendorf  
IBW Technologieberatung, Berlin, Germany

**3DV.2.6 High Speed Curing of AR Coatings on Thin-Film Modules by Laser Irradiation: An End-of-Line Approach for Improved Power Outputs**

D. Hawelka & J. Stollenwerk  
Fraunhofer ILT, Aachen, Germany  
R. Cauchois, Y. Li & H. Schoot  
DSM, Geleen, The Netherlands

**3DV.2.7 Back Contact Modification in Cu<sub>2</sub>ZnSnSe<sub>4</sub> Solar Cells: The Use of Transition Metal Oxides as Possible Back Electron Reflectors**

S. Giraldo, M. Espindola-Rodriguez, F. Oliva,  
V. Izquierdo-Roca & E. Saucedo  
IREC, Barcelona, Spain  
A. Perez-Rodriguez  
University of Barcelona, Spain

**3DV.2.8 Structural, Morphological and Raman Scattering Studies of Carbon Doped ZnO Nanoparticles Fabricated by PSP Technique**

R. Taziwa & E. Meyer  
University of Fort Hare, Alice, South Africa

**3DV.2.9 First Principles Calculations on Incorporation of Point Defects in Beta-In<sub>2</sub>S<sub>3</sub>**

E. Ghorbani & K. Albe  
Technical University of Darmstadt, Germany

**3DV.2.10 Reverse Bias JV Characteristics of CIGS Devices**

B.E. Pieters  
Forschungszentrum Jülich, Germany

**3DV.2.12 Rear-Side Contacted, Laser-Structured CIGSe Cells: A Proof of Concept**

G. Fariás Basulto, M.D. Heinemann, C.A. Kaufmann,  
B. Rau & R. Schlatmann  
HZB, Berlin, Germany  
C. Schultz & B. Stegemann  
Berlin University of Applied Sciences, Germany

**3DV.2.13 Properties of Co-Sputtered Cd<sub>x</sub>Te<sub>1-x</sub> Thin Films for Compositional Optimization in High Performance CdS/CdTe Solar Cells**

M.A. Islam, K.S. Rahman, F.M. Tahzib Enam, K. Sobayel,  
I. Kamaruzzaman, M. Akhtaruzzaman & N. Amin  
National University of Malaysia, Bangi, Malaysia

**3DV.2.14 A Growth Model to Predict the Composition of Cadmium Telluride Films**

X. Tan, A. Saraf, G. Liu, A.E. Delahoy & K.K. Chin  
NJIT, Newark, United States  
S. Peng & S. Xia  
Bengbu Design & Research Institute for Glass Industry,  
China  
J. Pan  
CNBM Chengdu Optoelectronic Materials, China  
V. Krishnakumar & B. Siepchen  
CTF Solar, Dresden, Germany

**3DV.2.15 Densification of Solution-Based Processed Kesterite Cu<sub>2</sub>ZnSnS<sub>4</sub> Thin Films by Thermal Annealing**

R.A. Wibowo, F. Berzsenyi & N. Bansal  
AIT, Vienna, Austria

**3DV.2.16 Structure and Physical Properties of CuIn<sub>1-x</sub>Ce<sub>x</sub>Se<sub>2</sub> Compound Grown via Electrodeposition Route**

A. Chihi, M.F. Boujmil & B. Bessais  
CRTE, Hammam-Lif, Tunisia

**3DV.2.17 Analytical and Empirical Modeling of CZTSSe Solar Cells with Incomplete Gamma Function of Quantum Efficiency under Voltage and Light Biases**

S. Lee & K.J. Price  
Morehead State University, United States  
E. Saucedo & S. Giraldo  
IREC, Barcelona, Spain

**3DV.2.18 Optical Optimization of CIGS Solar Cells Based on Rear Dual-Layer Dielectric Spacer and Point-Contact Scheme**

N. Rezaei, O. Isabella & M. Zeman  
Delft University of Technology, The Netherlands  
Z. Vroon  
TNO, Geleen, The Netherlands

**3DV.2.19 Physical Model of Defect Formation in Non-Stoichiometric Cadmium Telluride**

X. Tan, A. Saraf, A.E. Delahoy & K.K. Chin  
NJIT, Newark, United States  
S. Peng & S. Xia  
CTIEC, Bengbu, China  
J. Pan  
CNBM, Chengdu, China  
V. Krishnakumar & B. Siepchen  
CTF Solar, Dresden, Germany

**3DV.2.20 Investigation of KF-PDT Induced Surface Modification of Cu(In,Ga)Se<sub>2</sub> Absorbers and Its Correlation with Device Performance**

I. Majumdar, V. Parvan, D. Greiner, R. Schlatmann & I. Lauermann  
HZB, Berlin, Germany  
M.C. Lux-Steiner  
Free University of Berlin, Germany

**3DV.2.21 Layer-Selective Laser-Lift off and Removal Mechanism in a TCO/Si and TCO/CdTe Thin Film System by Nano-to-Femtosecond Pulses**

S. Krause, P. Miclea, K. Kaufmann & C. Hagendorf  
Fraunhofer CSP, Halle, Germany

**3DV.2.22 Properties of Cu<sub>2</sub>ZnSn(S<sub>x</sub>Se<sub>1-x</sub>)<sub>4</sub> Thin Films Obtained by an Electrodeposition-Annealing Process**

E.P. Zaretskaya & V.F. Gremenok  
NASB, Minsk, Belarus  
K.A. Urazov & M.B. Dergacheva  
National Academy of Sciences, Almaty, Kazakhstan  
S. Özcelik  
University of Gazi, Ankara, Turkey

**3DV.2.23 Low Resistivity of ZnMgO Films Grown by Spin-Coated Method**

H. Tominaga & K. Yoshino  
University of Miyazaki, Japan

**3DV.2.24 Growth of Photovoltaic Compound Single Crystals**

A. Nagaoka & Y. Nose  
Kyoto University, Japan  
M.A. Scarpulla  
University of Utah, Salt Lake City, United States  
K. Yoshino  
University of Miyazaki, Japan

**3DV.2.26 Comparative Study of CuSbS<sub>2</sub> Thin Film Solar Cells Prepared by Two Different Hybrid Inks**

S. Banu & A. CHO  
KIER, Daejeon, Korea South

**3DV.2.27 Influence of Mo Microstructural Properties on the Formation of MoS<sub>2</sub> Thin Film by Sulphurization Process**

P. Chelvanathan, S.A. Shahahmadi, Z. Zakaria, Y. Yusoff, M.T. Ferdaous, M.M.I. Sepali, K. Sopian & N. Amin  
National University of Malaysia, Bangi, Malaysia

**3DV.2.28 Photovoltaic Properties of CdSeTe Alloys**

A. Los  
First Solar, Perrysburg, United States

**3DV.2.31 Identification of Trap States in Hybrid Organic/Inorganic Perovskites**

G. Gordillo, C.A. Otálora, E.R. Romero & A.A. Ramírez  
National University of Colombia, Bogotá, Colombia

**3DV.2.32 Comparison of Simulation Models for Perovskite Solar Cells**

S. Silvestre & J. Puigdollers González  
UPC, Barcelona, Spain  
E. Mas-Marzá, F. Fabregat-Santiago & V.G. Alfonso  
UJI, Castellón, Spain

**3DV.2.34 Challenges and Solutions in the R2R Manufacturing of Perovskite Solar Cells**

M. Busch, T. Kolbusch, K. Crone & N. Meyer  
Coatema, Dormagen, Germany

**3DV.2.37 Long Term Thermal Stability Tests for Air Processed Inkjet Infiltrated Carbon Based Printed Perovskite Solar Cells**

S.G. Hashmi, A. Rimppi & P.D. Lund  
Aalto University, Espoo, Finland

**3DV.2.40 Reduced Graphene Oxide Nano Sheet Modified Dye-Sensitized Solar Cell for Future Energy Challenge**

M.Z.H. Khan & M.R. Hasan  
Jessore University of Science and Technology, Bangladesh

**3DV.2.41 Eliminating Irregular Hysteresis Behavior in Perovskite Solar Cells**

O. Bhandakkar  
University of Massachusetts, Lowell, United States

**3DV.2.43 Emergence of Flexible Perovskite Photovoltaic Solar Cells**

S. Uddin & I. Rehman Ansari  
Aligarh Muslim University, India

**3DV.2.45 Stability Issues of Perovskite Photovoltaic Cells**

D. Strachala, J. Hylsky, J. Vanek, M. Kadlec & J. Mucha  
Brno University of Technology, Czech Republic

**3DV.2.47 Machine Learning for Stability Research of Dye-Sensitised and Perovskite Solar Cells**

A. Tiihonen, K. Miettunen & P.D. Lund  
Aalto University, Espoo, Finland

- 3DV.2.49 Optical and Recombination Losses in Hybrid Perovskite Solar Cells**  
M. Tamakoshi, T. Fujiseki, S. Fujimoto & H. Fujiwara  
Gifu University, Japan  
T. Miyadera, T. Murakami, T. Sugita & M. Chikamatsu  
AIST, Tsukuba, Japan
- 3DV.2.50 Fabrication of CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Perovskite Solar Cells with MAI-PbI<sub>2</sub>-MAI Structure via Sandwich Evaporation Technique**  
P.-T. Kuo, S.-P. Lin, C.-S. Lin & C.-F. Lin  
NTU, Taipei, Taiwan
- 3DV.2.51 Molecular Strategies towards Efficient Organic Solar Cells**  
C. Zhan  
CAS, Beijing, China
- 3DV.2.52 Enhanced Charge Carrier Dynamics in Perovskite Solar Cells Probed by Femtosecond Transient Absorption Spectroscopy**  
E. Serpetzoglou, I. Konidakis & E. Stratakis  
FORTH, Heraklion, Greece  
G. Kakavelakis, T. Maksudov & E. Kymakis  
TEI, Heraklion, Greece
- 3DV.2.53 Solution-Processed Inverted Organic Solar Cells: Towards Fully Spray-Coated Devices**  
R. López Vicente, C. Toledo Arias, J. Padilla, A. Urbina & J. Abad  
UPCT, Cartagena, Spain
- 3DV.2.54 Determination of the Optimum Thickness for Improved Conversion Efficiency of the Absorber Layer of Sandwiched Perovskite - Based Solar Cell Using Solar Cell Capacitance (SCAPS-1D) Simulator**  
I.T. Bello, M.K. Awodele & A.O. Awodugba  
LAUTECH, Ogbomoso, Nigeria
- 3DV.2.55 Perovskite Solar Cell via Ultrasonic Spray Assisted Two-Step Deposition Method**  
S. Wang, G. Chai & H. Zhou  
PKUSZ, Shenzhen, China  
P. Hiralal  
Zinergy, Shenzhen, China  
T. Meng  
University of Delaware, Newark, United States
- 3DV.2.56 Conductive Inks with Epoxy Resin Based Vehicles for Perovskite Screen Printing Metallization as a Viable and Low-Cost Alternative to Thermal Evaporation**  
C. Montes, L. Ocaña, C. Quinto, M. Friend & M. Cendagorta  
ITER, Granadilla de Abona, Spain  
S. González-Pérez, B. González-Díaz & R. Guerrero-Lemus  
ULL, La Laguna, Spain

- 3DV.2.57 Performance Enhancement of Naturally Synthesized Dye-Sensitized Solar Cells (DSSCs) by Using Mono- and Bimetallic Nanoparticles Additives**  
K. Ranabhat, K.S. Skripkin, E.A. Sofronova & A.I. Pylinin  
RUDN University, Moscow, Russia  
A.A. Revina  
RAS, Moscow, Russia  
L.N. Patrikeev & V.A. Lapshinsky  
MEPhI, Moscow, Russia
- 3DV.2.58 Structural, Optical and Electrical Properties of ZnO/Perovskite/CuO/ Al Solar Cells**  
H. Ait Dads, L. Nkhaili, A. El Kissani, H. El Aakib, S. Laalioui, M. Ait Ali & A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco
- 3DV.2.59 Synthesis and Characterization of (2-(4-Chlorophenyl-diazenyl)-Ethyl(2-Amino-7-Hydroxy-pyrazolo[1,5-a]Pyrimidin-5-yl) Acetate as Hole-Transporting Layer for Perovskite Solar Cells**  
E. El-Menyawy  
National Research Center, Cairo, Egypt
- 3DV.2.61 Investigation of the Effect of Interfacial Transport Layer on Perovskite Solar Cells by Optoelectronic Approach**  
D.B. Khadka, Y. Shirai, M. Yanagida & K. Miyano  
NIMS, Tsukuba, Japan
- 3DV.2.62 Perovskite-Based Solar Devices: Towards 2-Terminal Silicon Heterojunction Tandem Cells**  
R. Benrabbah, M. Manceau, D. Muñoz, C. Roux & S. Berson  
CEA, Le Bourget du Lac, France
- 3DV.2.63 Tunneling Assisted Trapping as a Possible Origin of the Hysteresis in Perovskite Solar Cells, a Study with the Simulation Software SILVACO ATLAS**  
S. Almosni, L. Cojocar, S. Uchida, T. Kubo & H. Segawa  
University of Tokyo, Japan  
D. Li  
Silvaco Japan, Yokohama, Japan
- 3DV.2.64 Enhancement of Efficiency for Mixed Metal Sn/Pb Perovskite Solar Cells with 16% Efficiency from the View Point of Crystal and Hetero-Interface Architecture**  
Y. Ogomi, K. Hamada, D. Yamasuso, D. Hirotsu, A. Yonaha, E. Yamaguchi & S. Hayase  
Institute of Technology, Kitakyushu, Japan  
S. Shen & T. Toyoda  
University of Electro-Communication, Chofu, Japan  
K. Yoshino  
University of Miyazaki, Japan  
T. Minemoto  
Ritsumeikan University, Kusatsu, Japan

- 3DV.2.65 Laser Patterning of Perovskite Solar Cells: Process Development and Determination of the Heat-Affected Zone**  
C. Schultz, F. Schneider & B. Stegemann  
Berlin University of Applied Sciences, Germany  
C. Ferber, L. Kegelmann, S. Meyer, B. Rech,  
R. Schlatmann & S. Albrecht  
HZB, Berlin, Germany
- 3DV.2.66 Designing Highly Efficient Perovskite Solar Cells**  
B.M.W. Wilkinson, M.A. Green & A.W.Y. Ho-Baillie  
UNSW Australia, Sydney, Australia
- 3DV.2.68 One-Step Fabrication of Two Dimensional Copper Based Perovskite Thin Film**  
N. Bansal, P. Santos Oritz, R. Wibowo & T. Dimopoulos  
AIT, Vienna, Austria
- 3DV.2.69 On Cost Effectiveness of Perovskite/c-Si Tandem Modules**  
B. Geerligs  
ECN, Petten, The Netherlands
- 3DV.2.70 Investigation of Industrial Crystalline Silicon Cell Architectures as Bottom Cell in Perovskite/c-Si Hybrid Tandems**  
S.L. Luxembourg, Y. Wu & L.J. Geerligs  
ECN, Petten, The Netherlands  
D. Zhang, W. Verhees & S.C. Veenstra  
ECN, Eindhoven, The Netherlands
- 3DV.2.71 A One-Step Deposition Method Assisted with Non Polar Washing Solvent Treatment for Producing Uniform Thin Layers of Perovskite Validated through Ellipsometry**  
C. Montes, L. Ocaña, C. Quinto, M. Friend & M. Cendagorta  
ITER, Granadilla de Abona, Spain  
S. González-Pérez, B. González-Díaz,  
C. Hernandez-Rodríguez & R. Guerrero-Lemus  
ULL, La Laguna, Spain
- 3DV.2.72 Design Guidelines for Highly Efficient Perovskite/Si Tandem Solar Cells**  
M.H. Futscher & B. Ehrler  
AMOLF, Amsterdam, The Netherlands
- 3DV.2.73 Maximization of Short Circuit Current in Perovskite Solar Cells by Optical Engineering**  
M. Koç, D. Turkay, W. Soltanpoor & S. Yerci  
METU, Ankara, Turkey
- 3DV.2.74 Comparison of the Aluminium Back Contact Deposited by Sputtering, E-Beam, or Thermal Evaporation for Inverted Perovskite Solar Cells**  
J. Hanisch, T. Wahl & E. Ahlswede  
ZSW, Stuttgart, Germany

- 3DV.2.75 CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub>-xBr<sub>x</sub> Films with Tunable Optoelectronic Properties by Thermal Co-Evaporation**  
W. Soltanpoor, O. Yilmaz, M. Cem Sahiner & S. Yerci  
METU, Ankara, Turkey
- 3DV.2.76 Unencapsulated CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Solar Cells under Different Relative Humidity**  
A. De Maria, V. La Ferrara, L.V. Mercaldo, A. Bruno,  
G. Rametta & P. Delli Veneri  
ENEA, Portici, Italy  
F. Matteocci & A. Di Carlo  
University of Rome „Tor Vergata“, Italy
- 3DV.2.77 ITO-ZnO Perovskite Solar Cell Using Hexagonal Array Nano Cone Patterned Substrate for Improving Efficiency**  
M. Byun, K.S. Oh, Y.D. Kim, J.-Y. Choi, D. Huh, K. Kim & H. Lee  
Korea University, Seoul, Korea South  
D.S. Kim  
KIER, Ulsan, Korea South
- 3DV.2.78 Nordic Outdoor Aging Test for Dye-Sensitised Solar Cells**  
S. Lepikko, K. Miettunen, A. Poskela, A. Tiihonen & P.D. Lund  
Aalto University, Espoo, Finland
- 3DV.2.79 The Potential of Perovskite Solar Cell in Morocco**  
S. Laaloui, K. Belhiti Alaoui, Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco  
K. El Assali, H. Ait Dads & A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco
- 3DV.2.80 A Fast and Easy Perovskite Solar Cell Simulation Tool Featuring Ion Migration**  
A. Fell & S.W. Glunz  
Fraunhofer ISE, Freiburg, Germany  
D. Walter  
ANU, Canberra, Australia
- 3DV.2.81 Raman Spectroscopy and Imaging of Titanium Dioxide Nanotubes**  
R. Taziwa & E.L. Meyer  
University of Fort Hare, Alice, South Africa
- 3DV.2.82 Spatial Atomic Layer Deposition: A Potential Up-Scalable Route for Selective Contacts in Perovskite Solar Cells**  
V. Zardetto, F. Di Giacomo, F. van den Bruele, H. Lifka,  
R.A.J.M. Andriessen, P. Poodt & A. Illiberi  
TNO/Solliance, Eindhoven, The Netherlands  
A. Hadipour  
imec, Leuven, Belgium  
S.C. Veenstra  
ECN, Eindhoven, The Netherlands

- 3DV.2.84 Light Management Films for Enhanced Harvesting in Printable Photovoltaics**  
J. Mayer, T. Offermans, B. Gallinet, I. Zhurminsky & R. Ferrini  
CSEM, Muttenz, Switzerland
- 3DV.2.85 Perovskite Stability Investigated by Combined Surface and Bulk Analysis Techniques**  
E. Pellereau, D. Aureau, M. Bouttemy, M. Frégnaux, A.-M. Goncalves, N. Steunou, J. Vigneron & A. Etcheberry  
UVSQ, Versailles, France  
J.-E. Bouree, C. Dindault, B. Geffroy, H. Lee, A. Marronnier, D. Tondelier & Y. Bonnassieux  
CNRS, Palaiseau, France  
T. Bourgeteau  
NAIST, Ikoma, Japan  
G. Roma  
CEA, Gif Sur Yvette, France
- 3DV.2.87 Parallel Tandem Solar Cell Based on Transparent Singlet Fission Solar Cell**  
J. Lee, M.H. Futscher & B. Ehrler  
AMOLF, Amsterdam, The Netherlands  
L. Pazos-Outón  
University of California, Berkeley, United States
- 3DV.2.88 Influence of Pd-Doped TiO<sub>x</sub> on Inverted Organic Solar Cells Performance**  
J.G. Sánchez López, A. Viterisi, J. Ferré-Borrull, L.F. Marsal Garví & J. Pallarès Marzal  
URV, Tarragona, Spain  
V.S. Balderrama Vazquez & M. Estrada del Cueto  
CINVESTAV, Mexico City, Mexico
- 3DV.2.89 Solar Cell Efficiency as a Function of Blocking Layer Thicknesses and Exciton Fluorescence Quantum Yield**  
B. Godefroid & G. Kozyreff  
Free University of Brussels, Belgium
- 3DV.2.90 Raising the Technology Readiness for Highly Efficient, Stable Perovskite-Based Photovoltaic Modules**  
T. Aernouts, W. Qiu & R. Gehlhaar  
imec, Leuven, Belgium  
F. Di Giacomo & R.A.J.M. Andriessen  
TNO, Eindhoven, The Netherlands  
Y. Galagan & S.C. Veenstra  
ECN, Eindhoven, The Netherlands
- 3DV.2.91 Characterisation of a Multidimensional Nonlinear Solar Cell**  
T. Fey, I. Kröger & S. Winter  
PTB, Braunschweig, Germany

- 3DV.2.92 Effect of Single-Chirality Single-Walled Carbon Nanotubes in Dye Sensitized Solar Cells Photoanodes**  
F. Gaspari & S. Quaranta  
University of Ontario, Oshawa, Canada  
V.L. Davis  
University of Freiburg, Germany  
A. Latini & C. Cavallo  
University of Rome, Italy
- 3DV.2.96 Large Perovskite Single Crystals for Integrated Circuits**  
S. Liu  
CAS, Dalian, China  
Y. Liu & Z. Yang  
Shaanxi Normal University, Xi'an, China
- 3DV.2.97 Hydromolecular-Resist and Dipole Effects of Metal-Acetylacetonate Series in Interface Engineering for Full Low Temperature Processed, High Performance and Stable Inverted Planar Perovskite Solar Cells**  
Z. He & W. Chen  
SUSTech, Shenzhen, China
- 3DV.2.98 Loss Analysis for Meso-Structured Perovskite Solar Cells**  
H. Xue, E. Birgersson & R. Stangl  
NUS, Singapore  
K. Fu  
NTU, Singapore
- 3DV.2.99 Enhancing the Efficiency of Perovskite Solar Cell Using Selective TiO<sub>2</sub> Nanorod Patterned Substrate**  
D. Huh, H.-J. Choi, J.-Y. Choi, M. Byun & H. Lee  
Korea University, Seoul, Korea South  
M. Kim & D.S. Kim  
KIER, Ulsan, Korea South
- 3DV.2.100 Cu Based Hole Transport Materials for Perovskite Solar Cells**  
V. Erkkara Madhavan, M. Buffière & A. Belaidi  
QEERI, Doha, Qatar  
I. Zimmermann, C. Roldán-Carmona, G. Grancini & M.K. Nazeeruddin  
EPFL, Lausanne, Switzerland
- 3DV.2.101 Scalable Synthesis of Carbon Materials for Highly Efficient Charge Transfer Perovskite Solar Cells**  
A.R. bin Mohd Yusoff & J. Jang  
Kyung Hee University, Seoul, Korea South  
M.K. Nazeeruddin  
EPFL, Lausanne, Switzerland

**3DV.2.102 Charge Carrier Lifetime in CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Thin Film: Role of Humidity**

A.S. Chouhan, N. Prathibha Jasti & S. Avasthi  
Indian Institute of Science, Bangalore, India

**3DV.2.103 Structural and Raman Spectroscopic Characterization of c-TiO<sub>2</sub> Nanotubes Synthesized by Template Assisted Sol-Gel Technique**

N. Takata, E.L. Meyer & R.T. Taziwa  
University of Fort Hare, Alice, South Africa

**3DV.2.104 Low Temperature Growth of ZnMgO Thin Films for Perovskite Based Solar Cell**

H. Tominaga & K. Yoshino  
University of Miyazaki, Japan  
Y. Ogomi & S. Hayase  
Kyushu Institute of Technology, Kitakyushu, Japan  
Q. Shen & T. Toyoda  
University of Electro-Communication, Chofu, Japan  
T. Minemoto  
Ritsumeikan University, Shiga, Japan

**3DV.2.105 Translucent, Color-Neutral and Efficient Perovskite Modules**

L. Rakocevic, R. Gehlhaar, M. Jaysankar & J. Poortmans  
imec, Leuven, Belgium  
H. Fledderus  
TNO, Eindhoven, The Netherlands

**3DV.2.107 Characterization of Lead Halide Perovskites by Modulated Surface Photovoltage**

C.A. Omondi, T. Dittrich, E. Unger, L. Kegelmann,  
S. Albrecht & B. Rech  
HZB, Berlin, Germany

**3DV.2.108 Role of the Fabrication Technique in the Stability of CH<sub>3</sub>NH<sub>3</sub>PbI<sub>3</sub> Perovskite Film**

M. Habibi & M. Eslamian  
Shanghai Jiao Tong University, China

**3DV.2.109 Comparison of Outdoor Performance of Large Scale DSSC Module**

K.-W. Ko, C.-H. Han & S. Hong  
KIER, Daejeon, Korea South

**3DV.2.111 Development of Polymer Gel Electrolytes Containing Cobalt Complexes for Efficient and Durable Dye-Sensitized Solar Cells**

S.-E. Kim, D.-H. Kim & M.-S. Kang  
Sangmyung University, Cheonan, Korea South

**3DV.2.112 Performance Enhancement of Perovskite Solar Cells with TiO<sub>2</sub> Scaffold Modified by Block Copolymer Templating Method**

D.-H. Kim, H.-R. Kim, S.-E. Kim & M.-S. Kang  
Sangmyung University, Cheonan, Korea South

**3DV.2.113 Peroprint-Printing Perovskite Solar Cells**

A. Verma, J. Heier & F. Nüesch  
EMPA, Dübendorf, Switzerland  
D. Martineau & T. Meyer  
Solaronix, Aubonne, Switzerland

**3DV.2.114 Synthesis of TiO<sub>2</sub> Nanorods/Nanoparticles via Facile Hydrothermal Method and Their Influence in DSSC as a High-Performance Photoanode**

R. Rajamanickam, N. Santhosh, M. Senthil Pandian & P. Ramasamy  
SSN College of Engineering, Kalavakkam, India

**3DV.2.115 Efficient Polymer Solar Cells with Solution-Processed Gold Chloride/Polyacrylonitrile as an Anode Interfacial Bilayer**

J.-H. Jeong, S.-W. Kim, Y.-J. Noh, S.-N. Kwon & S.-I. Na  
Chonbuk National University, Jeonju, Korea South

**3DV.2.116 Analytical Modeling for Large-Scale Perovskite Solar Cell Modules**

S.H. Lee, K.-S. Lee & M.G. Kang  
ETRI, Daejeon, Korea South

**3DV.2.117 Preliminary Guidelines for Accurate I-V Measurements on Perovskite Solar Cells**

R.B. Dunbar, T.W. Jones, K.F. Anderson, B.C. Duck,  
C.J. Fell & G.J. Wilson  
CSIRO Energy Technology, Mayfield West, Australia

**3DV.2.118 SnS/CdS Thin Film Solar Cells by Ionized Jet Deposition**

D. Menossi, S. Di Mare, E. Artegiani, F. Piccinelli & A. Romeo  
University of Verona, Italy  
G. Tedeschi  
Noivion, Rovereto, Italy

**3DV.2.119 Highly Efficient Polymer Solar Cells Based on Photo-Cross-Linked Perylene Diimide Derivative Materials**

Y.-J. Noh, J.-H. Jeong, S.-N. Kwon, K.-U. Jeong & S.-I. Na  
Chonbuk National University, Jeonju, Korea South

**3DV.2.120 Multi-Layer Strategy to Enhance the Grain Size of CIGS Thin Film Fabricating by Single Quaternary CIGS Target**

X. Peng, M. Zhao & D.-M. Zhuang  
Tsinghua University, Beijing, China

**VISUAL PRESENTATIONS 5DV.3**

**17:00 - 18:30 PV Module Performance and Reliability (II) / Inverters and Balance of System Components / Sustainability and Recycling**

**5DV.3.1 Advanced PV Module Hot Spot Characterisation**

S. Wendlandt, L. Süthoff, S. Berendes, J. Teubner,  
L. Podlowski, J. Berghold, S. Krauter & P. Grunow  
PI Berlin, Germany

**5DV.3.2 Shading and Hot Spot Performance of Shingled Cell Array Module**

H. Zhou  
Flextronics International, Shanghai, China  
L. Zhou  
Flextronics International, San Jose, United States

**5DV.3.3 Effect of High Temperature on the Reliability of Photovoltaic Module Solder Interconnections for Improved Performance in Hot Climate**

O.O. Ogbomo & N.N. Ekere  
University of Wolverhampton, United Kingdom  
E.H. Amalu  
Teesside University, Middlesbrough, United Kingdom

**5DV.3.4 Tape Interconnection for Silicon Solar Cells with Extended Long Term Stability**

J. Buddgård, T. Lagerstedt & A. Machirant  
JB EcoTech, Lidingö, Sweden

**5DV.3.5 Indium-Free Coating and Advanced Metallization for SmartWire Connection Technology**

A. Faes, M. Despeisse, J. Champiaud, H.-Y. Li, J. Levrat,  
A. Lachowicz, N. Badel, J. Geissbühler, L. Curvat,  
J. Escarré, F. Debrot, J. Horzel, L.-E. Perret-Aebi & C. Ballif  
CSEM, Neuchâtel, Switzerland  
T. Söderström, Y. Yao, S. Beyer & B. Bonnet-Eymard  
Meyer Burger, Gwatt, Switzerland  
P. Papet & B. Strahm  
Meyer Burger Research, Hauterive, Switzerland

**5DV.3.6 Reliability Analysis of Photovoltaic Modules by Contact States between Interconnector Ribbon and Ag Electrode**

I.-A. Kim, Y.-K. Min, C.-H. Kim, J.-H. Chio, E.-J. Lee,  
S. Ryu & D.-S. Kim  
Shinsung Solar Energy, Eumseong-gun, Korea South

**5DV.3.7 Assessing the Impact of Broken and Defective Interconnection Ribbons on the Electrical Performance of Crystalline Silicon Photovoltaic Modules**

E. Annigoni, A. Virtuani, F. Sculati-Meillaud & C. Ballif  
EPFL, Neuchâtel, Switzerland

**5DV.3.8 Advances in the Development of a Novel Module Design Based on Electrical Conductive Adhesive Glue for Contacting Highly Efficient n-Type Solar Cells with PVD Al Back Contact**

E. Cabrera, A. Schneider, T. Buck, Z.-W. Peng & R. Kopecek  
ISC Konstanz, Germany  
T. Fischer  
Teamtechnik Maschinen und Anlagen, Freiberg, Germany

**5DV.3.9 Advances in the Development of a Novel Module Concept Based on Conductive Structures in the Encapsulation Material for Contacting Highly Efficient n-Type Back-Contact Solar Cells**

E. Cabrera, A. Schneider, D. Thaller, L.J. Koduvelikulathu & A. Halm  
ISC Konstanz, Germany  
B. Pérez & R. Merino  
STRE, Llanera, Spain  
B. Puerto, P. Sánchez-Friera & R. Cambor  
Fundación PRODINTEC, Gijón, Spain  
R. Pittson, D. Greenhill & T. Brown  
Gwent Electronic Materials, Pontypool, United Kingdom

**5DV.3.10 EVA and Backsheet Inspection for Solar Module**

H.-H. Hsieh, Y.-H. Lee, Y.-T. Li, E.-Y. Wang & H.-S. Wu  
ITRI, Hsinchu, Taiwan

**5DV.3.11 Verification of the Hydrolysis Resistance of Polyester Based Backsheets on the Market**

B. Ottersböck & G. Oreski  
PCCL, Leoben, Austria  
M. Kühne  
Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
G. Pinter  
University of Leoben, Austria

**5DV.3.12 Development of an Electrically-Conductive Backsheet for Back-Contact Based PV-Modules**

R.H.C. Janssen, F. van Duijnhoven, I.J. Bennett & J.J. Xu  
DSM, Geleen, The Netherlands



**5DV.3.13 Improved Accelerated Durability Testing and Comparison to Field Degradation**

W.J. Gambogi, T. Felder, S. MacMaster, K. Roy-Choudhury,  
A. Bradley, B.-L. Yu, K.M. Stika & J. Trout  
DuPont, Wilmington, United States  
Y. Heta  
DuPont, Utsunomiya, Japan  
L. Garreau-Iles  
DuPont, Geneva, Switzerland  
H. Hu  
DuPont, Shanghai, China

**5DV.3.14 Benchmarking of New, Promising Polyolefin Encapsulation Material under Extreme Weathering Conditions**

D. Philipp, L. Pitta Bauermann & I. Dürr  
Fraunhofer ISE, Freiburg, Germany  
B. Broeders, S. Hellström, G. Galgali & F. Costa  
Borealis, Vienna, Austria

**5DV.3.15 Thermoplastic Polyolefin Based Encapsulant (POE) a Better Encapsulant Material for PV Module Reliability**

A.K. Singh & R. Singh  
RenewSys, Bangalore, India

**5DV.3.16 Investigation of Effects due to Encapsulation Thickness Reduction in Light Weight Modules**

G. Oreski  
PCCL, Leoben, Austria  
A. Halm  
ISC Konstanz, Germany  
V. Schenk & W. Krumlacher  
ISOVOLTAIC, Lebring, Austria  
H. Nussbaumer  
ZHAW, Winterthur, Switzerland

**5DV.3.17 Concept of Optimized Encapsulant Composition for PV Module Reliability under Different Climatic Conditions**

A. Mihaljevic & G. Oreski  
PCCL, Leoben, Austria  
G. Eder & Y. Voronko  
OFI, Vienna, Austria  
W. Mühleisen, L. Neumaier & C. Hirschl  
CTR, Villach, Austria  
R. Ebner  
AIT, Vienna, Austria  
G. Pinter  
University of Leoben, Austria

**5DV.3.18 Influence of Acetic Acid Retention in PV Module Degradation**

G. Oreski & A. Mihaljevic  
PCCL, Leoben, Austria  
G.C. Eder & Y. Voronko  
OFI, Vienna, Austria  
L. Neumaier & C. Hirschl  
CTR, Villach, Austria  
R. Ebner  
AIT, Vienna, Austria  
M. Edler & W. Krumlacher  
ISOVOLTAIC, Lebring, Austria

**5DV.3.19 Long Term Stability Test and Analysis of Amorphous Silicon Glass-Glass Mini-Modules**

U. Banik, N. Reininghaus, M. Vehse & C. Agert  
NEXT ENERGY, Oldenburg, Germany

**5DV.3.20 Modeling and Simulation of Non-Uniform Encapsulant Discoloration Effect in Crystalline-Silicon Photovoltaic Modules**

H. Mohammed Niyaz, A. Sinha & R. Gupta  
IIT Bombay, Mumbai, India

**5DV.3.21 Correlation of Degree of EVA Crosslinking with Formation and Discharge of Acetic Acid in PV Modules**

J. Zhu, D. Montiel-Chicharro, T.R. Betts & R. Gottschalg  
Loughborough University, United Kingdom

**5DV.3.22 Effect of the Frame Sealing on the Functionality of a Photovoltaic Module**

J. Vanek, K. Jandová, M. Sturm, J. Hylsky & D. Strachala  
Brno University of Technology, Czech Republic

**5DV.3.23 Analyses of Photovoltaic Modules Influenced by Volcanic Ashes at Kagoshima in Japan**

Y. Chiba, R. Sato & A. Masuda  
AIST, Tosu, Japan  
T. Hirayama & S. Kawabata  
Kagoshima University, Japan  
Y. Yoshimura  
KIT, Kirishima, Japan

**5DV.3.24 Annual Evaluation and Changes of Thirty Types of PV Modules in Outdoor Exposure for Two Years**

Y. Nakamura, K. Otani & J. Hashimoto  
AIST, Koriyama, Japan

**5DV.3.25 Determination of Degradation Rates for PV Modules and PV Generators Applying Various Methods**

D. Stellbogen & P. Lechner  
ZSW, Stuttgart, Germany

**5DV.3.27 Indoor and Outdoor Soiling Experiments: Comparison of Different Glass Coatings**

K. Ilse, L. Schönleber, M.Z. Khan, V. Naumann & C. Hagendorf  
Fraunhofer CSP, Halle, Germany  
J. Rabanal-Arabach  
ISC Konstanz, Germany  
J. Bagdahn  
Anhalt University of Applied Sciences, Köthen, Germany

**5DV.3.28 Soiling Effect on PV Modules Performance in Arid Environment**

F.G. Alzubi & A.T. Alasfour  
KISR, Safat, Kuwait

**5DV.3.29 Effect of Dust on Solar Photovoltaic Modules in Shiraz**

S.A. Bahreini & M. Yaghoubi  
Shiraz University, Iran

**5DV.3.31 Advanced Method for Determining Soiling Losses on PV Modules in Desert Climate**

D. Daßler, S. Malik, J. Fröbel & M. Ebert  
Fraunhofer CSP, Halle, Germany  
A. Benazzouz, Z. Naimi & B. Ikken  
IRESEN, Rabat, Morocco

**5DV.3.32 Advanced Coating for Solar Cell Module Protection**

G.K. Zhavnerko, V.Y. Shiripov, E.A. Khokhlov & V.A. Savich  
Izovac Technologies, Minsk, Belarus  
O.V. Sergeev  
NEXT ENERGY, Oldenburg, Germany

**5DV.3.33 Analyses of Soils Deposited on PV Modules in Different Climates**

B. Laarabi, D. Dahlioui, F. Chaouki, W. Anana, M.A. Sebbar & A. Barhdadi  
University Mohammed V-Agdal, Rabat, Morocco

**5DV.3.34 Energy Yield Losses due to Soiling and Assessment of Different Cleaning Strategies for PV Modules Installed in a Semi-Arid Area in South Africa**

M.B. Øgaard, J.H. Krogh Selj, J.A. Tsanakas, E.S. Marstein & S.E. Foss  
Institute for Energy Technology, Kjeller, Norway

**5DV.3.35 Investigation of Soiling Impact on Photovoltaic Modules Performance Installed in Rabat- Morocco**

D. Dahlioui, B. Laarabi, A. Sebbar & A. Barhdadi  
University Mohammed V, Rabat, Morocco  
J. Boardman, E. Menard & G. Dambriane  
HeliosLite, Le Bourget du Lac, France

**5DV.3.36 Sol-Gel Based Antireflecting Coatings with Tunable Wettability for Solar Glass Covers**

D. Adak, R. Bhattacharyya, S. Ghosh, H. Saha & A. Mondal  
IEST Shibpur, Howrah, India  
P. Chakraborty  
IIT Kharagpur, India

**5DV.3.37 Classification of Photovoltaic Defectives through Type of Characterizing Methods and Faults Discriminations**

G. Vannier, V. Soulima, A. Grobon, F. Al Shakarchi & H. Colin  
CEA, Le Bourget du Lac, France

**5DV.3.38 Investigating Hotspots Performance of PV Module Using Halved Multi-Crystalline Silicon Cells**

J. Jiang, J. Ni, D. Rong, Y. Li, G. Li, Y. He, C. Ma, J. Shi & D. Song  
Yingli Green Energy, Baoding, China

**5DV.3.39 Energy Performance Improvement and Thermal Operation of Crystalline Silicon Photovoltaic Modules Designed with Innovative Packaging Components**

G. Makrides & G.E. Georghiou  
University of Cyprus, Nicosia, Cyprus  
J. Bratcher & J. Pratt  
Honeywell, Morris Plains, United States

**5DV.3.40 The New Method of the Silicon Photovoltaic Panels Fault Detection Using Impedance Spectroscopy**

J.K. Symonowicz, N. Riedel, S. Thorsteinsson & P.B. Poulsen  
Technical University of Denmark, Roskilde, Denmark

**5DV.3.43 Inverter Testing and Evaluation - Brazilian Standards Application and Compliance**

J.C. de Souza Almeida Neto, R. Zilles & A.R. Mocelin  
University of São Paulo, Brazil  
J. Tavares Pinho  
Federal University of Pará, Brazil

**5DV.3.44 Long-Term Performance of PV Micro-Inverters**

S. Krauter & J. Bendfeld  
University of Paderborn, Germany

**5DV.3.45 Development of a Controller-Hardware-in-the-Loop (CHIL) Toolbox Applied for Pre-Certification Services for Grid-Connected PV Inverters According to the State-of-the-Art BDEW RL Guideline and FGW TR3 Standard**

G. Lauss, F. Leimgruber, Z. Miletic & R. Bründlinger  
AIT, Vienna, Austria  
D. Majstorovic, N. Fischer Celanovic, I. Morar & D. Medjo  
Typhoon HIL, Novi Sad, Serbia

- 5DV.3.46 DLMS Smart Meter Reading Application for PV-Micro-Grids**  
M. Ait Benali & A. Outzourhit  
Cadi Ayyad University, Marrakech, Morocco
- 5DV.3.47 49 Levels Inverter Connected to the Grid**  
P. Salim Daher Vasconcelos & F.L.M. Antunes  
UFC, Fortaleza, Brazil
- 5DV.3.50 Introduction of an Advanced Method for Testing of Battery Charge Controllers for Off-Grid PV Systems**  
A. Khatibi, J. Bendfeld, W. Bermpohl & S. Krauter  
University of Paderborn, Germany
- 5DV.3.51 Testing and Analysis of Battery Charge Controllers for Off-Grid PV Systems**  
A. Khatibi, J. Bendfeld, W. Bermpohl & S. Krauter  
University of Paderborn, Germany
- 5DV.3.53 Photovoltaic System Test Platform with Integrated Battery Energy Storage Emulator**  
S.V. Spataru, D. Sera & D. Stroe  
Aalborg University, Denmark
- 5DV.3.54 DC-Coupled Buck-Boost Battery Charge Controller for Utility Scale Photovoltaic Plants**  
P. Burski & R. Merz  
University of Applied Sciences Karlsruhe, Germany
- 5DV.3.56 A Scalable Wireless System for Monitoring of PV Modules on a Substring Level**  
M. Jankovec, D. Morelj, G. Matic, K. Brecl, M. Bokalic & M. Topic  
University of Ljubljana, Slovenia
- 5DV.3.57 Approach to Determine the Impact of Cosmic Rays on PV Systems**  
M. Halwachs & M. Schwark  
AIT, Vienna, Austria
- 5DV.3.62 Pursuing a Product Stewardship Approach to Energy Storage in the PV Sector in Australia**  
L. Chaplin  
Australian Battery Recycling Initiative, Melbourne, Australia  
N. Florin & E. Dominish  
University of Technology, Sydney, Australia
- 5DV.3.63 Evaluation of EoL Treatment Strategies from a Holistic and Long-Term Perspective Considering the Shift towards More Circular Economies: A Case Study for Photovoltaic (PV) Panels**  
E. Bracquené, J. Peeters, W. Dewulf & J. Dufflou  
KU Leuven, Belgium

- 5DV.3.64 Implementation of a Circular Economy Based on Recycled, Reused and Recovered Indium, Silicon and Silver Materials for Photovoltaic and Other Applications**  
W. Palitzsch  
Loser Chemie, Zwickau, Germany
- 5DV.3.65 Building a Dynamic Photovoltaic Waste Management Model: Current Results and Future Potentials**  
A. Han & S. Rotter  
Berlin University of Technology, Germany  
A. Castillo  
Imperial College London, United Kingdom
- 5DV.3.66 Eco-Solar Factory: Establishment of Pan Industrial Material Re-Use Opportunities**  
K. Wambach & I. Fechner  
bifa Environmental Institute, Augsburg, Germany  
M.P. Bellmann  
SINTEF, Trondheim, Norway  
G.S. Park  
NorSun, Oslo, Norway  
J. Denafas  
Soli Tek R&D, Vilnius, Lithuania  
F. Buchholz  
ISC Konstanz, Germany  
R. Einhaus  
Apollon Solar, Lyon, France  
G. Noja  
Garbo, Cerano, Italy  
B. Ehlen  
Boukje.com Consulting, Bleiswijk, Germany  
R. Roligheten  
Steuler Solar Technology, Porsgrunn, Norway  
P. Romero  
AIMEN, Porrino, Spain  
A. Bollar  
INGESEA, Elgoibar, Spain
- 5DV.3.67 Comminution and Separation of End-of-Life Photovoltaic Materials**  
P. Bogust & Y.R. Smith  
University of Utah, Salt Lake City, United States
- 5DV.3.68 Sustainable Recycling of Wafer-Silicon Solar Modules**  
M. Tao, W.-H. Huang & J. Schichtel  
Arizona State University, Tempe, United States
- 5DV.3.69 A Study on the Morphology of Silver Particles Electrochemically Recovered from c-Si Solar Cell with Variation of Current Density**  
J.-K. Lee, J.-S. Lee, Y.-S. Ahn & G.-H. Kang  
KIER, Daejeon, Korea South

**5DV.3.70 Circular Economy - with PV Recycling**

W. Palitzsch & U. Loser  
Loser Chemie, Zwickau, Germany

**5DV.3.71 Remelting and Production of PV-Wafers Using Purified Si-Kerf**

M. Syvertsen & A. Nordmark  
SINTEF, Trondheim, Norway  
T. Halvorsen  
Resitec, Kristiansand, Norway  
T. Kaden  
Fraunhofer THM, Freiberg, Germany  
A. Ulyashin  
SINTEF, Oslo, Norway

**5DV.3.72 Electrodynamic Fragmentation (EDF) for Photovoltaic Module Recycling: A Feasibility Study**

F. Lenzmann, A. van Zomeren, I. Velzeboer & P. Blokker  
ECN, Petten, The Netherlands  
D. Hoellen  
University of Leoben, Austria  
S. Seifert  
Fraunhofer IBP, Valley, Germany

**5DV.3.73 Laboratory Scale Optimization of the Different Layers Separation of a Photovoltaic Panel by Supercritical CO<sub>2</sub> Treatment**

M. Chaillou, J. Ducamp & C. Sanvoisin  
Innoveox, Paris, France  
C. Slostowski & C. Aymonier  
CNRS, Pessac, France

**5DV.3.75 Assess the Possibility to Recycle Heavy Metals from E Scrap Using Solar Energy**

B. Bhardwaj & N. Bhardwaj  
Maclec Technical Project Laboratory, New Delhi, India

**5DV.3.77 Ecodesign of an Innovative Building Integrated Photovoltaic System: The PHOSTER Project**

R. Turconi, A.-L. Hetteringer & R. Vignal  
Arcelor Mittal, Maizières-lès-Metz, France  
L. Samain & L. Fourdrinier  
CRM Group, Liège, Belgium

**5DV.3.78 A Comparative Life Cycle Assessment of CIGS/Si, CZTS/Si and AZTS/Si Tandem Solar Cells**

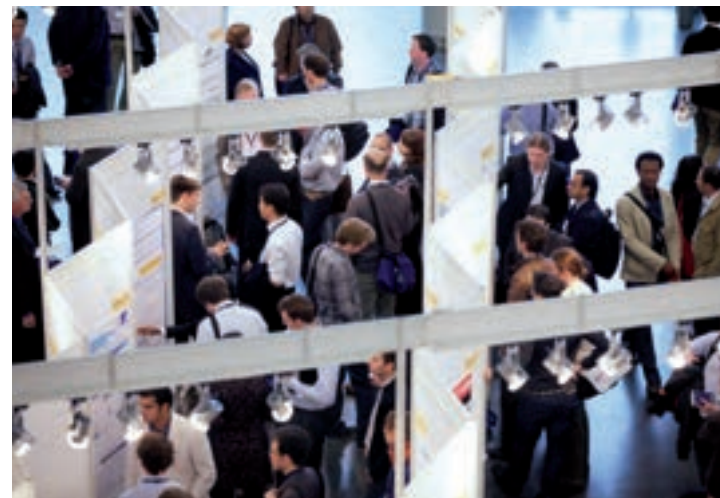
M.M. Lunardi, R.P. Corkish, S. Moore, J.P. Alvarez-Gaitan,  
C. Yan & X. Hao  
UNSW Australia, Sydney, Australia

**5DV.3.79 An Assessment of a Photovoltaic System in Tehran (Iran): Life-Cycle Approach**

A. Bakhtiari, S. Eslami & H. Akhbari  
Shahid Beheshti University, Tehran, Iran  
I. Kazemi  
Islamic Azad University, Damavand, Iran

**5DV.3.81 Physical Delamination of PV-Modules in Less Than One Second**

M. Heuschkel & H. Gross  
FLAXRES, Dresden, Germany



For more information on the Poster Area please refer to the Poster Guide or visit [www.photovoltaic-conference.com](http://www.photovoltaic-conference.com)



**AUTHORS INDEX****A**

Aarich, N.,5BV.4.17  
 Abad, J.,6BV.3.59, 3DV.2.53  
 Abaidia, S.E.H.,2AV.1.42  
 Abbott, M.,2CO.10.3, 2AV.1.36, 2BO.2.6, 2BO.2.3  
 Abbott, M.D.,2CV.2.48  
 Abdallah, A.A.,5CO.5.5, 2BO.4.4, 2CV.2.24, 5BV.4.46  
 Abdelatif, S.,6BV.1.51, 6BV.1.41  
 Abdellatif, O.E.,6BV.1.51  
 Abdelrasheed, M.,6BV.1.51  
 Abdulraheem, Y.,2AV.3.28, 2AV.3.26  
 Abenante, L.,1CV.3.10, 2CV.2.51, 2CV.2.39  
 Aberle, A.G.,5CO.6.2, 5BV.4.79, 2AO.4.5  
 Abolmasov, S.,2AV.3.12  
 Abotaleb, A.,5CO.5.5  
 Abouabassi, K.,3CV.1.47  
 Abramov, A.,5BV.4.33, 2AV.3.12, 2AV.3.39  
 Abrosimov, N.V.,2BO.1.5, 2AV.1.19  
 Acciarri, M.,3CV.1.15  
 Achard, V.,3AO.9.6  
 Ackermann, R.,2CO.11.1  
 Adachi, D.,2BP.1.1  
 Adak, D.,5DV.3.36  
 Adami, J.,6BV.3.65  
 Adamovic, N.,2CO.12.2  
 Adamski, T.,5DO.5.3  
 Adelhelm, C.,3CV.1.32  
 Adouane, M.,5BV.4.84  
 Aernouts, T.,3DO.7.3, 3DV.2.90, 3CO.4.5  
 Afanasyeva, S.,7DO.8.1  
 Agafonov, V.,2AV.2.36  
 Agert, C.,2AV.3.13, 5DV.3.19, 6EO.2.6, 5BV.4.74, 6CO.14.4

Aggour, M.,3DV.2.2  
 Aghahosseini, A.,7DO.8.1  
 Agresti, A.,3CO.4.2  
 Agrimi, A.,7EO.3.4  
 Aguilar, H.,6BV.3.53, 6BV.3.54  
 Aguilar Valero, F.J.,6BV.3.35  
 Ahlswede, E.,3DV.2.74, 3CV.1.51  
 Ahmanache, A.,2AV.1.20  
 Ahmed, H.,1CV.3.62, 1CV.3.81, 1CV.3.59, 1CV.3.74, 1CV.3.73  
 Ahn, J.H.,6BV.1.33  
 Ahn, S.J.,3CV.1.42, 3CV.1.56, 3CV.1.28  
 Ahn, S.K.,3CV.1.56, 3CV.1.31, 2CV.2.10, 3CV.1.28  
 Ahn, Y.S.,5DV.3.69  
 Aho, A.,4CV.4.12  
 Aho, T.,4CV.4.12  
 Ahzi, S.,5BV.4.46  
 Aichinger, M.,6BV.3.57, 5BV.4.73  
 Aichinger, W.,7DV.1.18  
 Aijaz, A.,3BO.10.2  
 Aissa, B.,2CV.2.24  
 Ait Ali, M.,3DV.2.58  
 Ait Benali, M.,5DV.3.46  
 Ait Dads, H.,3DV.2.79, 3DV.2.58  
 Akari, S.,1CV.3.83  
 Akey, A.,2CV.2.31  
 Akhbari, H.,5DV.3.79  
 Akhsassi, M.,5BV.4.83, 5BV.4.26, 6BV.2.32, 5BV.4.17  
 Akhtar, M.S.,1CV.3.50  
 Akhtaruzzaman, M.,3CV.1.53, 3DV.2.13  
 Akinoglu, B.G.,6BV.1.17, 6BV.3.24  
 Akiyama, A.,6BV.3.5  
 Akiyama, H.,1AO.1.4  
 Aktaa, J.,1CO.1.2  
 Al Hajri, H.,6BV.3.32

Al Magoussi, A.,3CV.1.47  
 Al Mahmud, A.,6BV.2.20  
 Al Mansouri, I.,2AV.3.41  
 Al Marri, A.,6BV.3.32  
 Al Shakarchi, F.,5DV.3.37, 6CO.16.6, 6BV.2.27, 6CO.15.2  
 Al-Ajmi, R.,6BV.1.21  
 Alam, M.,7DV.1.3  
 Alami Merrouni, A.,1CV.3.72  
 Alamy, P.,7DV.1.29  
 Alapont Sabater, A.,2AO.5.4  
 Alarcón, J.,6BV.3.53, 6BV.3.54  
 Alarcón Reyero, C.,2AV.1.26  
 Alasfour, A.T.,5DV.3.28, 5BV.4.15  
 Al-Bairami, L.,6BV.1.21  
 Albaric, M.,2CO.10.2  
 Albe, K.,3DV.2.9  
 Albert, M.,2AV.3.15  
 Albrecht, S.,3DV.2.65, 3DO.7.2, 3DV.2.107  
 Alcubilla González, R.,2CV.2.37, 2CV.2.6  
 Aledo Vives, S.,6BV.3.35  
 Aleman, M.,2CV.2.45  
 Al-Falahi, F.,2CO.10.6  
 Alfonso, V.G.,3DV.2.32  
 Alford, C.,4DO.4.1  
 Algasinger, M.,3BO.9.1  
 Al-Hajjawi, S.,2AO.6.1  
 Alharbi, F.H.,1CV.3.65  
 Ali, A.,2BO.4.6  
 Ali, K.,7DV.1.3  
 Ali, W.,2BO.4.6  
 Alkhabbaz, A.A.,1CV.3.5  
 Allebé, C.,2AV.3.4, 2BO.4.3, 2BO.4.1, 2DO.1.1, 3DO.7.5, 1CV.3.93  
 Allen, C.,6BV.3.19  
 Allen, N.P.,1CV.3.5

Almeida, R.H.,6BV.1.27, 6BV.1.24, 6BV.1.26, 6BV.1.25  
 Almheiri, A.,5CO.5.4  
 Almonacid, F.,4CV.4.30  
 Almosni, S.,3DV.2.63  
 Almuneau, G.,4CV.4.7  
 Alnuaimi, A.,2AV.3.41  
 Alonso, C.,6BV.2.15  
 Alonso, P.,7DO.8.6  
 Alonso, R.,7DV.1.29  
 Alonso-Álvarez, D.,2CV.2.50  
 Al-Otaibi, Z.S.,5BV.4.46  
 Al-Qattan, A.,5BV.4.84  
 Al-Qudaihi, A.,6BV.1.21  
 Alshahrani, J.,6BV.2.51  
 AlSkaif, T.,7DV.1.26  
 Altenberend, J.,2AV.1.16  
 Altermatt, P.P.,2CO.11.5, 5CO.6.2  
 Althaus, J.,5CO.5.2  
 Alvarez-Gaitan, J.P.,5DV.3.78  
 Alves Dias, P.,6BV.3.78  
 Alves Myazaki, A.,6CO.13.2  
 Alves Schmitt, L.,7DV.1.50  
 Aly, S.P.,5BV.4.46  
 Alzubi, F.G.,5BV.4.15, 5DV.3.28  
 Amalu, E.H.,5DV.3.3  
 Amar, A.,6BV.3.1  
 Amara, M.,6BO.8.5  
 Amaral, A.,1CV.3.76  
 Ambigapathy, R.,2AO.5.2  
 Amin, N.,3DV.2.13, 1CV.3.65, 3CV.1.53, 3DV.2.27  
 Amiri, D.,2BO.3.6  
 Amkreutz, D.,2BP.1.5  
 Ammann, P.,1CV.3.69  
 Ams, A.,2AV.1.24  
 Anagnostopoulos, J.S.,7DV.1.36  
 Anagnostos, D.G.,5BV.4.45  
 Anana, W.,5DV.3.33, 4CV.4.24

- Anderson, K.F.,3DV.2.117  
 Andersson, A.,6DO.10.3  
 Ando, D.,2AV.2.25  
 Andr , G.,2CV.2.13, 2CO.12.3, 1CO.2.1, 2CV.2.19  
 Andreani, L.C.,4CV.4.14  
 Andres, C.,3BO.11.6  
 Andriessen, R.A.J.M.,3DV.2.90, 3CO.4.5, 3DO.7.3, 3DV.2.82  
 Andronikov, D.,2AV.3.12, 2AV.3.39, 5BV.4.33  
 Angenendt, G.,6CO.16.4, 6BV.1.38  
 Aninat, R.,3CV.1.46  
 Annigoni, E.,5DV.3.7, 7DV.1.41  
 Anspach, O.,2AV.1.33  
 Ant n, I.,1AO.3.4  
 Antonin, C.,1CV.3.78  
 Antoniou, L.,7EO.3.4  
 Antunes, F.L.M.,5DV.3.47, 6BV.3.89  
 Antunes De Paulo, A.,7DV.1.50  
 Aoki, M.,2AV.2.23  
 Aoukach, B.,6BV.1.9  
 Aoyama, T.,2AV.2.23  
 Apilo, P.,3BO.12.5  
 Aquino, C.,2CV.2.72  
 Araki, K.,4DO.4.6  
 Aranc n, S.,7DV.1.32  
 Araya, F.,5BV.4.29, 5CO.5.3  
 Arbab, S.,6BV.2.19  
 Archer, D.-E.,6DO.10.3  
 Arisily, T.A.A.,6BV.3.83, 7DV.1.16  
 Arnaud, C.,7DO.8.6  
 Arnds, A.,6BV.2.10, 5BV.4.64  
 Arninkhof, M.,7DV.1.31  
 Arnoult, A.,4CV.4.7  
 Arosh, S.,6BV.2.41  
 Aroudam, E.,6BV.1.7  
 Arp, J.,5CO.5.6, 5BO.6.6
- Arqu s, L.,3BO.11.1  
 Arrifano Manito, A.R.,6BV.2.4, 6BV.2.31  
 Arsalan, M.,7DV.1.8  
 Artegiani, E.,1CV.3.68, 3AO.7.4, 3BO.9.5, 3DV.2.118  
 Arumughan, J.,2CV.2.71  
 Arushanov, E.K.,3CV.1.41  
 Arvanitis, K.G.,6BV.1.23  
 Arzel, L.,3BO.11.4  
 Asaei, B.,5BV.4.22  
 Asahi, S.,1CV.3.88, 1CV.3.89, 1AO.3.2  
 Aschenbeck-Florange, T.,7DO.8.6  
 Asgharzadeh, A.,6BV.2.35  
 Askins, S.,1AO.3.4  
 Aspinall, M.,6CO.14.2  
 Asquini, R.,2AV.3.30  
 Asselman, A.,6BV.2.8  
 Assmann, L.,3BO.11.4  
 Athienitis, A.K.,6BV.3.50  
 Athresh, E.,1CV.3.47  
 Atkinson-Willes, J.,6BV.1.48  
 Atourki, L.,3CV.1.47  
 Attari, K.,6BV.2.8  
 Atwater, H.A.,4CV.4.27  
 Audinot, J.N.,2CV.2.55  
 Audoin, C.,2AV.1.3  
 Auer, J.,7DV.1.51  
 Auer, M.,7DV.1.18  
 Aureau, D.,3DV.2.85, 2CV.2.26, 3AO.9.6  
 Avancini, E.,3BO.10.1  
 Avasthi, S.,4CV.4.8, 3DV.2.102, 1CV.3.47  
 Awasthi, V.,1CV.3.39, 1CV.3.21  
 Awodele, M.K.,3DV.2.54  
 Awodugba, A.O.,3DV.2.54  
 Ayg ler, M.,3CO.3.5  
 Aymonier, C.,5DV.3.73
- Ayoub, J.,6BV.3.58  
 Ayoub, M.,6BV.3.32  
 Azar, A.S.,2AV.1.19, 2AV.1.18  
 Azizan, M.,1CV.3.14  
 Azpilicueta, L.,6BV.2.23  
 Azzolini, J.A.,6BV.3.93
- B**  
 Baarah, G.,5BV.4.32  
 Baba, M.,1AO.3.1  
 Babaeae, S.,4CV.4.29  
 B cker, J.-P.,3AO.9.1, 3AO.9.3  
 Badeda, J.,6CO.16.4, 6BV.1.38  
 Badel, N.,5DV.3.5, 2DO.1.4, 2DO.2.4, 3CO.4.6, 2DO.1.1  
 Badia, F.,4CV.4.22  
 Baert, K.,5BV.4.9, 6BO.7.3, 6BV.3.49, 5BV.4.45  
 Bagdahn, J.,5DV.3.27, 5BV.4.35, 5BV.4.49  
 Baghdadi, I.,6BV.2.8  
 Bagnall, D.M.,2CV.2.48  
 Bagnenard, C.,1CV.3.53, 6BV.3.40  
 Bahirat, H.,2BO.3.1  
 Bahrami, M.,1CV.3.1, 6BV.1.1  
 Bahrani, F.,3CV.1.21  
 Bailat, J.,1CO.2.2, 3CO.4.6  
 Bailly, L.,6BV.3.40, 1CV.3.53  
 Bakhtiari, A.,5DV.3.79, 6BV.1.1  
 Bakker, K.,3CV.1.39  
 Bakkers, E.P.A.M.,1AO.3.3, 1AO.1.2  
 Balderrama Vazquez, V.S.,3DV.2.88  
 Bales, C.,6BV.3.81  
 Baliozian, P.,2AO.6.1, 7DO.9.4  
 Ballif, C.,2DO.2.4, 3CO.4.6, 2BO.4.3, 3DO.7.1, 5DV.3.5, 2AV.3.22, 2CV.2.72, 5DV.3.7, 1CV.3.78, 2AV.3.4, 2AO.5.2, 7DV.1.41, 6BV.3.62, 2DO.1.4, 2BO.4.1, 3DO.7.5, 1CV.3.93, 1CO.2.2, 2CV.2.24, 2DO.1.1
- Baltide, C.-E.,6BV.3.100  
 Balucani, M.,2CV.2.72  
 Bamberg, F.,2BO.3.4  
 Banakar, A.,6BV.3.56  
 Banda, P.,5CO.5.4  
 Banerjee, C.,1CV.3.52  
 Bangel, D.,2CO.9.3  
 Banik, U.,5DV.3.19  
 Bansal, N.,3DV.2.15, 3DV.2.68  
 Bansen, R.,2CV.2.15  
 Banu, S.,3DV.2.26  
 Bao, J.,2AV.3.17  
 B r, M.,3BO.11.5, 3BO.10.1  
 Barbato, M.,3BO.9.5  
 Barbillon, P.,6BV.1.14  
 Barbosa, C.,6BV.2.16  
 Barbosa, L.S.N.S.,7DO.8.1  
 Barchi, G.,6BV.3.75  
 Bardizza, G.,3BO.12.3  
 Barhdadi, A.,4CV.4.24, 5DV.3.35, 5DV.3.33  
 Barink, M.,1AO.2.6, 3CV.1.7  
 Barnikel, J.,5EO.1.6  
 Barragan Yani, D.A.,3AO.9.3  
 Barrau, J.,4CV.4.22  
 Barraud, L.,2DO.2.4, 2DO.1.1, 3DO.7.5, 1CV.3.93, 2CV.2.24  
 Barreau, N.,3BO.11.4  
 Barredo Egusquiza, J.,2AV.1.26  
 Barrio Martin, R.,2AV.3.42  
 Barrios, L.,7EO.3.6  
 Barrioz, V.,1CV.3.42  
 Barros, A.,6BV.3.53  
 Barros Galhardo, M.,6BV.2.16, 6BV.1.22  
 Barry, J.,6CO.16.3, 6BV.3.87  
 Bartesaghi, D.,3CO.3.3  
 Barth, N.,5BV.4.46  
 Bartha, J.W.,2AV.3.15

- Bartsch, J.,2CO.10.6, 2CV.2.82, 2AV.2.26  
 Bartzsch, M.,2CO.9.6  
 Barua, A.K.,1CV.3.52  
 Basappa Ayanna, M.,6CO.16.1  
 Baschir, L.,1CV.3.85  
 Bashkirov, S.A.,3CV.1.50  
 Bassi, N.,2AO.5.2  
 Bastek, H.,7EO.3.4  
 Bastide, S.,2AV.2.32  
 Batentschuk, M.,3BO.12.1  
 Bathon, T.,2CV.2.81  
 Battaglia, A.,2CV.2.72, 2DO.1.2  
 Baumann, P.,5DO.5.6  
 Baumann, T.,5BV.4.28  
 Baumann, U.,2AV.2.20  
 Baumgartner, F.P.,6BV.1.15, 5BV.4.28, 6CO.15.1, 6EO.2.4  
 Bautista, A.,7EO.3.6  
 Bay, N.,2CO.9.1  
 Bayoumi, A.,6BV.1.51  
 Bearda, T.,2AV.3.26, 2CO.12.4, 2BO.3.4, 2AV.3.14, 2CO.12.2  
 Beaucarne, G.,2CV.2.92  
 Becerra, J.,2CO.10.6  
 Becker, C.,2CV.2.54  
 Becker, F.,5BV.4.10  
 Becker, G.,6DO.10.2  
 Becker, R.,5BV.4.11  
 Bednar, N.,2AV.1.3, 2CO.12.2  
 Beglinger, F.,6CO.15.1  
 Behnke, L.,3CV.1.49  
 Behrens, G.,5BV.4.64  
 Bein, T.,3CO.3.5  
 Beinert, A.J.,5DO.5.5, 1CO.1.2  
 Belaidi, A.,3DV.2.100  
 Belaqqiz, M.,1CV.3.9  
 Belgardt, C.,2CV.2.90  
 Belkova, N.,2AV.3.12  
 Bellemare, L.,6CO.16.6, 6BV.3.100  
 Bellenda, G.,6BV.1.37  
 Bellmann, M.P.,5DV.3.66, 2CV.2.77, 5EO.1.4, 6BV.2.19, 2BO.1.2  
 Bello, I.T.,3DV.2.54  
 Belluardo, G.,6CO.14.3, 6BO.7.2, 5BO.6.3  
 Belrhiti Alaoui, K.,3DV.2.79, 2CV.2.12, 1CV.3.72  
 Belyakov, O.A.,2AV.1.14  
 Bemm, A.,5CO.8.2  
 Benamara, M.,4DO.4.2  
 Benayad, A.,2AV.1.25  
 Benazzouz, A.,6BO.7.4, 5BV.4.58, 5DV.3.31, 6BV.2.2  
 Benda, V.,5BV.4.48, 5BV.4.3  
 Bende, E.E.,5BV.4.50  
 Bendfeld, J.,5DV.3.50, 5DO.5.1, 5DV.3.44, 5DV.3.51  
 Benharrat, L.,2CV.2.32  
 Benick, J.,2CO.10.4, 1AP.1.3, 2DO.3.1, 2DO.2.1  
 Benjamin, F.,6BV.1.31  
 Benlarabi, A.,6BO.7.4, 6BV.2.18, 5BV.4.26  
 Benmansour, M.,2AV.1.25  
 Benmarraze, S.,7DO.8.3  
 Bennett, I.J.,5DV.3.12, 1CV.3.77  
 Bennouna, A.,6BO.7.4, 6BV.2.18, 6BV.2.32, 7DV.1.23, 6BV.2.6, 5BV.4.26, 5BV.4.17, 5BV.4.58  
 Benqilou, C.,7DV.1.38  
 Benrabbah, R.,3DV.2.62  
 Bent, S.F.,2BO.4.6, 3DO.7.6  
 Benyoucef, D.,5DO.5.6  
 Benyoussef, A.,1CV.3.60  
 Beone, F.,7DV.1.30  
 Ber, B.,1CV.3.11  
 Berardone, I.,5BV.4.75  
 Berdiyrov, G.,1CV.3.13  
 Berendes, S.,5DV.3.1  
 Berendsen, P.,3DV.2.4  
 Berezovska, N.I.,1CV.3.46  
 Berg, R.,7DO.9.6  
 Berge, C.,2CV.2.88  
 Berger, K.A.,5BV.4.72, 6BV.2.21, 6BV.3.57  
 Berghold, J.,5DV.3.1  
 Berghuis, W.-J.-H.,2AV.3.2  
 Berglund, T.,6BV.1.43  
 Bergmann, A.,7DO.8.6  
 Bergum, K.,1CV.3.85  
 Bermpohl, W.,5DV.3.50, 5DV.3.51  
 Bermudez, V.,3CP.1.1  
 Bernal, E.A.,6EO.2.2  
 Bernardi, A.,3BO.12.5  
 Bernardoni, P.,4CV.4.17  
 Bernhard, D.B.,7DV.1.46  
 Bernhard, N.,2AV.2.46, 2CV.2.86, 2AV.1.35, 2AV.2.18, 6BV.2.22, 2CV.2.85  
 Bernreitner, K.,1CV.3.51  
 Bernsen, O.,7EO.3.4  
 Berson, S.,3DV.2.62  
 Bertazzo, M.,1CO.1.1  
 Bertoni, M.I.,2AV.3.32  
 Bertsch-Engel, C.,6CO.15.5  
 Berzsenyi, F.,3DV.2.15  
 Bessais, B.,3DV.2.16  
 Besson, P.,5BV.4.29  
 Betak, J.,6BV.2.37  
 Betancourt, Y.,4CV.4.22  
 Bett, A.W.,1AP.1.3, 1AO.1.3  
 Betti, A.,6DP.2.4  
 Bettinelli, A.,2DO.1.5  
 Betts, T.R.,5BV.4.5, 5DV.3.21  
 Beurskens, L.,7DV.1.9  
 Beutel, P.,1AP.1.3  
 Beuttell, W.,6BV.3.5  
 Beye, M.,1CV.3.25  
 Beyer, C.,2BO.3.2  
 Beyer, H.G.,6BV.1.19  
 Beyer, S.,5DV.3.5  
 Bezrukikh, P.,6BV.3.80  
 Bezrukikh, P.P.,6BV.3.80  
 Bhandakkar, O.,3DV.2.41  
 Bhardwaj, B.,5DV.3.75  
 Bhardwaj, N.,5DV.3.75  
 Bhardwaj, S.,1CV.3.27  
 Bhattacharyya, R.,5DV.3.36  
 Bheemreddy, V.,5CO.8.1  
 Bhuiyan, A.,7DV.1.3  
 Bian, L.,4CV.4.13  
 Biasi de Moura, C.,6BV.1.5, 6BV.3.64, 6CO.13.2  
 Biba, C.,1CV.3.78  
 Bikbulatov, A.,6BV.2.24  
 Bilau, Z.,6BV.2.19  
 Bilbao, J.I.,6BV.3.104  
 bin Mohd Yusoff, A.R.,3DV.2.101  
 Binaie Masouleh, F.,2CO.9.2  
 Binesti, D.,6BV.1.14  
 Binetti, S.,7DV.1.30, 3CV.1.15  
 Birgersson, E.,3DV.2.98  
 Biro, D.,2CO.9.3  
 Bischof-Niemz, T.,6CO.16.1  
 Bissig, B.,3BO.10.1  
 Bitnar, B.,2CO.11.3  
 Bittau, F.,3BO.9.5  
 Bittkau, K.,7DV.1.30, 2CV.2.54  
 Bittner, Z.S.,4CV.4.6  
 Bivour, M.,2CO.10.6, 2DO.1.3, 2AV.3.8, 2AV.3.9, 2BO.4.2  
 Bizzarri, F.,2CV.2.72, 6CO.14.1  
 Bjarlin Jensen, O.,6BV.2.29  
 Black, L.,1AO.3.3  
 Blakers, A.,2BO.4.5  
 Blakesley, J.C.,5CO.7.4



- Blanc, P.,6DO.6.5, 6BV.3.2  
 Blankemeyer, S.,2AV.2.20  
 Blanker, A.J.,3DV.2.4  
 Bläsi, B.,2AO.5.4, 6BV.3.70  
 Bledzinska, M.,6BV.3.75  
 Blévin, T.,2AV.2.37, 2AV.2.21,  
 2CV.2.26, 2AV.2.47  
 Bliss, M.,3AO.8.6  
 Blokker, P.,5DV.3.72  
 Blonskiy, I.V.,1CV.3.46  
 Blum, A.,2AO.6.6  
 Boait, P.,6BV.2.51  
 Boardman, J.,5DV.3.35  
 Bobeico, E.,2AV.3.18, 2AV.3.16  
 Bocard, M.,2CV.2.24, 2DO.1.6,  
 3DO.7.1  
 Boddart, S.,6BV.3.40, 1CV.3.53  
 Bodian, W.,2AV.2.32  
 Boeck, T.,2CV.2.15, 3CV.1.48,  
 7DV.1.30  
 Boero, M.,7DV.1.24  
 Bofill, M.A.,6BV.2.14  
 Bogar, I.,6BV.2.19  
 Bogdanov, D.,7DO.8.1  
 Bogucka, A.,7DV.1.29  
 Bogust, P.,5DV.3.67  
 Boheemen, M.,7DO.9.6  
 Bohra, M.,7DV.1.10  
 Bohra, R.,5BV.4.27  
 Bokalic, M.,5BV.4.57, 5DV.3.56,  
 5BV.4.63  
 Bollar, A.,5DV.3.66, 5EO.1.4  
 Bonnassieux, Y.,3DV.2.85,  
 3CO.3.4  
 Bonnet-Eymard, B.,5DV.3.5  
 Bonomo, P.,6DO.10.1, 6BV.1.37  
 Bordihn, S.,2CO.9.6  
 Bordin, N.,2CV.2.71  
 Borg, S.,6BV.3.45  
 Borgers, T.,5BO.5.2, 2AO.5.1,  
 1CO.2.4
- Borkovskaya, O.Y.,1CV.3.55  
 Borland, J.,6BV.3.84  
 Borne, A.,5BO.5.6  
 Boschetti, M.,4CV.4.17  
 Bosco, N.,5BO.5.3  
 Bose, S.,2AV.3.6  
 Bose, S.,1CV.3.52  
 Bosio, A.,1CV.3.68  
 Bosman, J.,3CV.1.62  
 Bothorel, L.,6BV.2.44  
 Bouabid, K.,3CV.1.47  
 Bouaichi, A.,5BV.4.58, 5BV.4.54  
 Bouhafs, D.,2AV.1.42  
 Bouhamidi, M.H.,6BV.3.1  
 Bouia, H.,6BV.1.14  
 Boujmil, M.F.,3DV.2.16  
 Boukhattem, L.,5BV.4.83  
 Boulanger, A.,6DO.11.5  
 Bounaas, L.,2AV.2.38  
 Bounouh, A.,4CV.4.7  
 Bouree, J.-E.,3DV.2.85, 3CO.3.4  
 Bourgeois, E.,3BO.10.1  
 Bourgeteau, T.,3DV.2.85  
 Bourret-Sicotte, G.,2BO.2.3  
 Bourrigaud, S.,6BV.3.40,  
 1CV.3.53  
 Bourry, F.,6BV.3.100, 6CO.16.6  
 Bouttemy, M.,3AO.9.6,  
 2CV.2.26, 1CV.3.12, 3DV.2.85  
 Bowen, L.,1CV.3.42  
 Bowers, J.W.,7DV.1.30, 3BO.9.5  
 Boyd, O.,6CO.16.5, 7DO.9.2  
 Boyer, F.,2AV.3.5  
 Brabec, C.J.,3BO.12.1, 5CO.8.2,  
 6BV.1.44, 3AO.8.2, 6BO.8.2,  
 5DO.5.3, 6BV.1.28  
 Bracquené, E.,5DV.3.63  
 Bradley, A.,5DV.3.13  
 Brammer, T.,5BV.4.35  
 Brammertz, G.,3BO.11.5,  
 3BO.11.4
- Brand, A.A.,2CO.9.5, 2CO.11.1,  
 2CV.2.82  
 Brassier, P.,7DV.1.29  
 Bratcher, J.,5DV.3.39  
 Bräuer, G.,3DV.2.5  
 Bräuniger, M.,3CO.4.6, 3DO.7.5  
 Brecl, K.,5BV.4.63, 5DV.3.56,  
 5BV.4.57  
 Bredemeier, D.,2BO.2.1  
 Bremner, S.P.,2AV.2.28, 2AV.2.8  
 Brendel, R.,1AP.1.2, 2BO.3.5,  
 2DO.2.2, 2AV.2.20  
 Brendemühl, T.,2AV.2.2  
 Brennan, B.,5BO.5.5  
 Bressan, M.,6BV.2.15  
 Breyer, C.,7DO.8.4, 6BV.3.82,  
 7DO.8.1, 7DO.9.1  
 Briddon, P.,3CV.1.21  
 Briels, S.,6BV.2.30  
 Briggs, J.,6BV.3.19  
 Brinnig, S.,2AV.1.22  
 Brito, M.C.,6BV.3.95, 6BV.3.67,  
 6DO.11.6  
 Britze, C.,3DV.2.5  
 Brizé, V.,2AV.1.25  
 Brocker, H.,2CO.9.3  
 Brockmann, D.,7EO.3.4  
 Broeders, B.,5DV.3.14, 5BO.5.2  
 Brogueira, P.,1CV.3.76  
 Bronkhorst, J.,6BV.2.30  
 Bronsveld, P.C.P.,2AV.3.7,  
 2AV.3.2  
 Brouwer, E.,5CO.5.1  
 Brown, T.,5DV.3.9  
 Bruc, L.I.,3CV.1.41  
 Bruce, A.,7DV.1.15  
 Brückner, U.,2CO.12.3  
 Bründlinger, R.,5DV.3.45  
 Brunetti, F.,7DV.1.30  
 Brunken, S.,3AO.9.3  
 Bruno, A.,3DV.2.76
- Bryan, J.,2AV.3.27  
 Buchholz, F.,2CV.2.77, 2BO.1.2,  
 5DV.3.66, 5EO.1.4  
 Büchle, F.,6CO.16.3  
 Büchler, A.,2CV.2.82  
 Buck, T.,2AV.2.5, 2AO.6.5,  
 2AV.2.12, 5DV.3.8  
 Buckley, A.R.,6BV.3.19  
 Buddgård, J.,5DV.3.4  
 Budiman, A.S.,2CV.2.59  
 Buecheler, S.,3CV.1.60,  
 3BO.10.1, 7DV.1.30, 3CO.4.3,  
 3DO.7.4  
 Bueno, M.,6EO.2.2  
 Buerhop-Lutz, C.,6BV.1.44,  
 6BV.1.28, 6BO.8.2, 5CO.8.2,  
 5DO.5.3  
 Buffière, M.,3DV.2.100, 5CO.5.5  
 Bulatbaev, F.N.,5BV.4.34  
 Bulkin, P.,2AV.2.37, 2AV.2.33  
 Bulygin, B.,5BV.4.33  
 Bundesmann, J.,2CV.2.7  
 Buonassisi, T.,2CV.2.31,  
 2CV.2.30  
 Burgers, A.R.,2BP.1.2, 5CO.5.1  
 Burghoorn, M.,3CV.1.7  
 Burgun, F.,7DV.1.29  
 Burschik, J.,2CO.9.1, 2AV.2.15  
 Burski, P.,5DV.3.54  
 Burton, B.,7DO.8.6  
 Busch, M.,3DV.2.34  
 Bush, K.A.,3DO.7.6, 2BO.4.6  
 Buskens, P.,3CV.1.7  
 Busquet, S.,6BV.1.42  
 Busse, H.,5BV.4.40, 5BV.4.41  
 Byun, M.,3DV.2.99, 3DV.2.77,  
 1CV.3.64
- C**  
 Caballero, R.,3BO.11.6  
 Cabrera, E.,5BV.4.29, 5DV.3.8,  
 5DV.3.9  
 Caccivio, M.,6BV.1.37

- Cadel, E.,3BO.10.1  
 Cadena, A.I.,6BV.2.15  
 Cai, L.,2AV.3.17  
 Cai, W.,2AO.6.4, 2CV.2.84  
 Cai, X.,5BV.4.51  
 Calabrò, E.,3CO.4.2  
 Caldera, U.,7DO.8.1  
 Calle, E.,2CV.2.6, 2CV.2.37  
 Calnan, S.,3DO.7.2  
 Calo López, A.,6BV.3.43  
 Cambie, D.,1AO.2.2  
 Cambior, R.,5DV.3.9  
 Campesato, R.,4CV.4.18  
 Camus, C.,6BV.1.44, 5CO.8.2, 3AO.8.2, 6BV.1.28, 6BO.8.2, 5DO.5.3  
 Cancelliere, P.,6BV.1.37  
 Caneva, S.,7DO.8.6  
 Canino, A.,2DO.1.2  
 Canteli, D.,2CV.2.11  
 Cao, X.,2CV.2.78  
 Cao, Z.,2CV.2.54  
 Cárabe, J.,2AV.3.42, 7EO.3.6, 7DV.1.30, 2CV.2.11  
 Carbone, M.,6CO.13.4  
 Carbone, R.,6BV.3.61  
 Carcouet, C.,1CV.3.77  
 Cardoso Ferreira, A.,6BV.1.22  
 Cardoso Melo, F.,5DO.5.2, 6BV.1.8  
 Carigiet, F.,6EO.2.4, 6CO.15.1  
 Cariou, R.,1AP.1.3  
 Carius, R.,2CV.2.54  
 Carlos de Freitas, L.,5DO.5.2  
 Carmassi, M.,6BV.1.14  
 Carolus, J.,5CO.6.1  
 Caroprese Castro, R.,6CO.14.5  
 Carr, A.J.,5CO.5.1, 5BV.4.39, 5BV.4.31  
 Carrano, V.,2CV.2.56  
 Carrasco, L.M.,6BV.1.25, 6BV.1.26, 6BV.1.27, 6BV.1.24  
 Carrêlo, I.B.,6BV.1.26, 6BV.1.25, 6BV.1.27, 6BV.1.24  
 Carrió, D.,2CV.2.37  
 Carron, R.,3BO.11.6, 3BO.10.1  
 Carvalho, P.,2AV.1.18  
 Casaburi, D.,7DV.1.30  
 Casado, A.,2AV.3.42  
 Cascone, I.,6CO.13.4  
 Castellanos, A.,7DO.8.5  
 Castillo, A.,5DV.3.65  
 Castillo, G.,6BO.8.6  
 Castro, C.,3BO.10.1  
 Catena, M.,6CO.13.4  
 Cattaneo, G.,3CO.4.6, 1CV.3.78  
 Catthoor, F.,5BV.4.45  
 Cattin, J.,3DO.7.1, 2CV.2.24  
 Cauchois, R.,3DV.2.6  
 Cavallari, E.,4CV.4.23  
 Cavalli, A.,1AO.3.3, 1AO.1.2  
 Cavallo, C.,3DV.2.92  
 Cavassilas, N.,4CV.4.7  
 Cem Sahiner, M.,3DV.2.75  
 Cendagorta, M.,3DV.2.71, 3DV.2.56, 6BV.3.21  
 Cerná, L.,5BV.4.3  
 Cesar, I.,2CO.11.6, 2BP.1.2  
 Chabli, A.,2AV.1.25  
 Chai, G.,3DV.2.55  
 Chai, J.,5CO.6.2  
 Chaik, M.,3DV.2.2  
 Chaillou, M.,6BV.3.40, 5DV.3.73  
 Chakraborty, P.,5DV.3.36  
 Chaliyawala, H.A.,2AV.3.38  
 Challet, S.,7DV.1.29  
 Chalvet, F.,3BO.10.2  
 Champlaud, J.,2DO.1.4, 5DV.3.5, 2AO.5.2  
 Chan, C.,2AV.1.36, 2AV.1.38, 2BO.2.3  
 Chan, S.-W.,3CV.1.3  
 Chandra, S.,1CV.3.73, 1CV.3.62, 1CV.3.81, 1CV.3.59, 1CV.3.74  
 Chang, C.-W.,3CV.1.3  
 Chang, J.,6BO.8.1  
 Chang, P.-K.,2AV.2.27  
 Chang, S.,5BV.4.35  
 ChanKam, S.,5CO.7.5  
 Chantana, J.,1CV.3.83  
 Chaouchi, S.,2CV.2.32  
 Chaouki, F.,4CV.4.24, 5DV.3.33  
 Chaplin, L.,5DV.3.62  
 Chapon, P.,2CV.2.26, 1CV.3.12, 3AO.9.6  
 Chapuis, V.,6BV.3.62  
 Chaurasia, S.,4CV.4.8  
 Chehouani, H.,1CV.3.9  
 Cheikh, O.M.,3DV.2.2  
 Chelvanathan, P.,3DV.2.27  
 Chemisana, D.,2CV.2.50  
 Chen, C.,2CV.2.78  
 Chen, C.-Y.,5BV.4.42  
 Chen, C.-H.,6BV.3.55  
 Chen, D.,2BO.2.6, 2BO.2.3, 2AV.1.36  
 Chen, G.,2CV.2.84  
 Chen, G.,5BV.4.51  
 Chen, H.-Y.,2CV.2.38  
 Chen, J.,3CV.1.25  
 Chen, K.,2CV.2.87  
 Chen, K.,2CO.10.1  
 Chen, L.-C.,5BV.4.42  
 Chen, R.,2AV.1.36, 2BO.2.3  
 Chen, R.,5BV.4.23  
 Chen, S.,2CO.11.5  
 Chen, S.-F.,1AO.2.5  
 Chen, S.-Y.,2AV.2.24  
 Chen, T.-C.,2AO.6.2  
 Chen, W.,2AV.1.7, 2AV.1.8  
 Chen, W.,3DV.2.97  
 Chen, W.,2AV.3.34  
 Chen, W.,2CV.2.73  
 Chen, X.,2CV.2.84  
 Chen, Y.,2CO.11.5  
 Chen, Y.,5CO.6.2, 2CO.11.5  
 Chen, Y.-T.,5BV.4.42  
 Chen, Z.D.,3CO.3.6  
 Cheng, C.-Y.,2AV.1.28  
 Cheng, Y.-T.,2AV.2.3  
 Cheong, H.,3CV.1.42  
 Chiantore, P.,7DV.1.48  
 Chiba, Y.,5CO.6.3, 5DV.3.23, 5BV.4.76  
 Chichignoud, G.,2AV.1.16  
 Chien, J.-W.,2AV.2.3  
 Chihi, A.,3DV.2.16  
 Chikamatsu, M.,3DV.2.49  
 Child, M.,7DO.8.1  
 Chilibon, I.,1CV.3.85  
 Chin, K.K.,3DV.2.19, 3DV.2.14  
 Chinello, E.,1CO.2.2  
 Chio, J.-H.,5DV.3.6, 5BV.4.36  
 Chiodetti, M.,6BV.1.14  
 Chiu, S.-W.,2AV.2.27  
 Chiwewe, T.,6BV.2.47  
 Cho, A.,3DV.2.26, 3CV.1.56, 3CV.1.31, 3CV.1.42, 3CV.1.28  
 Cho, J.-S.,3CV.1.31, 2CV.2.10, 3CV.1.56  
 Cho, Y.S.,3CV.1.42  
 Choi, H.-J.,1CV.3.64, 3DV.2.99  
 Choi, J.-Y.,3DV.2.77, 1CV.3.64, 3DV.2.99  
 Choi, M.-J.,6BV.2.49  
 Choi, S.,5BV.4.76, 5CO.6.3  
 Choi, Y.S.,2AV.2.1  
 Chong, C.M.,2BO.2.3, 2AV.1.36  
 Chong, T.K.,2BO.4.5  
 Chou, C.-C.,7DV.1.45

- Choubineh, N.,1CV.3.67  
 Choubrac, L.,3BO.11.5, 3BO.11.4  
 Chouhan, A.S.,3DV.2.102, 1CV.3.47, 4CV.4.8  
 Christiansen, S.,3CO.4.2  
 Christmann, G.,2DO.2.4, 2DO.1.1  
 Christopher, E.,6BV.3.79  
 Chrysochoidis, C.,6DO.12.5  
 Chrysochoidis-Antsos, N.,6DO.12.5  
 Chu, H.,2CV.2.88, 2AO.5.6  
 Chuang, C.C.,2AV.2.19, 2AV.2.34, 2AV.2.44  
 Chung, H.W.,1CV.3.98  
 Chung, W.-T.,2AV.2.27  
 Ciesla, A.,2BO.2.3  
 Cieslak, J.,2CO.9.6  
 Ciftja, A.,2BO.1.2  
 Cimiotti, G.,2CO.10.6, 2CV.2.82  
 Cipollina, A.,7DV.1.21  
 Claveau, Y.,4CV.4.7  
 Claville Lopez, A.,2CV.2.48  
 Clemens, P.,6BV.1.36  
 Clement, F.,1CO.1.3, 2CV.2.70, 2CO.9.3  
 Clifford, L.,7DO.8.6  
 Clochard, L.,2AV.2.41  
 Clohessy, C.M.,6BV.3.15  
 Clua Longas, A.,6BV.3.47  
 Coelho, E.A.A.,5DO.5.2  
 Coenen, T.,1CV.3.19  
 Coeuret, F.,2AV.2.47  
 Coig, M.,2CV.2.76  
 Cojocar, L.,3DV.2.63  
 Coletti, G.,2AV.1.38  
 Colin, H.,5BV.4.25, 6CO.13.5, 5DV.3.37  
 Colin, J.,4CV.4.7  
 Coll-Mayor, D.,7DO.8.5  
 Colwell, J.,2BO.2.3  
 Comparotto, C.,2CV.2.23  
 Comuth, R.,7DV.1.31  
 Concha-Ramon, B.,2CV.2.46  
 Condorelli, G.,2DO.1.2  
 Congyi, T.,5BV.4.79  
 Conibeer, G.J.,1CV.3.38  
 Corkish, R.P.,5DV.3.78  
 Cornagliotti, E.,2AV.2.6, 2BP.1.3  
 Cornaro, C.,6BV.3.16, 5BV.4.14, 6BO.7.2  
 Cornille, C.,4CV.4.7  
 Correa, J.,6BV.2.16  
 Corso, G.,3BO.12.5  
 Costa, F.,5DV.3.14  
 Cotton, M.K.,2CV.2.34  
 Couderc, J.,2AV.2.37  
 Coustier, F.,5EO.1.5, 2AV.1.25, 2AV.1.23  
 Craciunescu, D.,1CV.3.85  
 Creatore, M.,3CO.3.1, 2DO.3.4  
 Cren, J.,7DV.1.25  
 Cristea, P.,1CV.3.57  
 Cristi, ,5BV.4.11  
 Crockford, D.,7DO.8.6  
 Crone, K.,3DV.2.34  
 Cros, S.,6BV.3.8  
 Crozier, J.L.,6BV.1.16  
 Cruz-Campa, J.,2CV.2.48  
 Cui, Y.,1AO.1.2  
 Cunden, K.,6BV.1.3, 6BV.1.4  
 Cunow, E.,6BO.8.4  
 Curmei, N.,3CV.1.41  
 Curvat, L.,5DV.3.5, 2DO.1.4  
 Cyras, V.,2CV.2.77  
 Czurratis, P.,2AV.1.10  
**D**  
 D'Haen, J.,1CO.2.4  
 da Costa Fernandes, J.,6BV.3.90  
 da Costa Pó, J.M.,6BV.3.5  
 da Silva Junior, B.,7DV.1.7  
 Dadaniya, A.,5BV.4.81  
 Dadzis, K.,2BO.1.5  
 Daenen, M.,5CO.6.1  
 Dahl, O.,2AV.1.18  
 Dahlioui, D.,5DV.3.33, 5DV.3.35, 4CV.4.24  
 Dai, P.,4CV.4.13  
 Dai, X.,2AV.3.31  
 Daiber, B.,1AP.1.1, 1CV.3.15, 1CV.3.29  
 Dalibor, T.,3BO.9.1  
 Daliouris, P.,7DV.1.35  
 Dambrine, G.,5DV.3.35  
 Dam-Hansen, C.,5BV.4.78, 6BV.2.29  
 Danel, A.,2DO.1.5, 2CO.10.2, 7DV.1.30  
 Dannenberg, T.,2CO.11.1  
 Danyluk, S.,2AV.1.32  
 Daoud Henderson, V.,7DO.8.6  
 Daoudi, K.,6BV.3.83  
 Darez, P.,6BV.1.48  
 Darivon, S.,6BV.3.100, 6CO.16.6  
 Darr, C.,6BV.1.48  
 Das, G.,1CV.3.52  
 Das, U.K.,4DO.4.1  
 Daßler, D.,5DV.3.31  
 Dastgheib-Shirazi, A.,2CV.2.31  
 Datla, N.V.,5BV.4.81  
 Daulethanova, A.D.,5BV.4.34  
 Dauskardt, R.H.,5BO.5.3  
 David, C.,3CV.1.49  
 Davis, K.O.,2AO.6.6  
 Davis, R.,1CO.2.5  
 Davis, V.L.,3DV.2.92  
 Dax, M.,5EO.1.6  
 De Brida, V.,6BV.3.71  
 de Carvalho, P.C.M.,6BV.3.89  
 De Ceuninck, W.,5CO.6.1  
 De Clercq, E.,7EO.3.4  
 de Cloet, J.,3CV.1.26  
 De Felice, M.,6BV.3.16  
 de Ferrari, A.,7DO.8.6  
 de Gabaï, D.,6BV.1.11  
 De Girolamo, A.,7DV.1.30  
 de Groot, K.M.,5BV.4.31, 5BV.4.39  
 de Jong, M.,7DO.8.6  
 de Jong, M.M.,6BV.3.44, 6BV.3.42, 6DO.12.3  
 de Jong, P.,7DV.1.31  
 de Keizer, C.,4CV.4.26  
 de la Parra, I.,6BV.2.45, 6EO.2.3, 6BV.3.94  
 de la Parra, M.,6CO.15.3  
 De Maria, A.,3DV.2.76  
 De Rose, A.,2AV.3.1  
 De Roubaix, M.,6BV.3.8  
 de Souza Almeida Neto, J.C.,5DV.3.43  
 de Vicente Suso, C.,6BV.3.43  
 De Vries, A.,7DV.1.31  
 de Vries, I.,3CO.4.5  
 de Waal, A.C.,6BV.1.31  
 De Wolf, S.,3DO.7.1, 2DO.2.4  
 de Zárate, M.E.O.,2AV.1.26  
 Debernardi, N.,3CV.1.62  
 Debije, M.G.,1AO.2.2, 6BV.3.42  
 Debnath, T.,6BV.2.20  
 Debourdeau, M.,2AV.1.23  
 Debrot, F.,5DV.3.5  
 Debucquoy, M.,2AV.3.14, 2AO.5.1, 2BO.3.4, 2AV.3.26, 2CO.12.4  
 Deckelmann, M.,2CV.2.81  
 Decobert, J.,4DO.4.3  
 Degutis, G.,3BO.10.1  
 Dehbi-Alaoui, A.,1CV.3.97

- Dekker, N.J.J., 5BV.4.39, 5BV.4.50
- del Cañizo, C., 2CV.2.31, 7DV.1.30
- Delahoy, A.E., 3DV.2.14, 3DV.2.19
- Delaleux, F., 2AV.2.49
- Delamarre, A., 1CV.3.22
- Delaplagne, T., 6BV.3.100
- Delbos, E., 2AV.2.37
- Delgado, H., 7DV.1.29
- Deleine, C., 6BV.2.35, 6CO.13.3, 5CO.6.2
- Delisle, V., 6BV.3.58
- Della Noce, M., 2AV.3.16, 2AV.3.18
- Delli Veneri, P., 3DV.2.76, 2CV.2.72, 2AV.3.16, 2AV.3.18
- Dellith, A., 1CO.2.1
- Dellith, J., 1CO.2.1
- Delsaux, N., 7EO.3.4
- Demant, M., 2CO.11.1, 2BO.1.3, 2CO.11.3
- Demircioğlu, Z., 2CV.2.8
- Demura, H., 2AV.2.43
- Denafas, J., 2BO.1.2, 5DV.3.66, 2AV.1.3, 5EO.1.4, 2CV.2.77, 2CV.2.81
- Deng, X., 2CV.2.78
- Denis, C., 2AV.2.38
- Denisov, A.V., 2AV.1.11
- Déniz Quintana, F., 6BV.3.25
- Denker, A., 2CV.2.7
- Depauw, V., 2AV.3.26, 2CO.12.4, 2BO.3.4, 2AV.3.14
- Déramaix, D., 7DV.1.29
- Derbouz, K., 2AV.1.3
- Dergacheva, M.B., 3DV.2.22
- Dermenji, L., 3CV.1.41
- Derricks, C., 2AV.1.37
- Descoedres, A., 1CV.3.93, 2DO.1.1, 2DO.2.4
- Despeisse, M., 2CV.2.24, 2DO.1.1, 5DV.3.5, 2DO.1.4, 2DO.2.4, 3CO.4.6, 3DO.7.5, 1CV.3.93, 1CO.2.2, 2AV.3.4, 2AO.5.2, 2BO.4.3, 2BO.4.1, 2AV.3.22, 2CV.2.72
- Desrués, T., 2CV.2.76
- Deswaziere, A., 3CV.1.62
- Dewulf, W., 5DV.3.63
- Dhar, S., 1CV.3.52
- Dhawale, D.S., 3CV.1.37
- Dhlamini, M.S., 1CV.3.63
- Di Carlo, A., 3CO.4.2, 3DV.2.76, 7DV.1.30
- Di Giacomo, F., 3DV.2.90, 3DV.2.82, 3CO.4.5
- Di Mare, S., 3DV.2.118
- Di Napoli, S., 3BO.10.1
- Di Stefano, A.G.F., 6CO.14.1
- Diao, A., 1CV.3.3
- Díaz, F., 6BV.3.25
- Diaz Almeida, D.E., 5CO.5.3
- Diehl, M., 6BV.2.10, 5BV.4.64
- Dielissen, B., 2CV.2.79
- Dieng, D., 1CV.3.25
- Dietrich, S., 5CO.8.3
- Digdaya, I., 1CO.2.6
- Diletto, C., 7DV.1.30
- Dimmler, B., 3BO.10.1
- Dimopoulos, T., 3DV.2.68
- Dimroth, F., 1AP.1.3
- Dindault, C., 3DV.2.85
- Ding, F., 3CV.1.30
- Dinyari, R., 6BV.2.5
- Diouf, A., 1CV.3.3, 1CV.3.4
- Ditsela, J., 6BV.2.47
- Dittmann, S., 5BV.4.35
- Dittrich, T., 3DV.2.107
- Djelloul, A., 2CV.2.32
- Djessas, K., 1CV.3.9
- Dkhichi, F., 6BV.2.39
- Dlouhy, A., 7DO.8.6
- Dmitruk, I.M., 1CV.3.46
- Dmitruk, N.L., 1CV.3.46, 1CV.3.55
- Dobb, A., 6CO.16.5, 7DO.9.2
- Docampo, P., 3CO.3.5
- Doi, T., 5BO.6.5
- Dold, P., 2AV.1.11
- Doll, O., 2CV.2.70
- Dols, N., 6BV.1.31
- Domergue, C., 2AV.1.26
- Dominguez, F., 6CO.15.4, 6BO.8.6
- Dominish, E., 5DV.3.62
- Domnik, A., 5BV.4.64
- Dong, G., 2AV.2.40
- Dong, J., 6BV.3.51
- Dong, J., 2CV.2.84, 2AO.6.4
- Dong, Z., 6DO.6.3
- Donker, J., 6BV.2.30
- Donoso Alonso, J., 7EO.3.1
- Donsanti, F., 3AO.9.6
- Donzel-Gargand, O., 3AO.9.2
- Dörenkämper, M., 3CO.4.5
- Dorn, S., 2AV.2.2
- Dornich, K., 2CV.2.29
- Dörr, M., 2AV.2.5
- Dorrity, I., 2BO.1.1
- dos Reis Benatto, G.A., 6BV.2.29, 5BV.4.78
- Dottermusch, S., 2AV.2.50
- Dov, D., 7DV.1.37
- Draaisma, G., 1CV.3.77
- Dragan, F., 1CV.3.85
- Drahi, E., 2AV.2.37, 2AV.2.47, 2AV.2.33, 2AV.2.21
- Drefke, T., 7DO.8.6
- Drevet, B., 2AV.1.34
- Driesen, J., 5BV.4.9, 5BV.4.45, 6BO.7.3
- Driesse, A., 6BV.3.28
- Drießen, M., 2BO.3.6, 2CO.10.4
- Drobisch, A., 5BO.6.3
- Drode, E., 2BO.1.1
- Drost, C., 3CV.1.52, 3CV.1.14, 3CV.1.17, 3CV.1.16, 3CV.1.13
- Drozdiak, K., 5EO.1.1
- Dshkhunyan, V.L., 2AV.1.14
- Du, C.-H., 2AV.2.45, 2AV.2.24
- Dubois, S., 2AV.2.17, 2CV.2.76, 2AV.2.38
- Dubrovskiy, A., 2AV.3.12, 5BV.4.33
- Ducamp, J., 5DV.3.73
- Duck, B.C., 3DV.2.117
- Ducroquet, F., 2AV.1.34
- Duerinckx, F., 2CV.2.45, 2BP.1.3, 2AV.2.6
- Duflou, J., 5DV.3.63
- Dugan, S., 2AV.2.42
- Duguay, S., 3BO.10.1
- Dülger, G., 5BV.4.32
- Dullweber, T., 2AV.2.20
- Duman, A.C., 6BV.2.50
- Dumitru, C., 1CV.3.85
- Dumoulin, R., 6BV.3.50
- Dümpelfeld, W., 2CO.9.1
- Dunbar, R.B., 3DV.2.117
- Duncker, K., 2CO.9.6
- Dunlop, E., 6DO.6.1, 3BO.12.3
- Dunne, B., 3CV.1.62
- Dupre, C., 4DO.4.3
- Dupré, O., 3DO.7.1, 2CV.2.24
- Durastanti, J.-F., 2AV.2.49
- Durose, K., 3CV.1.27
- Dürr, I., 5DV.3.14
- Duttgupta, S.P., 6BV.2.41, 6BV.2.42
- Dwan, J., 2CV.2.86
- Dyer, A., 3CV.1.12
- Dyer, R., 2BO.1.1

**E**

Eberle, R.,2BP.1.4  
 Eberlein, D.,2AO.6.5, 1CV.3.71  
 Ebert, M.,5DV.3.31  
 Ebert, M.,6BV.3.63, 5DO.5.5, 6DO.12.4, 1AO.2.3  
 Ebner, R.,5BV.4.72, 5DV.3.17, 6BV.2.21, 5DV.3.18, 5BV.4.4, 6BV.1.34  
 Ech-Chamikh, E.M.,1CV.3.14  
 Eckert, J.,2AV.2.26  
 Eder, G.C.,5BV.4.73, 5BV.4.72, 6DO.11.3, 6BV.3.57, 5DV.3.17, 5DV.3.18, 6BV.1.34  
 Edler, M.,1CV.3.51, 5DV.3.18  
 Edoff, M.,3AO.9.2, 3BO.10.2  
 Eerenstein, W.,5BV.4.50  
 Efinger, R.,2CV.2.70, 2AV.2.26  
 Egger, S.,7DO.8.6  
 Ehlen, B.,5DV.3.66, 5EO.1.4  
 Ehlers, C.,2CV.2.15  
 Ehrler, B.,1CV.3.15, 1AP.1.1, 3DV.2.87, 3DV.2.72, 1CV.3.29  
 Eibl, O.,2CV.2.55, 2CV.2.64, 2AO.4.4  
 Eidner, A.,2CO.9.6  
 Einhaus, R.,5DV.3.66, 5EO.1.4  
 Eisenberg, N.,2CV.2.71  
 Eisenberg, Y.,2CV.2.71  
 Eisenlohr, J.,6DO.11.1  
 Eisert, S.,2CV.2.77  
 Eitner, U.,2AV.3.1, 1CO.1.2, 2AO.6.5, 6BV.3.63, 6DO.12.4, 1CO.1.4  
 Eizinger, B.,6BV.2.36  
 Ekere, N.N.,5DV.3.3  
 Ekins-Daukes, N.J.,4CV.4.5, 2CV.2.50, 4CV.4.11  
 Ekstrøm, K.E.,2BO.1.2  
 El Aakib, H.,3DV.2.58  
 El Amrani, A.,5BV.4.58  
 El Assali, K.,3DV.2.79

El Belghiti, H.,2AV.2.37  
 El Dehaibi, N.,7DV.1.10  
 El Fathi, A.,6BV.2.32  
 El Gammal, A.,6BV.3.36  
 El Hassani El Alaoui, A.,6BV.2.18, 5BV.4.58, 6BV.2.6, 5BV.4.54  
 El Jaouhari, A.,2CV.2.74  
 El Khalfi, A.-I.,1CV.3.14  
 El Kissani, A.,3DV.2.58, 1CV.3.14, 3DV.2.2  
 El Kouari, Y.,6BV.2.39  
 El Mkadmi, C.,6BV.2.27  
 El Yaakoubi, A.,6BV.2.8  
 El-Amine Madjet, M.,1CV.3.13  
 ElAnzeery, H.,3AO.8.4  
 Elborg, M.,2CV.2.57  
 Elfanaoui, A.,3CV.1.47  
 El-Mellouhi, F.,1CV.3.13  
 El-Menyawy, E.,3DV.2.59  
 Elnosh, A.,5CO.5.4  
 Elrayyah, A.,6BV.3.32  
 Elsinga, B.,6BV.3.13  
 Emanuel, G.,2CV.2.41  
 Emelianov, V.,1CV.3.45  
 Emieux, F.,3AO.7.3  
 Emmelkamp, J.,3CV.1.46, 3CV.1.26  
 Emtsev, K.,2AV.3.12, 2AV.3.39, 5BV.4.33  
 Ennaceri, H.,1CV.3.60  
 Ennaoui, A.,3CV.1.37, 1CV.3.60, 5BV.4.46, 3CV.1.11  
 Eo, Y.-J.,3CV.1.56, 3CV.1.42, 3CV.1.28  
 Eraerds, P.,3BO.9.1  
 Erath, D.,2AV.3.1, 2DO.1.3  
 Erban, C.,1CV.3.70  
 Erfurth, T.,6CO.14.4  
 Ergashev, B.,1CV.3.68

Erkkara Madhavan, V.,3DV.2.100  
 Ermes, M.,2CV.2.54  
 Ernst, M.,1CO.1.5, 2BO.4.5  
 Erraissi, N.,5BV.4.17  
 Ershovaa, E.,2AV.1.31  
 Es, F.,2AV.2.48  
 Escarré, J.,5DV.3.5  
 Eslami, S.,6BV.1.1, 5DV.3.79, 1CV.3.1  
 Eslamian, M.,3DV.2.108  
 Esmaeili Shayan, M.,6BV.3.56  
 Espeche, J.M.,7DV.1.29  
 Espelien, S.,2AV.1.2  
 Espindola-Rodriguez, M.,3DV.2.7  
 Essafti, A.,1CV.3.14  
 Essaleh, L.,1CV.3.9  
 Essig, S.,1CV.3.93  
 Esteban, J.C.,7DV.1.29  
 Estrada, J.,3CV.1.1  
 Estrada del Cueto, M.,3DV.2.88  
 Eswara, S.,2CV.2.55  
 Etcheberry, A.,3DV.2.85, 2AV.2.37, 3AO.9.6, 2CV.2.26, 1CV.3.12  
 Etienne, D.,5CO.7.5  
 Ettayeb, Y.,7DV.1.16  
 Evstropov, V.V.,4CV.4.16  
 Eylers, K.,3CV.1.48  
 Eypert, C.,1CV.3.12, 3CO.3.4, 2CV.2.26  
**F**  
 F. Fernández, E.,4CV.4.30  
 Fabregat-Santiago, F.,3DV.2.32  
 Fadili, S.,3CV.1.29  
 Faes, A.,2AV.3.22, 2DO.1.4, 2DO.2.4, 3CO.4.6, 1CO.2.2, 5DV.3.5  
 Fahrner, W.R.,2AV.3.34  
 Fairbrother, A.,5BO.5.4  
 Fakhfoury, V.,2AO.5.2

Fakhraldeen, A.,5BV.4.84  
 Fakkar, A.,6BV.2.39  
 Falcón Morales, S.,7EO.3.4  
 Falcone, I.,7DV.1.30  
 Falster, R.,2BO.2.5  
 Fan, H.,2CV.2.87  
 Fan, W.,2CO.9.2  
 Faouzi, K.,3CV.1.22  
 Fara, L.,1CV.3.85  
 Farfan, J.,7DO.8.1  
 Farhangi, S.,5BV.4.22  
 Farias, V.J.,5DO.5.2  
 Farias Basulto, G.,3DV.2.12, 3CV.1.59  
 Farneda, R.,2CV.2.91  
 Farress, F.,6BV.2.6  
 Farshchimonfared, M.,6BV.3.104  
 Fath, P.,2CO.9.2  
 Fauveau, A.,2AV.1.34  
 Fave, A.,2AV.3.5  
 Favre, W.,2DO.1.2  
 Faye, M.E.,1CV.3.25, 6BV.2.17  
 Fecchio, A.,1CO.1.1  
 Fecher, F.W.,6BO.8.2, 5CO.8.2  
 Fechner, H.,7DV.1.32  
 Fechner, I.,5DV.3.66  
 Federzoni, L.,7DV.1.4  
 Fedina, M.,3BO.10.1  
 Fehling, S.,6BV.3.74  
 Fehling, T.,6BV.1.29  
 Fejfar, A.,2DO.2.4, 2BO.4.3  
 Felder, T.,5DV.3.13  
 Feldman, D.,7EP.1.2  
 Feldmann, F.,2DO.2.1, 2DO.3.3, 2DO.2.5, 2AO.4.3, 2DO.1.3  
 Felecan, S.,6DO.11.3  
 Félix, R.,3BO.11.5  
 Fell, A.,2AO.4.3, 2CV.2.36, 3DV.2.80, 2CV.2.33  
 Fell, C.J.,3DV.2.117

Fellmeth, T.,2CV.2.33, 2DO.3.5  
 Felser, C.,3CV.1.38  
 Feng, P.,1CV.3.87  
 Feng, S.-K.,1CV.3.61  
 Feng, V.,5CO.7.5  
 Feng, Z.,5BV.4.43, 2CO.11.5, 5CO.6.2  
 Ferber, C.,3DV.2.65  
 Ferdaous, M.T.,3DV.2.27  
 Fernandes, M.,2DO.1.2  
 Fernandes, M.,2CV.2.16, 1CV.3.76  
 Fernandez, A.,4CV.4.22  
 Fernández, J.,6BV.3.21  
 Fernández, M.,6BO.8.6  
 Fernández, S.,2CV.2.11  
 Ferrada, P.,5BV.4.29, 5CO.5.3  
 Ferrara, C.,6DO.11.1  
 Ferré-Borrull, J.,3DV.2.88  
 Ferre-Llin, L.,2CV.2.50  
 Ferrer Rodríguez, J.P.,4CV.4.30  
 Ferrini, R.,3DV.2.84  
 Fertig, F.,5CO.6.4, 2CO.9.6  
 Feurer, T.,3CO.4.3, 3DO.7.4  
 Fey, T.,3DV.2.91, 5BO.6.2, 5BV.4.5  
 Fidler, H.,7DO.9.6  
 Field, M.,5BV.4.6, 6CO.15.1  
 Figgis, B.W.,5BV.4.46  
 Figueiredo, G.,6BV.2.34, 6BV.2.31  
 Filipic, M.,2AV.3.26, 2CO.12.4, 2AV.3.14  
 Filonovich, S.,2AV.2.37  
 Fina, B.,7DV.1.51  
 Finsterle, T.,5BV.4.3  
 Fischer, C.,2AV.2.7  
 Fischer, G.,2AV.2.33  
 Fischer, M.,2AO.6.1, 7DV.1.1  
 Fischer, T.,2AO.6.5, 1CV.3.90, 2CV.2.44, 5DV.3.8

Fischer Celanovic, N.,5DV.3.45  
 Fisher, K.C.,2AV.3.27  
 Flade, F.,6DO.10.2  
 Fladung, A.,6BV.1.36  
 Flandre, D.,3BO.11.3  
 Fledderus, H.,3BO.12.4, 3DV.2.105  
 Fleischhacker, A.,7DV.1.51  
 Fleissner Sunding, M.,2AV.1.19  
 Florez, J.A.,6BO.8.6, 6CO.15.4  
 Florides, M.,5BV.4.61  
 Florin, N.,5DV.3.62  
 Folkerts, W.,6BV.3.42, 6BV.3.44, 5BV.4.21, 6DO.10.4, 6DO.12.6, 4CV.4.26, 6DO.10.1  
 Fong, K.C.,2BO.4.5  
 Fons, P.,3BO.9.3  
 Fonseca Jr., J.G.S.,6BV.3.14  
 Fontaine, C.,4CV.4.7  
 Forberich, K.,3BO.12.1  
 Forchhammer, S.,6BV.2.29  
 Förster, S.,3CV.1.61  
 Foss, S.E.,1CV.3.85, 5DV.3.34, 2AV.1.4  
 Fourdrinier, L.,3BO.11.3, 5DV.3.77  
 Francisco, G.,6BV.3.34  
 Francisco, V.,7DV.1.29  
 Franklin, E.,2BO.4.5  
 Franz, R.,3CV.1.32  
 Franzke, E.,3CV.1.32  
 Frauenstein, S.,3CV.1.52  
 Frearson, L.,7DO.9.2, 6CO.16.5  
 Fréchette, L.,4CV.4.22  
 Frederiksen, K.H.B.,6BV.2.29  
 Fredriksen, E.,6BV.3.69  
 Frégnaux, M.,3DV.2.85, 2CV.2.26, 1CV.3.12, 3AO.9.6  
 Frei, C.,6CO.15.1  
 Freitas, D.M.,6BV.3.89

Freitas, S.R.,6BV.3.67, 6DO.11.6, 6BV.3.95  
 Frías, P.,7DV.1.21  
 Frieden, D.,7DV.1.18  
 Friederichs, M.,5BO.6.3  
 Friedrich, J.,2BO.1.1, 2AV.1.6, 2AV.1.10  
 Friedrich, L.,2CV.2.41  
 Friedrich-Schilling, N.,3BO.12.4  
 Friend, M.,3DV.2.56, 3DV.2.71, 6BV.3.21  
 Friesen, G.,5BO.6.3  
 Frijnts, T.,2CV.2.7, 2CO.12.5  
 Frikh, B.,7DV.1.23  
 Frischknecht, R.,5DP.1.4, 5EO.1.3  
 Fritz, J.,2AV.1.40, 2BO.2.2  
 Fritzsche, S.,1CV.3.71  
 Fritzsche, U.,5BV.4.20  
 Fröbel, J.,5DV.3.31  
 Frontini, F.,6DO.10.1, 6BV.3.36, 6BV.1.37  
 Frost, J.M.,1AP.1.1, 1CV.3.29  
 Fu, F.,3CO.4.3, 3DO.7.4  
 Fu, K.,3DV.2.98  
 Fu, Y.-H.,4CV.4.1  
 Fucci, R.,5BO.6.3  
 Fuchs, M.,2AV.1.31, 2AV.1.29  
 Fuerst, M.,2CV.2.74  
 Fugattini, S.,4CV.4.17  
 Fujimori, M.,5BV.4.68  
 Fujimoto, S.,3DV.2.49  
 Fujimoto, T.,2BP.1.1  
 Fujiseki, T.,3DV.2.49  
 Fujiwara, H.,3DV.2.49, 3AO.7.2  
 Fujiwara, K.,6BV.1.45, 5BV.4.24  
 Fukuda, T.,2AV.1.30  
 Fukuda, T.,2AV.2.25  
 Futscher, M.H.,3DV.2.87, 3DV.2.72

**G**  
 Gadaleta Caldarola, C.,7EO.3.4  
 Gagliardi, M.,5BV.4.75  
 Gagne, A.,6BV.3.58  
 Gaiaschi, S.,1CV.3.12, 3AO.9.6, 2CV.2.26  
 Gaillard, L.,6BO.8.5  
 Gajda, O.,7DO.8.6  
 Gajewski, W.,2CV.2.80  
 Galagan, Y.,3CO.4.5, 3DV.2.90  
 Galbiati, G.,2AO.5.6  
 Galgali, G.,5DV.3.14  
 Gali, S.,5BV.4.31  
 Galianzo, M.,1CO.1.1  
 Gall, S.,2CO.12.5, 2CV.2.7  
 Galleano, R.,6CO.15.1, 5BO.6.3, 1AO.1.5  
 Gallinet, B.,3DV.2.84  
 Gambogi, W.J.,5DV.3.13  
 Gan, J.-Y.,2CV.2.28  
 Gandhi, O.,6BV.2.26  
 Gandía, J.J.,2AV.3.42, 2CV.2.11  
 Gao, Y.,6BV.3.51  
 García, C.,6BV.3.54, 6BV.3.53  
 García, M.,6BV.2.45, 6EO.2.3, 6BV.3.94  
 Garcia Alvarado, R.,6BV.3.54, 6BV.3.53  
 Garcia Goma, E.,5CO.7.1, 6DO.6.6  
 García Gutiérrez, L.A.,6BV.2.15  
 García-Pérez, F.,2CV.2.11  
 Garg, V.,1CV.3.39, 1CV.3.21  
 Garliska, M.,7EO.3.4  
 Garnett, E.C.,1CV.3.29, 1AO.1.2, 1CV.3.24, 1AP.1.1, 1CV.3.7  
 Garreau-Iles, L.,5DV.3.13, 6BV.2.23  
 Gaspari, F.,3DV.2.92  
 Gast, J.,3BO.12.1

- Gaston, J.P.,3CO.3.4  
 Gaudig, M.,2CV.2.27, 2AV.2.46, 2AV.2.18  
 Gauduchon, M.-V.,7DO.8.6  
 Gaulocher, S.,2AV.1.24  
 Gaume, J.,6DO.11.5, 2DO.1.5, 1CV.3.56  
 Gawlik, A.,2CV.2.13, 2CO.12.3  
 Gay, X.,2CV.2.79  
 Gburek, B.,3BO.12.4  
 Ge, H.,2AV.3.19  
 Geerligs, B.G.,3DV.2.69, 2DO.3.2, 2AO.4.6, 3DO.7.3, 3DV.2.70  
 Geffroy, B.,3DV.2.85, 3CO.3.4  
 Gehlhaar, R.,3DV.2.105, 3DV.2.90  
 Geipel, T.,1CV.3.91  
 Geirinhas Ramos, H.,6BO.7.6  
 Geisemeyer, I.,2CV.2.43  
 Geissbühler, J.,2AO.5.2, 2AV.3.22, 2DO.1.1, 2DO.1.4, 2DO.2.4, 3DO.7.5, 5DV.3.5  
 Geißler, S.,2CO.9.6  
 Geisz, J.F.,1CV.3.93  
 Gemmel, C.,2BO.3.5  
 Gensowski, K.,2AV.2.26  
 Genzel, C.,3AO.9.3, 3AO.9.1  
 Georghiou, G.E.,6BV.2.13, 6DP.2.3, 5DV.3.39, 7DV.1.32, 5BV.4.61, 4CV.4.30  
 Gérard, F.,6BV.3.36  
 Gerardi, C.,2DO.1.2, 2CV.2.72  
 Gerbaud, M.,7EO.3.4  
 Gerber, A.,5CO.6.5  
 Gerdes, H.,3DV.2.5  
 Gerhard, A.,4DO.4.4  
 Gerlach, A.,7DV.1.1, 7DO.9.1  
 Gerritsma, M.,7DO.9.6  
 Gerstenberg, L.,5BV.4.30  
 Gevorgyan, S.A.,7DV.1.30  
 Geyer, B.,5BO.5.2  
 Gfeller, D.,6CO.15.6  
 Ghali, H.,6BV.1.41  
 Ghannam, M.Y.,2AV.3.28  
 Ghennioui, A.,5BV.4.26  
 Ghita, R.V.,1CV.3.57  
 Ghorbani, E.,3CV.1.38, 3DV.2.9  
 Ghorbani, N.,7DO.8.1  
 Ghosh, B.K.,1CV.3.54  
 Ghosh, K.,6BV.2.41  
 Ghosh, S.,5DV.3.36  
 Ghotge, R.,6DO.10.4  
 Ghozati, S.B.,4CV.4.29  
 Ghriach, O.,7DV.1.38  
 Gialanella, L.,2CV.2.56  
 Giesbrecht, N.,3CO.3.5  
 Gilioli, V.,4CV.4.24  
 Gilligan, S.,1CV.3.73  
 Giraldo, S.,3DV.2.7, 3DV.2.17, 3BO.11.1, 3AO.9.5  
 Gisler, M.,1CV.3.78  
 Gissel, R.,5EO.1.6  
 Gläser, M.,2CV.2.86, 2CV.2.85, 2AV.1.35  
 Glatthaar, J.,5EO.1.6  
 Glatthaar, M.,2CV.2.82, 2AO.6.5, 2CO.10.6  
 Glomm, W.R.,6BV.2.19  
 Glunz, S.W.,3DV.2.80, 2AO.4.3, 2BO.4.2, 2DO.3.1, 2DO.3.3, 2DO.2.1, 2DO.1.3, 2DO.2.5, 1AP.1.3, 2CV.2.36, 2AO.6.5  
 Goær, G.,1CV.3.56  
 Godefroid, B.,3DV.2.89  
 Gogolin, R.,2AO.6.3  
 Gokita, K.,6BV.1.10  
 Gomes, J.,6BV.3.53  
 Gomes de Freitas, L.,5DO.5.2, 6BV.1.8  
 Gomes de Oliveira, M.,1CV.3.62  
 Gomes Relva, S.,6BV.3.10, 6BV.2.40, 7DV.1.46  
 Gomez, E.,5BV.4.21  
 Gomez, R.,6BO.8.6  
 Gómez, T.,7DV.1.21  
 Gómez Riva, J.,1AO.1.2  
 Gómez-Mancebo, M.B.,2CV.2.11  
 Goncalves, A.-M.,3DV.2.85  
 Goncalves, J.,6BV.3.49  
 Gonçalves, M.,6BV.3.53  
 Gong, L.,2CV.2.73  
 Gonzalez, M.,2BO.3.4  
 González, J.P.,2CV.2.11  
 González, M.A.,6CO.15.4  
 González, O.,6BV.3.21  
 Gonzalez-Aparicio, I.,6BV.3.78  
 González-Díaz, B.,3DV.2.71, 6BV.3.21, 3DV.2.56  
 González-Pérez, S.,3DV.2.71, 3DV.2.56, 6BV.3.21  
 Goodnick, S.,2DO.1.6  
 Gordillo, G.,3CV.1.1, 3DV.2.31  
 Gordon, I.,2CO.12.4, 2AV.3.26, 2BO.3.4, 2CO.12.2, 2AV.3.14, 7DV.1.30  
 Gorter, H.,3CO.4.5  
 Görtzen, R.,2CV.2.79  
 Goss, J.,3CV.1.21  
 Gotoh, K.,2AV.3.11  
 Gottschalg, R.,3AO.8.6, 7DV.1.48, 5BO.6.6, 5DV.3.21  
 Gottschalk, L.,5BV.4.10  
 Gou, X.,2CO.9.2  
 Govaerts, J.,6BV.3.49, 5BV.4.45, 5BO.5.2, 2AO.5.1, 1CO.2.4, 5CO.6.1  
 Goverde, H.,2AO.5.1, 5BV.4.9, 6BV.3.49, 5BV.4.45  
 Gowda, R.G.,5BV.4.27  
 Gracia Amillo, A.M.,6DO.6.1, 6BV.3.4, 3BO.12.3  
 Graebing, D.,5BV.4.11  
 Grancini, G.,3DV.2.100  
 Grand, P.P.,2AV.2.37  
 Grandidier, J.,4CV.4.27  
 Grandjean, B.,6BV.3.52  
 Grassi Cardoso, L.S.,1CV.3.95  
 Green, M.A.,3BO.11.2, 4CV.4.2, 1CV.3.44, 3CO.4.1, 3CP.1.4, 2CV.2.46, 3DV.2.66  
 Greenhill, D.,5DV.3.9  
 Gregory, A.,7DO.8.6  
 Greiner, D.,3AO.9.3, 3AO.9.5, 3DV.2.20  
 Gremenok, V.F.,3DV.2.22, 3CV.1.50  
 Grenet, L.,3AO.7.3  
 Greulich, J.M.,2CV.2.63, 2CV.2.43, 2AO.5.4, 2CV.2.41, 2CO.11.1, 2CV.2.33, 2CV.2.65, 2CO.10.4  
 Greutmann, R.,2CO.9.3  
 Grill, I.,3CO.3.5  
 Grimm, M.,2BO.3.4  
 Gritzman, A.,6BV.2.47  
 Grobon, A.,5DV.3.37  
 Groen, P.,3CO.4.5  
 Gross, H.,5DV.3.81  
 Gross, W.,2AV.1.6  
 Grossberg, M.,3CV.1.48, 7DV.1.30  
 Großer, S.,5BV.4.71, 2CO.11.2  
 Grosset-Bourbange, D.,5EO.1.5  
 Grübel, B.,2CV.2.82  
 Grumbach, A.,1CO.1.3  
 Grunow, P.,5DV.3.1  
 Grünzweig, A.,1AO.2.3  
 Gu, H.,3CV.1.8, 3CV.1.30  
 Gu, T.,4DO.4.1  
 Gu, W.,2CV.2.84  
 Gu, X.,5BO.5.4  
 Guada, M.,6CO.15.4  
 Guc, M.S.,3CV.1.41  
 Guelbenzu Michelena, E.,6CO.15.3  
 Guercio, M.,2DO.1.2

Guerrero-Lemus, R.,3DV.2.71,  
3DV.2.56, 6BV.3.21  
Gueymard, C.A.,5BV.4.14  
Guidi, V.,4CV.4.17  
Guido, L.J.,1CV.3.5  
Guiheneuf, V.,2AV.2.49  
Guillén, C.,3CV.1.36  
Guillerez, S.,1CV.3.56  
Guillevin, N.,2BP.1.2, 5BV.4.50  
Guina, M.,4CV.4.12  
Gulagi, A.,7DO.8.1  
Güler, O.,6BV.2.50  
Guo, L.,3CV.1.43, 3CV.1.34  
Guo, Q.,2AV.2.42  
Guo, T.,3CV.1.35  
Guo, T.,1CV.3.18  
Gupta, N.,1CV.3.20  
Gupta, R.,3AO.8.6, 5CO.8.6,  
5DV.3.20  
Gupta, S.,6BV.2.42  
Gurieva, G.,3CV.1.41  
Gürlek, A.,1CV.3.42  
Gusak, V.,3CP.1.2  
Gust, E.,2BO.3.6  
Gutjahr, A.,3DO.7.3  
Gutscher, S.,2CO.11.3, 2CO.9.5  
Gutschner, M.,7EO.3.4  
Gwak, J.,3CV.1.28, 3CV.1.56,  
3CV.1.31, 3CV.1.42

**H**

Ha, J.,5BV.4.79  
Ha Duy, L.,6BV.2.27  
Haass, S.,3BO.11.6  
Habibi, M.,3DV.2.108  
Habte, A.,6BV.3.11  
Habyarimana, F.,6BV.1.19  
Hacke, P.,5BO.5.1, 5CO.8.5,  
5CO.6.2, 5BO.5.3  
Hadibrata, W.,1CV.3.42  
Hadipour, A.,3DV.2.82  
Hadjipanayi, M.,7DV.1.32

Haedrich, I.,1CO.1.5  
Haffner, F.,6CO.13.5  
Häfliger, P.,2AO.5.2  
Hage, F.,2CO.9.3  
Hagendorf, C.,3DV.2.21,  
2CO.11.2, 5DV.3.27, 1CO.1.6,  
5BV.4.52  
Hahn, G.,2AV.1.39, 2CV.2.31,  
2AV.2.7, 2AV.1.37, 2AV.1.40,  
2BO.2.2  
Haidar, M.,7DO.9.4  
Hain, A.,2AV.2.5, 2AO.6.5  
Hajjaj, C.,5BV.4.26  
Hajji, A.,7DV.1.16, 6BV.3.83  
Hajjiah, A.T.,1CV.3.5, 2AV.2.13,  
2CV.2.1  
Halabi, L.M.,6BV.1.13  
Halambalakis, G.,7DV.1.30  
Hall, J.,3CV.1.12  
Hallam, B.,2BO.2.3, 2BO.2.6,  
2AV.1.36  
Halm, A.,5DV.3.16, 1CV.3.35,  
5DV.3.9, 2AO.5.6, 1CV.3.90,  
2CV.2.44, 2CV.2.91  
Halvorsen, T.,5EO.1.5,  
5DV.3.71, 2AV.1.18  
Halwachs, M.,6BV.1.35,  
5DV.3.57, 6BV.2.21, 5BO.6.3  
Hamada, K.,3DV.2.64  
Hamdan, O.T.,2CV.2.1  
Hameiri, Z.,2AV.1.38, 2AO.5.3,  
2CO.10.3, 2AO.4.2  
Hamza, H.,5EO.1.5, 2AV.1.25  
Han, A.,5DV.3.65  
Han, C.-H.,3DV.2.109  
Han, S.M.,2BO.3.3  
Hanan, N.,4CV.4.20  
Handa, A.,3CP.1.1  
Handloser, M.,3CO.3.5  
Hanifi, H.,5BV.4.49  
Hanisch, J.,3DV.2.74  
Hanke, B.,6CO.14.4, 6EO.2.6

Hansen, C.W.,6BV.2.35,  
6CO.13.3  
Hansen, O.,5BV.4.78, 2CV.2.27  
Hao, X.,3BO.11.2, 1CV.3.44,  
5DV.3.78  
Hara, Y.,5CO.8.4  
Harder, K.,7DO.8.6  
Hardikar, K.,5CO.8.1  
Harel, S.,3BO.11.4  
Häring, A.,5DO.5.3  
Hariskos, D.,3BO.10.1, 3BO.9.2  
Harney, R.,2CV.2.91  
Harr, M.,3CV.1.52  
Harrison, S.,2DO.1.5  
Harrouni, K.,6BV.2.52  
Hartiti, B.,3CV.1.29  
Hartlin, B.,2CV.2.72  
Hartmann, C.,3BO.11.5  
Hartmann, N.F.,3CO.3.5  
Hartmann, P.,2AV.2.5  
Hartnauer, S.,3CP.1.2  
Hartschuh, A.,3CO.3.5  
Harwood, T.,7DO.8.6  
Hasan, M.R.,3DV.2.40  
Haschke, J.,3DO.7.1, 2CV.2.24  
Hashimoto, J.,5DV.3.24  
Hashmi, S.G.,3DV.2.37  
Haslinger, M.,2AV.2.13,  
2CO.12.4  
Hassan Daher, D.,6BO.8.5  
Hast, J.,7DV.1.30, 3BO.12.5  
Hatano, M.,6BV.1.10  
Hauch, J.,5DO.5.3, 6BV.1.28,  
6BO.8.2, 6BV.1.44, 5CO.8.2,  
3AO.8.2  
Haug, F.-J.,2AV.3.4, 2BO.4.1,  
2BO.4.3  
Haug, H.,1CV.3.85  
Haunschild, J.,2CV.2.41  
Hauser, H.,2DO.3.1  
Haverkamp, E.,5BO.6.3

Haverkamp, H.,2AO.6.5  
Haverkort, J.E.M.,1AO.1.2,  
1AO.3.3  
Havu, V.,3BO.10.1  
Hawelka, D.,3DV.2.6  
Hayase, S.,3DV.2.104, 3DV.2.64  
Hayashi, T.,5BV.4.13  
He, Y.,5DV.3.38  
He, Z.,3DV.2.97  
Heath, G.,5EO.1.2, 5DP.1.4  
Hegedus, S.,4DO.4.1  
Heidmann, B.,3CV.1.48  
Heier, J.,3DV.2.113  
Heikkinen, J.,2CO.12.2  
Heimfarth, J.P.,3CV.1.52  
Heinbach, K.,7DV.1.9  
Heinemann, M.D.,3DV.2.12,  
3AO.9.3  
Heinz, F.,2BO.3.6  
Heinzelmann, A.,5DO.5.6  
Heirman, S.G.M.,2CV.2.49  
Heitmann, J.,5CO.6.4, 5BV.4.71  
Held, P.,5DO.5.6  
Hellström, S.,5DV.3.14, 5BO.5.2  
Helmers, H.,1AO.1.3  
Hempel, W.,3BO.9.2  
Hendrichs, M.-S.,2AV.3.3  
Hennicke, J.,2AV.1.19  
Hensen, J.,2BO.3.5  
Hentsche, M.,2AV.1.37  
Hentschel, R.,6EO.2.6  
Hepp, J.,3AO.8.2  
Herasimenka, S.Y.,3CV.1.58  
Herbort, V.,6BO.7.1  
Herguth, A.,2AV.1.39, 2AV.1.37,  
2AV.1.43  
Hermans, J.,2DO.1.4  
Hermle, M.,2CV.2.36, 2DO.2.1,  
2DO.2.5, 1AP.1.3, 2DO.3.1,  
2AV.3.8, 2BO.4.2, 2DO.1.3,  
2DO.3.3, 2CO.11.3



- Hernández, J.,6BV.3.7, 6BV.3.6  
Hernández, J.L.,2BP.1.1  
Hernández-Martínez, A.,3BO.11.1  
Hernandez-Rodriguez, C.,6BV.3.21, 3DV.2.71  
Herrero, J.,3CV.1.36, 7EO.3.4  
Herrero Alonso, R.,6CO.13.2, 6BV.1.5, 6BV.3.64  
Herrmann, W.,5DP.1.1, 5CO.7.2, 5CO.5.2  
Herteleer, B.,7DO.9.2, 6CO.16.5  
Herz, M.,6CO.14.3  
Herzog, E.,5CO.6.4  
Hesham, M.,6BV.1.41  
Heslinga, D.R.,5BV.4.25  
Heta, Y.,5DV.3.13  
Hettinger, A.-L.,5DV.3.77  
Heuschkel, M.,5DV.3.81  
Higa, M.,5BO.6.5  
Higuchi, H.,3AO.7.6  
Hildreth, O.,2AV.3.32  
Hill, M.,6BV.3.88  
Hinderer, M.,2AV.1.10  
Hino, M.,3BO.10.3  
Hinz, C.,5BV.4.59  
Hiralal, P.,3DV.2.55  
Hirao, K.,1CV.3.88  
Hirayama, T.,5DV.3.23  
Hirofani, D.,3DV.2.64  
Hirsch, B.,7DV.1.9  
Hirsch, D.,3CV.1.13, 3CV.1.17, 3CV.1.16  
Hirsch, J.,2AV.2.18, 2AV.2.46  
Hirschl, C.,6BV.1.34, 5BV.4.73, 5BV.4.72, 6BO.8.3, 6BV.2.21, 6BV.1.35, 5DV.3.17, 5DV.3.18  
Hischier, I.,6DO.10.6  
Hishikawa, Y.,5BO.6.5  
Hiyama, H.,2AV.2.30  
Ho, W.-J.,2CV.2.61, 1CV.3.61  
Ho-Baillie, A.W.Y.,3CO.4.1, 3CP.1.4, 3DV.2.66  
Hoellen, D.,5DV.3.72  
Hoex, B.,2BO.4.4, 2AO.4.5  
Hofbeck, B.,3AO.8.2  
Hofer, J.,6DO.10.6  
Höffler, H.,2CV.2.41  
Hoffmann, M.-C.,7DV.1.4  
Hoffmann, S.,2AO.6.5, 1CV.3.91, 5DO.5.5  
Hoffmann, V.,2AV.2.9  
Hofmann, A.,2CO.9.6  
Hofmann, M.,6DO.6.2  
Höhn, O.,6BV.3.70  
Höhne, U.,2DO.2.2  
Hoislbauer, C.,2AV.1.6  
Holman, Z.C.,3DO.7.6, 2AV.3.27, 2BO.4.6, 2DO.1.6  
Holovsky, J.,1CV.3.26  
Hölscher, T.,3CV.1.61  
Holze, C.,5CO.5.2  
Holzmann, D.,1CV.3.71  
Hong, S.,3DV.2.109  
Hong, T.,6BV.3.33  
Honold, T.,2CO.9.3  
Honsberg, C.B.,2CV.2.34  
Hoogendijk, K.,6BV.3.5  
Hoogland, S.,3CO.3.2  
Horng, R.-H.,4CV.4.1  
Hörnlein, S.,2CO.9.6  
Horowitz, K.,1CV.3.93  
Hörteis, M.,2AV.2.10  
Horzel, J.,2BO.4.1, 2AV.3.4, 2DO.1.4, 5DV.3.5, 2AV.3.22  
Hossain, M.I.,1CV.3.65  
Hou, S.,3BO.12.2  
Houben, F.,6BV.1.31  
Houchati, M.,5CO.5.5  
Hovhannisyann, A.,2AV.1.44  
Hrzina, P.,5BV.4.3  
Hsieh, C.F.,5BV.4.67  
Hsieh, H.-H.,5DV.3.10  
Hsieh, T.P.,3CV.1.3  
Hsu, C.-P.,3CO.4.4  
Hsu, S.-T.,5BV.4.69, 3BO.12.6, 5BV.4.1  
Hsu, W.C.,2AV.1.17, 2BO.1.4  
Hu, B.,2CO.9.2  
Hu, C.-S.,2AO.6.2  
Hu, F.,2CO.10.1  
Hu, H.,5DV.3.13  
Hu, J.,4DO.4.1  
Hu, W.,2AV.2.40  
Hua, C.-C.,1AO.2.4  
Huang, C.,5BV.4.51  
Huang, C.C.,2CV.2.40  
Huang, C.-J.,6BV.3.55  
Huang, H.,2CV.2.73, 2AV.3.34  
Huang, H.,5BV.4.43  
Huang, J.-F.,2AV.2.24  
Huang, J.,3BO.11.2  
Huang, J.,2CO.9.2  
Huang, L.-M.,6BV.3.55  
Huang, P.-S.,2AV.1.28  
Huang, Q.,2CO.9.2  
Huang, W.-H.,5DV.3.68  
Huang, Y.-H.,2AV.2.3  
Hubbard, S.,4CV.4.6  
Huber, F.,3CV.1.51  
Huffaker, D.,4CV.4.6  
Hugo, J.,6BV.3.15  
Huh, D.,3DV.2.77, 1CV.3.64, 3DV.2.99  
Huld, T.,6BV.3.78, 3BO.12.3, 6DO.6.1, 6BV.3.4, 5CO.7.4  
Hülsmann, P.,1CV.3.80  
Hünewaldt, E.,7DO.8.6  
Hung, J.Y.,2AO.6.2  
Hunger, R.,3CP.1.2  
Hünnekes, C.,7EO.3.4  
Hüsser, P.,7EO.3.1  
Hüttl, B.,5BV.4.10  
Huxley, Q.,6BV.3.19  
Huyeng, J.D.,2CV.2.70  
Huynh, T.C.T.,2AV.3.37  
Hwang, M.-I.,2AV.2.1, 6BV.1.33  
Hwang, S.-T.,4CV.4.10  
Hylsky, J.,3DV.2.45, 5DV.3.22, 6BV.1.46  
Hylton, N.P.,4CV.4.11  
Hyvl, M.,2BO.4.3  
I  
Iandolo, B.,5BV.4.78, 2CV.2.27  
Ibañez, M.,4CV.4.22  
Id Omar, N.-E.,5BV.4.83  
Ihlal, A.,3CV.1.47  
Iioka, M.,3AO.7.6  
Ijdiyaou, Y.,1CV.3.14  
Ikken, B.,7DV.1.23, 5BV.4.26, 5DV.3.31, 6BV.2.2, 1CV.3.72, 5BV.4.58, 3DV.2.79, 6BO.7.4, 2CV.2.12  
Ikki, O.,7DV.1.44  
Illa, J.,4CV.4.22  
Illiberi, A.,3DV.2.82  
Ilse, K.,1CO.1.6, 5DV.3.27  
Imtiaz, S.N.,6BV.2.20  
Ingenhoven, P.,6BO.7.2  
Ingenito, A.,2AV.3.4, 2BO.4.1  
Inglis, C.,7EO.3.4  
Inui, Y.,5BV.4.13  
Ioannidis, Z.,6BV.3.50  
Ioannidou, M.,7DV.1.32  
Ionescu, P.,1CV.3.57  
Irie, T.,2BP.1.1  
Irvine, S.J.C.,1CV.3.42, 3CV.1.12  
Isabella, O.,6BV.2.30, 2AV.3.19, 2DO.2.6, 2CO.12.1, 1AO.3.6, 6BV.3.51, 1CV.3.16, 2DO.3.2, 5BV.4.22, 3DV.2.18, 2CV.2.14, 2DO.2.3, 3AO.7.3, 6CO.14.5

Ishibashi, H.,2BP.1.1  
 Ishihara, Y.,6BV.1.45  
 Ishii, H.,6BV.3.48  
 Ishii, T.,5BV.4.76, 5CO.6.3  
 Ishikawa, Y.,5BV.4.82  
 Ishizuka, S.,3BO.9.3, 3BO.10.5  
 Ishmuratov, P.,2AV.3.12  
 Islam, M.A.,5BV.4.82, 3DV.2.13,  
 1CV.3.65, 3CV.1.53  
 Isoaho, R.,4CV.4.12  
 Ito, A.,2CV.2.25  
 Ivanov, A.,2AV.3.12  
 Ivanov, G.,2AV.3.12, 2AV.3.39  
 Iwata, N.,2CO.10.5  
 Izquierdo-Roca, V.,3DV.2.7,  
 3BO.11.1  
 Izzi, M.,2AV.3.30, 2AV.3.29,  
 2CV.2.72, 2AV.3.18

**J**

Jackson, P.,3BO.10.1, 3AO.7.5  
 Jadhav, A.,2BO.3.1  
 Jaeckel, B.,5BO.6.6, 5CO.5.6  
 Jafari, S.,2CV.2.86, 2AV.1.35  
 Jäger, K.,3DO.7.2  
 Jagomägi, A.,6BV.3.46  
 Jahn, U.,6CO.14.3  
 Jain, A.,3CO.3.2  
 Jakobi, M.,6BV.2.48  
 Jambaldinni, S.,2AV.2.6,  
 2CO.12.4, 2AV.2.13, 2AV.3.26,  
 2BO.3.4  
 Jamodkar, A.,3DO.7.3  
 Jander, S.,3CP.1.2  
 Jandová, K.,5DV.3.22  
 Jang, E.,2CV.2.10  
 Jang, J.,3DV.2.101  
 Jankovec, M.,5DV.3.56  
 Jannat, A.,1CV.3.50  
 Jansen, M.J.,5BV.4.50,  
 6DO.12.3  
 Janssen, G.J.M.,5BV.4.31,  
 2DO.3.2, 2AO.4.6  
 Janssen, R.H.C.,5DV.3.12  
 Jany, C.,4DO.4.3  
 Janz, S.,2BO.3.6, 2CO.10.4  
 Jaramillo, A.,6BV.3.6  
 Jared, B.H.,4DO.4.1  
 Jarmar, T.,3AO.9.4, 3CP.1.2,  
 3BO.10.4  
 Jarzembowski, E.,2CO.9.6  
 Jaysankar, M.,3DV.2.105  
 Jeangros, Q.,2DO.2.4, 2AV.3.4,  
 2BO.4.3  
 Jeffries, A.M.,2AV.3.32  
 Jehle, B.,5EO.1.6  
 Jeng, L.F.,5BV.4.79  
 Jensen, M.A.,2CV.2.30  
 Jeong, D.J.W.,2CO.9.6  
 Jeong, J.-H.,3CV.1.19  
 Jeong, J.-H.,3DV.2.119,  
 3DV.2.115  
 Jeong, K.,6BV.3.33  
 Jeong, K.-U.,3DV.2.119  
 Ji, H.Y.,2CV.2.3  
 Ji, J.,2AV.1.36  
 Ji, L.,4CV.4.13  
 Jia, G.,1CO.2.1, 2CV.2.13  
 Jia, R.,2AV.3.31  
 Jiang, J.,2CV.2.46  
 Jiang, J.,5DV.3.38  
 Jiang, J.-S.,1AO.2.4  
 Jiang, M.,4CV.4.4  
 Jie, Z.,5BV.4.23  
 Jiménez, J.,6CO.15.4  
 Jiménez Vargas, J.F.,6BV.2.15  
 Jin, C.,2CV.2.6  
 Jin, H.,1CO.1.5  
 Jin, S.,2CV.2.73  
 Jin, Z.,2AV.3.31  
 Jo, J.H.,3CV.1.31

Jo, J.,2CV.2.9  
 Jobin, M.,6BV.3.52  
 Joel, J.,3BO.10.2  
 John, J.J.,5CO.5.4  
 John, J.,2AV.2.6, 2CO.12.4,  
 2AV.2.13  
 Johnson, A.D.,4CV.4.5  
 Johnson, E.V.,2AV.2.33  
 Johnson, S.W.,5CO.6.5,  
 4CV.4.6, 3BO.11.2  
 Jones, T.W.,3DV.2.117  
 Jong, J.,5CO.5.1  
 Jooss, W.,2CO.9.2  
 Joshi, S.S.,2BO.3.1  
 Joubert, J.-M.,2AV.2.32  
 Joyce, A.,7DV.1.30  
 Ju, D.,1CV.3.87  
 Juang, B.-C.,4CV.4.6  
 Jubault, M.,3AO.9.6  
 Juhl, M.K.,2AO.5.3, 5BV.4.65,  
 2AO.4.2  
 Jun, H.Y.,3CV.1.9  
 Jung, M.,6BV.3.100  
 Jung, S.H.,4CV.4.9  
 Jung, S.,3DV.2.5  
 Junghänel, M.,2CO.9.6  
 Juskenas, R.,3CV.1.50

**K**

Kaden, T.,2BO.1.2, 2AV.1.19,  
 2AV.1.31, 5DV.3.71, 2AV.1.29  
 Kadlec, M.,3DV.2.45  
 Kähler, J.-D.,2DO.2.2  
 Kahn, A.,7DV.1.31  
 Kaizu, T.,1CV.3.88, 1CV.3.89,  
 1AO.3.2  
 Kaizuka, I.,7EO.3.1, 7DV.1.44  
 Kajari-Schröder, S.,2BO.3.5,  
 2AV.2.2, 1AP.1.2  
 Kakavelakis, G.,3DV.2.52  
 Kale, P.G.,1CV.3.41  
 Kalyuzhnyy, N.A.,4CV.4.16,  
 4CV.4.25  
 Kamarauskas, M.,2AV.2.36  
 Kamaruzzaman, I.,3DV.2.13  
 Kamdje, E.,5EO.1.6  
 Kamikawa-Shimizu, Y.,3BO.10.5  
 Kamino, B.,3CO.4.6, 3DO.7.5  
 Kaminski-Cachopo, A.,2AV.1.34  
 Kamioka, T.,2CO.10.5, 2CV.2.52  
 Kamiya, I.,2CV.2.52  
 Kamp, M.,2AV.2.26  
 Kane, M.M.,2BO.3.1  
 Kanematsu, M.,2BP.1.1  
 Kang, B.,6BV.1.40  
 Kang, G.-H.,5DV.3.69  
 Kang, H.K.,4CV.4.9  
 Kang, M.G.,3DV.2.116  
 Kang, M.-S.,3DV.2.111,  
 3DV.2.112  
 Kang, Y.,2AV.2.51  
 Kao, Y.-C.,4CV.4.1  
 Kapetana, P.,7DV.1.35  
 Kapranov, V.,4CV.4.25  
 Kapsis, K.,6BV.3.50  
 Kapur, J.,5BO.5.1  
 Kar, J.P.,1CV.3.41  
 Karabanov, A.,6BV.3.80,  
 2AV.1.14  
 Karabanov, S.M.,6BV.3.80,  
 2AV.1.14  
 Karaösz, K.,7EO.3.4  
 Karavas, C.-S.,6BV.1.23,  
 6BV.3.39  
 Karaveli, A.B.,6BV.3.24,  
 6BV.1.17  
 Karlina, L.B.,1CV.3.11  
 Karpowich, L.,2AV.2.10  
 Kartopu, G.,1CV.3.42  
 Karunadasa, H.,3CO.3.3  
 Karwal, S.,2DO.3.4  
 Kasaeian, A.,1CV.3.67

Kästner, J.,6CO.14.4  
 Kato, T.,3CP.1.1  
 Katsumata, Y.,1AO.1.1  
 Kauert, M.,2CO.9.6  
 Kaufmann, C.A.,3DV.2.12,  
 3CV.1.59, 3AO.9.5, 3AO.9.3  
 Kaufmann, K.,3DV.2.21  
 Kaule, F.,2BO.3.2, 2AO.5.5,  
 2AV.2.46, 2AV.1.22  
 Kausika, B.B.,6BO.7.5, 6EO.2.5  
 Kawabata, S.,5DV.3.23  
 Kawasaki, H.,2BP.1.1  
 Kawatsu, T.,2AV.1.27  
 Kawayama, I.,2CV.2.25  
 Kazantsev, D.Y.,1CV.3.11  
 Kazemi, I.,5DV.3.79  
 Kebe, C.M.F.,7DV.1.41  
 Keding, R.,2CV.2.70  
 Keebler, P.,5DO.5.4  
 Keeler, G.,4DO.4.1  
 Keevers, M.J.,2CV.2.46  
 Kegelmann, L.,3DV.2.107,  
 3DV.2.65  
 Keiner, A.,7DV.1.48  
 Keiner, D.,6BV.3.82  
 Kekelidze, G.,2AV.3.12  
 Keller, J.,3BO.10.4, 3BO.10.2  
 Keller, M.,6BV.1.14  
 Keller, N.,1CV.3.69, 5BV.4.28  
 Kelly, R.,7DO.8.6  
 Kempe, M.,5BO.5.1  
 Keohane, S.,2BO.1.6  
 Kepart, J.,3CP.1.3  
 Kerbache, T.,6BV.1.30  
 Kerkar, F.,2AV.1.20  
 Kersten, F.,2CO.9.6, 5CO.6.4  
 Kessels, W.M.M.,2DO.3.2,  
 2DO.3.4, 2AV.3.7, 1AO.3.3,  
 2CO.11.6, 2AV.3.2, 3CO.3.1  
 Kessler, F.,3BO.10.1

Kester, J.C.P.,6DO.12.3,  
 7DV.1.31  
 Khabbazi, A.,6BV.2.52  
 Khadka, D.B.,3DV.2.61  
 Khaldoun, A.,1CV.3.60  
 Khalil, A.S.G.,6BV.1.51  
 Khan, M.Z.H.,3DV.2.40  
 Khan, M.Z.,5DV.3.27  
 Khatibi, A.,5DV.3.51, 5DV.3.50  
 Khelifati, N.,2AV.1.42  
 Khenfouch, M.,1CV.3.63  
 Kho, T.,2BO.4.5  
 Khokhlov, E.A.,5DV.3.32,  
 3CV.1.58  
 Khoo, K.,2BO.4.4  
 Khoo, Y. S.,5CO.6.2  
 Khoram, P.,1CV.3.24  
 Khraisheh, M.,7DV.1.10  
 Khvostikov, V.P.,4CV.4.25  
 Kida, Y.,2CV.2.25, 2AV.2.16  
 Kiefer, F.,2AV.2.2  
 Kilper, T.,6BV.3.96  
 Kim, B.,5BV.4.35  
 Kim, C.Z.,4CV.4.9  
 Kim, C.-H.,5DV.3.6, 5BV.4.36  
 Kim, D.Y.,2CO.12.1  
 Kim, D.-H.,3DV.2.111, 3DV.2.112  
 Kim, D.S.,3DV.2.99, 3DV.2.77  
 Kim, D.S.,2AV.2.51  
 Kim, D.-C.,6BV.1.40  
 Kim, D.,2AV.2.51  
 Kim, D.-S.,5DV.3.6, 5BV.4.36  
 Kim, G.,2CV.2.9, 2CO.12.6  
 Kim, H.Y.,1CV.3.75  
 Kim, H.-R.,3DV.2.112  
 Kim, I.-A.,5DV.3.6, 5BV.4.36  
 Kim, J.H.,5BO.5.4  
 Kim, J.,4CV.4.10  
 Kim, J.H.,6BV.3.58  
 Kim, J.,2CV.2.5

Kim, J.T.,6BV.3.58  
 Kim, K.,3AO.7.2  
 Kim, K.,4CV.4.9  
 Kim, K.,2CV.2.3  
 Kim, K.,3CV.1.31, 3CV.1.56  
 Kim, K.,3DV.2.77  
 Kim, K.,6BV.1.40  
 Kim, K.,2AV.1.38  
 Kim, K.N.,2AV.2.51  
 Kim, M.,3DV.2.99  
 Kim, M.-S.,5BV.4.35  
 Kim, M.,6BV.1.33  
 Kim, M.,2AV.1.36, 2BO.2.6  
 Kim, M.J.,2CV.2.3  
 Kim, S.,2AV.2.51  
 Kim, S.,6BV.2.49  
 Kim, S.-W.,3DV.2.115  
 Kim, S.,3AO.7.2  
 Kim, S.-E.,3DV.2.111, 3DV.2.112  
 Kim, S.Y.,3CV.1.19  
 Kim, T.,2AV.2.1  
 Kim, W.-M.,3CV.1.19  
 Kim, W.K.,5BV.4.35  
 Kim, Y.-D.,3DV.2.77, 1CV.3.64  
 Kim, Y.-J.,2BO.3.3  
 Kim, Y.,4CV.4.9  
 Kimovec, R.,1AO.1.3  
 Kimura, K.,4DO.4.6  
 Kin, S.,7DV.1.31  
 Kinoshita, K.,2AV.1.27,  
 2AV.1.41, 2AV.1.13  
 Kirchner, G.,3CO.4.5  
 Kirou, H.,3CV.1.47  
 Kiss, J.,3CV.1.38  
 Kita, T.,1AO.3.2, 1CV.3.88,  
 1CV.3.89  
 Klaus, M.,3AO.9.3, 3AO.9.1  
 Klawitter, M.,2AV.2.26  
 Klein, P.,6CO.16.1  
 Kleiss, G.,6BV.1.29

Klement, P.,6CO.14.4  
 Klenk, M.,5BV.4.28, 1CV.3.69  
 Klenk, R.,3CV.1.48, 3CV.1.59  
 Klenke, C.,2CO.9.6  
 Klerks, S.,6DO.12.2  
 Klette, H.,2AV.1.5  
 Klöter, B.,5CO.6.4  
 Klumpner, C.,6CO.14.6  
 Kluska, S.,2DO.3.3, 2CV.2.82  
 Knazkins, V.,6EO.2.4  
 Knecht, R.,6BV.1.15, 6CO.15.1  
 Knight, M.W.,1CV.3.23  
 Knöbl, K.,6BV.3.57  
 Knörich Zuffo, M.,6CO.13.2,  
 6BV.1.5, 6BV.3.64  
 Ko, H.,1CO.2.3  
 Ko, K.-W.,3DV.2.109  
 Kobayashi, H.,2AV.1.13  
 Kobayashi, Y.,5BV.4.70  
 Kobor, D.,2AV.2.32  
 Koç, M.,3DV.2.73  
 Koch, S.,5BV.4.59, 6BV.1.36  
 Kodalle, T.,3AO.9.1  
 Koduvelikulathu, L.J.,5DV.3.9,  
 2AO.5.6  
 Koelblin, P.,5BV.4.77  
 Koepge, R.,2AV.1.22  
 Kogler, W.,3CV.1.51  
 Kohl, K.,7DO.8.6  
 Köhl, M.,5BO.5.6, 5BV.4.16  
 Köhler, B.,2AV.2.46, 2AV.2.18  
 Köhler, T.,3CV.1.59, 3CV.1.48  
 Kohno, T.,6BV.1.10, 5BV.4.68  
 Koida, T.,3BO.9.3, 3AO.7.6  
 Koike, J.,2AV.2.25  
 Koizumi, G.,2BP.1.1  
 Kojima, N.,4CV.4.28  
 Kojima, T.,2AV.1.41, 2AV.1.27,  
 2AV.1.13, 2AV.2.30  
 Kökbudak, G.,2AO.4.3

- Kolbusch, T.,3DV.2.34  
 Koller, M.,6EO.2.4  
 Komarala, V.K.,2AV.3.40  
 Komissarenko, F.,1CV.3.11  
 Komoto, K.,5EO.1.2  
 Komsa, H.-P.,3BO.10.1  
 Kong, M.,6BV.3.33  
 Konidakis, I.,3DV.2.52  
 König, M.,2CO.11.3, 1CV.3.71, 2CV.2.81, 1CO.1.3  
 Königstein, C.,7DV.1.24  
 Konishi, K.,2BP.1.1  
 Konishi, T.,2AV.3.23  
 Konovalov, I.,1CV.3.45  
 Köntges, M.,2AV.2.20  
 Koopman, S.,6CO.16.1  
 Koornneef, R.,2CV.2.49  
 Kopecek, R.,5DV.3.8, 2AV.2.5, 2AV.2.12  
 Köppel, G.,2CV.2.54  
 Kopte, T.,3CV.1.17, 3CV.1.16, 3CV.1.13  
 Korba, P.,6EO.2.4  
 Korevaar, M.,6BV.2.11, 5BV.4.22  
 Korovin, A.V.,1CV.3.55  
 Korpitsch, G.,7DV.1.18  
 Korte, L.,3DO.7.2, 2AV.3.3  
 Kost, C.,7DO.8.2  
 Kotipalli, R.,3BO.11.3  
 Kotova, N.,1CV.3.55  
 Kouchkarov, K.M.,1CV.3.68  
 Kouhlane, Y.,2AV.1.42  
 Koushik, D.,3CO.3.1  
 Koyama, K.,2AV.3.10, 2AV.3.37  
 Kozhukhovskaia, S.A.,4CV.4.16  
 Kozina, X.,3BO.11.5  
 Kozyreff, G.,3DV.2.89  
 Kraft, A.,1CV.3.91, 2AV.3.1, 2AO.6.5, 1CV.3.71  
 Kraft, C.,3CV.1.17, 3CV.1.16, 3CV.1.13, 3CV.1.52, 3CV.1.14  
 Kräling, U.,5BV.4.32  
 Kranert, C.,2BO.1.1  
 Kranz, C.,2AV.2.20  
 Kratzert, P.,3CP.1.2  
 Krause, S.,3DV.2.21, 5BV.4.35  
 Krauß, K.,2CO.9.5  
 Krauter, S.,5DV.3.1, 5DV.3.51, 5DV.3.50, 5DO.5.1, 5DV.3.44  
 Krc, J.,3BO.12.1  
 Kreinin, L.,2CV.2.71  
 Krenckel, P.,2BO.1.3, 2DO.3.1  
 Krieg, A.,2CV.2.41  
 Krippner, R.,6DO.10.2  
 Krishnakumar, V.,3CV.1.14, 3DV.2.14, 3CV.1.17, 3CV.1.16, 3CV.1.13, 3DV.2.19, 3CV.1.52  
 Krishnan, M.R.,5BV.4.27  
 Krishnan, S.,4CV.4.18  
 Krishnan Krishnakumary, P.,5BV.4.79  
 Kroely, L.,2CO.10.6  
 Kröger, I.,5BO.6.4, 5BV.4.5, 3DV.2.91, 5BO.6.2, 5BO.6.1  
 Krogh Selj, J.H.,5DV.3.34  
 Kroon, J.M.,7EO.3.5, 7DV.1.30  
 Kroyer, T.,6BV.3.70  
 Krügener, J.,2DO.2.2  
 Krumlacher, W.,1CV.3.51, 5DV.3.16, 5DV.3.18  
 Krustok, J.,3CV.1.48  
 Ku, C.-H.,2AO.6.2  
 Kuan, T.-M.,2CV.2.40  
 Kuang, Y.,3CO.3.1  
 Kubart, T.,3BO.10.2  
 Kubicek, B.,5BV.4.4, 5BV.4.72, 6BV.1.34  
 Kubo, T.,3DV.2.63  
 Kuczynski, M.,2AV.1.6  
 Kudo, Y.,4DO.4.6  
 Kuepers, R.,6BV.1.31  
 Kuhn, P.,6DO.6.5  
 Kuhn, T.E.,6DO.11.1, 6BV.3.70  
 Kühnapfel, S.,2CO.12.5  
 Kühne, M.,5DV.3.11  
 Kühne, T.,3CV.1.38  
 Kühnel, M.,6EO.2.6  
 Kühnhold-Pospischil, S.,2CO.10.4, 2BO.3.6  
 Kühnlein, H.,2CO.9.1, 2CV.2.74, 2AV.2.15  
 Kulagina, M.M.,1CV.3.11  
 Kulkarni, S.V.,2BO.3.1  
 Kumar, A.,7DV.1.5  
 Kumar, A.,2AV.1.32  
 Kumar, A.,6BV.1.12  
 Kumar, M.,6BV.1.12  
 Kumar, M.,5BV.4.55  
 Kumar, M.,2BO.3.1  
 Kumar, P.,2CV.2.55, 2CV.2.64, 2AO.4.4  
 Kumar, R.,1CV.3.85  
 Kumar, R.,6BV.3.17  
 Kumar, S.,1CV.3.39, 1CV.3.21  
 Kunaifi, K.,6BV.3.77  
 Kunert, R.,2AV.1.11  
 Kuntze, T.,3BO.12.4  
 Kunze, T.,3BO.10.1  
 Kuo, C.-W.,2CV.2.40  
 Kuo, C.,2AV.2.27  
 Kuo, P.-T.,3DV.2.50  
 Kuo, S.-Y.,3CV.1.57, 3CV.1.55  
 Kupka, I.,2AV.1.10  
 Kurien, T.,6BV.2.47  
 Kurimoto, Y.,2AV.2.25  
 Kurokawa, Y.,2AV.3.11  
 Kurtz, S.R.,5DP.1.2, 5CO.6.2, 5BO.5.3  
 Kusaki, K.,1CV.3.89, 1AO.3.2  
 Kuske, J.,2AV.3.15  
 Kutscher, J.,7EO.3.4  
 Kutsukake, K.,2AV.1.12  
 Kutter, C.,5DO.5.5  
 Kuypers, A.,7DV.1.31  
 Kuzma-Filipek, I.,2AV.2.6  
 Kvande, R.,7DV.1.30  
 Kwapil, W.,2BP.1.4  
 Kwon, O.,6BV.1.40  
 Kwon, S.-N.,3DV.2.115, 3DV.2.119  
 Kwon, T.,4CV.4.10  
 Kymakis, E.,3DV.2.52  
 Kyriakarakos, G.,6BV.1.23
- L**
- La Ferrara, V.,3DV.2.76  
 Laalioui, S.,3DV.2.79, 3DV.2.58, 2CV.2.12  
 Laarabi, B.,5DV.3.33, 5DV.3.35, 4CV.4.24  
 Lachenal, D.,2DO.2.4  
 Lachowicz, A.,2DO.1.4, 5DV.3.5, 2AV.3.22  
 Lackner, D.,1AP.1.3  
 Ladouy, S.,6BV.2.52  
 Lagerstedt, T.,5DV.3.4  
 Lagumavarapu, R.B.,4CV.4.6  
 Laguna, G.,4CV.4.22  
 Lagunas, A.R.,7DV.1.48  
 Lahlali, S.,1CV.3.9  
 Lai, B.,2CV.2.30  
 Lai, F.-I.,3CV.1.55, 3CV.1.57  
 Lai, K.-C.,2AV.2.19, 2AV.2.44, 2AV.2.34  
 Lai, S.Y.,2AV.1.4  
 Lai, W.,1CV.3.18  
 Lai, Y.,2AV.3.36  
 Laine, H.S.,2CV.2.30  
 Lamb, D.,3CV.1.12  
 Lan, C.Y.,2AV.1.17, 2BO.1.4  
 Lan, C.-W.,2AV.1.17, 2BO.1.4  
 Lan, D.,4CV.4.2  
 Lan, W.C.,2AV.1.17, 2BO.1.4

- Lancellotti, L.,2AV.3.16, 2AV.3.18  
 Landi, G.,2CV.2.56, 2CV.2.7  
 Landry, N.,7DV.1.49  
 Lanterne, A.,2CV.2.76  
 Lantreibecq, A.,2AV.1.15  
 Lantzsck, R.,2BO.3.2, 2CO.9.6  
 Lanzetta, C.,6DP.2.4  
 Lappalainen, K.,6CO.13.6  
 Lapshinsky, V.A.,3DV.2.57  
 Larionova, Y.,2DO.2.2  
 Larsen, J.K.,3BO.10.4  
 Larsson, F.,3AO.9.2  
 Latini, A.,3DV.2.92  
 Lauer mann, I.,3DV.2.20, 7DV.1.30  
 Laughlin, B.J.,2AV.2.42  
 Laurent, J.,2BO.1.1  
 Lausch, D.,2CV.2.27, 5BV.4.52, 2CV.2.86, 2AV.2.18, 2AV.1.35, 2AV.2.46, 2CV.2.85  
 Lauss, G.,5DV.3.45  
 Lavareda, G.,1CV.3.76  
 Lave, M.,6BV.2.35, 6CO.13.3  
 Lavrenko, T.,3AO.8.3  
 Lawrence, W.C.,6BV.1.40  
 Lazzarelli, G.,2AV.2.38  
 Le Donne, A.,3CV.1.15  
 Le Pivert, X.,6BV.3.100  
 Le Quang, N.,1CV.3.56  
 Le Ster, M.,3CV.1.62  
 Léal, R.,2AV.2.21  
 Lebreton, F.,2AV.2.21, 2AV.2.33, 2AV.2.37  
 Lechner, P.,3AO.8.1, 5DV.3.25  
 Lechner, R.,3BO.9.1  
 Ledinsky, M.,2DO.2.4, 2BO.4.3  
 Lee, B.,2CO.9.1  
 Lee, C.-Y.,2BO.4.4  
 Lee, C.H.,1CV.3.75  
 Lee, D.-H.,1CV.3.50  
 Lee, D.,2AV.2.51  
 Lee, E.,5BV.4.36, 5DV.3.6  
 Lee, G.,1CO.2.3, 2CV.2.9  
 Lee, G.Y.,1CO.2.3  
 Lee, G.-H.,6BV.1.40  
 Lee, H.-S.,2AV.2.51  
 Lee, H.,3CO.3.4, 3DV.2.85  
 Lee, H.,3DV.2.77, 1CV.3.64, 3DV.2.99  
 Lee, H.M.,4CV.4.10  
 Lee, H.-C.,1AO.2.4  
 Lee, H.,6BV.2.49  
 Lee, H.,2CO.10.5  
 Lee, I.-G.,3CV.1.19  
 Lee, J.I.,1CV.3.98  
 Lee, J.,2AV.2.1  
 Lee, J.S.,5EO.1.2, 5DV.3.69  
 Lee, J.,2AV.2.1  
 Lee, J.,2CV.2.34  
 Lee, J.,3DV.2.87  
 Lee, J.Y.,1CV.3.75  
 Lee, J.-K.,5DV.3.69  
 Lee, K.-S.,3DV.2.116  
 Lee, M.,6BV.3.33  
 Lee, M.L.,4CV.4.27  
 Lee, R.,6BV.2.49  
 Lee, S.,3DV.2.17  
 Lee, S.H.,2CV.2.9, 3DV.2.116  
 Lee, S.,6BV.1.33, 2AV.2.1  
 Lee, S.,6BV.1.40  
 Lee, Y.,2BO.3.3  
 Lee, Y.-L.,2AV.2.19, 2AV.2.44, 2AV.2.34  
 Lee, Y.-H.,5BV.4.67, 5DV.3.10  
 Lee, Y.,3CV.1.42  
 Leemrani, Z.,6BV.2.8  
 Lefillastre, P.,2DO.1.5  
 Legros, M.,2AV.1.15  
 Lehmann, J.,6BV.3.49  
 Lehner, M.,2CO.9.3  
 Leidl, R.,1CO.1.2  
 Leilaieoun, M.,2DO.1.6, 2AV.3.27  
 Leimgruber, F.,5DV.3.45  
 Leite, J.R.,6BV.3.89  
 Lemiti, M.,2AV.2.21, 2AV.3.5  
 Lemos, I.,6BV.2.16  
 Lemp, E.,2CV.2.91  
 Lenarda, P.,5BV.4.75  
 Lenes, M.,2DO.3.2, 2DO.3.5, 2DO.3.6  
 Lenzmann, F.,5DV.3.72, 7DV.1.9  
 Leon, A.,5BV.4.74  
 Leonardi, F.S.,6DP.2.4  
 Leotta, G.,6CO.14.1, 6DP.2.4  
 Lepikko, S.,3DV.2.78  
 Lerat, J.-F.,2CV.2.76  
 Lesiuk, P.,2CV.2.80  
 Lespinats, S.,6CO.15.2  
 Leszczynska, B.,2AV.3.15  
 Leszczynski, S.,2AV.3.15  
 Letellier, J.-Y.,2AV.2.47  
 Letize, A.,2CO.9.1  
 Lettner, G.,7DV.1.51  
 Letty, E.,2CO.10.2  
 Levchenko, S.,3AO.9.5, 3CV.1.41, 3AO.9.1  
 Levis, C.,6BV.3.88  
 Levrat, J.,3CO.4.6, 2AO.5.2, 5DV.3.5  
 Ley, H.,1CV.3.70  
 Leye, S.N.,1CV.3.3, 1CV.3.4  
 Li, C.,3BO.12.2  
 Li, C.-C.,2AV.2.19, 2AV.2.34, 2AV.2.27, 2AV.2.44  
 Li, C.-C.,3CV.1.3  
 Li, D.,3DV.2.63  
 Li, D.,4DO.4.1  
 Li, F.,2AV.2.11, 2CO.11.4  
 Li, G.,5DV.3.38  
 Li, G.-Y.,2CV.2.61  
 Li, H.-Y.,5DV.3.5  
 Li, H.,2CO.10.3  
 Li, H.,3CV.1.8, 3CV.1.30  
 Li, H.,2CV.2.87  
 Li, J.,3CV.1.25  
 Li, L.,4DO.4.1  
 Li, L.-Y.,2AV.2.45  
 Li, M.,2AO.4.5  
 Li, Q.,2AV.3.31  
 Li, Q.,2BO.1.6  
 Li, S.,3CO.3.6  
 Li, X.,2AV.2.40  
 Li, X.,2AV.3.34  
 Li, Y.,5DV.3.38  
 Li, Y.,3DV.2.6, 1CV.3.77  
 Li, Y.T.,5DV.3.10  
 Li, Y.,2AV.2.6  
 Li, Y.,3CV.1.25  
 Li, Z.Y.,1CV.3.50  
 Liao, A.,2AV.2.28  
 Liao, H.-C.,3CO.4.4  
 Lien, C.,5BV.4.67  
 Lifka, H.,3CO.4.5, 3DV.2.82  
 Lignier, H.,2AV.1.34  
 Liley, B.,6BV.3.29  
 Lim, H.I.,1CV.3.75  
 Lim, I.,5BV.4.2  
 Lim, J.-H.,2CV.2.5  
 Lim, J.-K.,6BV.1.33  
 Lim, J.-W.,2CO.12.6, 2CV.2.9  
 Lim, S.Y.,3CV.1.42  
 Lima, M.A.F.B.,6BV.3.89  
 Limodio, G.,2AV.3.19  
 Lin, C.-S.,3DV.2.50  
 Lin, C.-L.,2AV.2.3  
 Lin, C.-M.,2CV.2.86, 2CV.2.85  
 Lin, C.-F.,2AV.3.36, 3DV.2.50  
 Lin, F.-M.,3CV.1.3  
 Lin, M.-S.,2AV.2.34, 2AV.2.44, 2AV.2.19

Lin, S.-P.,3DV.2.50  
 Lin, W.-S.,3CV.1.3  
 Lin, W.,2AV.3.17  
 Lin, X.,3CV.1.11  
 Lin, X.,3CV.1.48  
 Lin, Y.-H.,2CV.2.38  
 Lin, Y.-J.,2AV.2.27  
 Lin, Y.-H.,2AV.2.24  
 Lin, Y.-S.,2AO.6.2  
 Lin, Z.-X.,1CV.3.61, 2CV.2.61  
 Lincot, D.,3AO.9.6, 2AV.2.37  
 Lindahl, J.,7EO.3.1  
 Lindekugel, S.,2CO.10.4  
 Lindsay, A.,6BV.1.14  
 Lingel, R.,6BV.3.74  
 Lingg, M.,3CV.1.60  
 Linke, C.,3CV.1.32  
 Linse, M.,1CO.1.3, 2CO.11.1  
 Lipovsek, B.,3BO.12.1  
 Liscidini, M.,4CV.4.14  
 Litjens, G.B.M.A.,6EO.2.5, 6BV.3.102  
 Liu, C.-H.,5BV.4.42  
 Liu, D.,2BP.1.2, 2CO.11.4  
 Liu, D.,3CO.3.6  
 Liu, F.,3BO.11.2  
 Liu, F.,3DV.2.96  
 Liu, G.,3DV.2.14  
 Liu, H.-C.,6BV.3.55  
 Liu, H.,4DO.4.2  
 Liu, J.-J.,2CV.2.61, 1CV.3.61  
 Liu, L.,3CV.1.35  
 Liu, L.,4CV.4.15  
 Liu, R.,2AV.3.34  
 Liu, R.,3BO.9.4, 4CV.4.4  
 Liu, W.,2CO.11.5  
 Liu, X.,2AV.3.31  
 Liu, Y.H.,3DV.2.4  
 Liu, Y.,3DV.2.96  
 Liu, Y.-T.,3CV.1.3

Liu, Z.,2AV.3.17  
 Livera, A.,6BV.2.13  
 Lo Piano, C.,6CO.13.4  
 Lo Trovato, M.L.,6DP.2.4  
 Loffredo, F.,3CV.1.48, 1CV.3.92  
 Löfgren, L.,3CO.4.6  
 Logerais, P.-O.,2AV.2.49  
 Logofatu, C.,1CV.3.57  
 Lohani, J.,4CV.4.8  
 Lohmüller, E.,2CO.11.3, 2AV.2.14, 2CV.2.65, 2CV.2.33, 2CO.11.1  
 Lokhande, C.D.,3CV.1.37  
 Lombardo, S.,2CV.2.72  
 Long, W.,1CV.3.18  
 Long, Y.-S.,3BO.12.6, 5BV.4.1  
 Loonen, R.,7DV.1.31  
 Looney, E.E.,2CV.2.30  
 Löper, P.,2BO.4.3, 2AO.4.2, 2AV.3.4, 2BO.4.1  
 López, G.,2CV.2.6, 2CV.2.19  
 López Prol, J.,7EO.3.2  
 López Vicente, R.,3DV.2.53, 6BV.3.59  
 Lopez-Garcia, J.,5CO.7.3  
 Lorenz, A.,2CO.9.3  
 Lorenz, E.,6BV.3.2  
 Lorenzo Navaro, C.,6BV.2.14  
 Los, A.,3DV.2.28  
 Loser, U.,5DV.3.70  
 Lossen, J.,2CV.2.23  
 Lotfi, S.,3CP.1.2  
 Lotter, E.,7DV.1.30, 3CV.1.48  
 Lottspeich, L.,2AV.1.29, 2AV.1.31  
 Loua, M.,7EO.3.6  
 Louarn, K.,4CV.4.7  
 Loubat, A.,2CV.2.26, 3AO.9.6, 1CV.3.12  
 Loucaidou, E.,7DV.1.32  
 Louro, P.,2CV.2.16

Louwen, A.,7DV.1.32  
 Lovati, M.,6BV.3.65, 6DO.11.2  
 Lövenich, W.,2AO.6.3  
 Lozach, M.,2AV.3.20  
 Lu, C.M.,2BO.1.4  
 Lu, J.,4CV.4.13  
 Lu, K.-W.,5BV.4.67  
 Lu, S.,4CV.4.13  
 Luce, R.,5BV.4.11  
 Luchies, J.R.M.,2DO.3.5, 2CV.2.79, 2DO.3.6, 2DO.3.2  
 Lufkin, S.,6BV.3.47  
 Lugli, P.,4DO.4.4  
 Luis, L.C.,3CV.1.1  
 Luka, T.,2CO.11.2, 2CV.2.47  
 Lunardi, M.M.,5DV.3.78  
 Lund, P.D.,3DV.2.37, 3DV.2.78, 3DV.2.47  
 Lundberg, O.,3BO.10.4, 3AO.9.4, 3CP.1.2  
 Luo, W.,5CO.6.2  
 Luthander, R.,6BV.3.81  
 Lutter, E.,7EO.3.4  
 Luxembourg, S.L.,1AO.3.5, 3DV.2.70  
 Lux-Steiner, M.C.,3CV.1.11, 3CV.1.48, 3DV.2.20  
 Lv, J.,2CV.2.84  
 Lyu, X.,3CV.1.43, 3CV.1.34  
 Lyu, Y.,5BO.5.4  
**M**  
 Ma, C.,5DV.3.38  
 Ma, F.-J.,2AO.4.5, 2CO.10.3  
 Ma, S.,2CV.2.87  
 Maaloufa, Y.,6BV.2.52  
 Maaroufi, M.,5BV.4.54, 5BV.4.26  
 Maas, C.,7DV.1.31  
 Macco, B.,2AV.3.2, 2AV.3.7  
 Macdonald, D.,2AO.4.1, 2BO.2.5, 1CO.1.5  
 Macé, P.,6BV.3.36

Macedo Blasques, L.C.,6BV.1.22  
 MacGill, I.F.,7DV.1.15  
 Machado, M.,7DV.1.29  
 Machado Golembieski, A.,7DV.1.50  
 Machirant, A.,5DV.3.4  
 Mack, I.,2AV.3.4  
 Mack, S.,2CV.2.30, 2CO.11.1, 2DO.1.3, 2CO.11.3, 2DO.3.5  
 MacMaster, S.,5DV.3.13  
 Macq, A.,5BV.4.11  
 Maggioni, E.,6BV.3.16  
 Magorian-Friedlmeier, T.,3AO.7.5  
 Maguire, D.,7DO.8.6  
 Mahmoud, I.M.,6BV.1.41  
 Mahmoud, N.A.,6BV.1.51  
 Mai, L.,2AV.1.36  
 Mai, Y.,2AV.2.40  
 Maiberg, M.,3CV.1.61  
 Maidaniuk, Y.,4DO.4.2  
 Maiello, P.,1CV.3.42  
 Maier, S.,2CO.11.1  
 Maifi, L.,6BV.1.30  
 Maiko, K.O.,1CV.3.46  
 Mainz, R.,3AO.9.1, 3AO.9.3  
 Major, J.D.,3CV.1.27  
 Majstorovic, D.,5DV.3.45  
 Majumdar, I.,3DV.2.20  
 Makita, K.,1AO.3.1  
 Makrides, G.,7DV.1.32, 4CV.4.30, 6DP.2.3, 5DV.3.39, 5BV.4.61, 6BV.2.13  
 Maksudov, T.,3DV.2.52  
 Malbranche, P.,6DO.12.1  
 Maleeha, H.,7DV.1.3  
 Malevskiy, D.A.,5BV.4.33  
 Malguth, E.,2CV.2.85  
 Malik, S.,5DV.3.31  
 Malm, U.,3CP.1.2, 3AO.9.4

- Malo, N.,7EO.3.6  
Mamidanna, A.,2AV.3.32  
Mamontova, I.B.,1CV.3.55,  
1CV.3.46  
Mamykin, S.V.,1CV.3.46,  
1CV.3.55  
Manceau, M.,3DV.2.62  
Mandal, S.,1CV.3.52  
Mandorlo, F.,2AV.3.5  
Manganiello, P.,2AO.5.1,  
5BV.4.45  
Mangel Raventos, A.,1CO.2.6  
Mann, S.A.,1CV.3.24, 1AP.1.1,  
1AO.1.2, 1CV.3.29  
Mannheim, A.,3CV.1.26  
Mantel, C.,6BV.2.29  
Mantescu, G.,6BV.3.98  
Manzano Chavez, L.,6DO.6.6  
Manzini, G.,6BV.1.37  
Manzolini, G.,6EO.2.1  
Manzoor, S.,2BO.4.6  
Marchionna, S.,3CV.1.15  
Marcos, J.,6BV.2.45, 6EO.2.3,  
6BV.3.94  
Marot, Y.,2AV.2.37, 2AV.2.47,  
2CV.2.26, 2AV.2.21  
Marquez-Prieto, J.,3AO.9.1,  
3AO.9.5  
Marronnier, A.,3DV.2.85,  
3CO.3.4  
Marroyo, L.,6BV.2.45, 6EO.2.3,  
6BV.3.94  
Marsal Garví, L.F.,3DV.2.88  
Marstein, E.S.,2AV.1.5,  
5DV.3.34  
Martel, B.,2AV.1.34, 2CO.10.2,  
2AV.1.3  
Martin, N.,6CO.16.6  
Martín, I.,2CV.2.37, 2CV.2.6,  
2CV.2.19  
Martin de Nicolàs, S.,2DO.1.1  
Martin-Carron, L.,5BV.4.11  
Martineau, D.,3DV.2.113,  
3CO.4.6  
Martinez, M.,6CO.15.4, 6BO.8.6  
Martínez, O.,6CO.15.4  
Martinez Buitrago, J.A.,7DV.1.47  
Martinez-Moreno, F.,6BV.1.24,  
6BV.1.26, 6BV.1.25, 6BV.1.27  
Martini, L.,2AV.3.30  
Martinoli, M.,7DO.8.6  
Marzo, A.,5BV.4.29  
Marzoli, M.,6BV.2.37  
Masada, I.,2AV.1.13  
Mas-Marzá, E.,3DV.2.32  
Masson, G.,6BV.2.23, 7EO.3.1,  
6BV.3.36, 7DO.9.1, 7DO.8.4  
Masuda, A.,5BV.4.70, 5CO.8.4,  
5BV.4.76, 5CO.6.3, 5DV.3.23,  
5BV.4.53  
Masuda, T.,4DO.4.6  
Mathiak, G.,5CO.5.2  
Mathiasson, J.,3CP.1.2  
Matic, G.,5DV.3.56  
Matsubara, K.,2AV.3.20,  
2AV.3.43  
Matsui, T.,2BO.4.2, 2AV.3.20  
Matsukawa, H.,7DV.1.44  
Matsumura, H.,2AV.3.10,  
2AV.3.37  
Matteocci, F.,3DV.2.76, 3CO.4.2  
Maturi, L.,6BV.3.65, 6DO.11.2  
Maul, L.,6BV.2.21, 6BV.3.57,  
6BV.1.35  
Mayberry, R.,2AV.2.10  
Mayer, J.,3DV.2.84  
Mazen, F.,2CV.2.76  
Mazorra Aguiar, L.,6BV.3.25  
Mazur, Y.I.,4DO.4.2  
Mazzarella, L.,3DO.7.2, 2AV.3.3  
Mbodji, N.,7DV.1.16, 6BV.3.83  
Mbodji, S.,1CV.3.3, 1CV.3.4  
McClure, H.,6BV.3.84  
McCormack, S.J.,1CV.3.59,  
1CV.3.74, 1CV.3.73, 1CV.3.62,  
1CV.3.81  
McGehee, M.D.,2BO.4.6,  
3DO.7.6  
McIntosh, K.R.,2CV.2.48  
McMeekin, D.,1CV.3.15  
Medjo, D.,5DV.3.45  
Medlège, F.,2DO.1.2  
Mehlich, H.,2DO.2.2  
Mehmood, H.,2CV.2.66  
Mehtiyev, A.D.,5BV.4.34  
Meier, L.,6BV.2.48  
Meier, R.,5CO.8.3  
Meinert, M.,1CV.3.91  
Mekhilef, S.,6BV.1.13  
Melendez, T.A.F.,6BV.2.4  
Melkote, S.N.,2AV.1.32  
Melloh, T.,6BV.1.29  
Mellor, A.,2CV.2.50, 4CV.4.11  
Melnyk, I.,2CO.9.2  
Melo, R.R.,6BV.3.89  
Melskens, J.,2DO.3.2, 2AV.3.7,  
2AV.3.2, 2DO.3.4, 2CV.2.49  
Melzer, B.,2CV.2.72  
Menard, E.,5DV.3.35  
Menchini, F.,2AV.3.30  
Meneghesso, G.,3BO.9.5  
Meneghini, M.,3BO.9.5  
Ménézo, C.,6BO.8.5  
Meng, T.,3DV.2.55  
Menna de Oliveira,  
L.P.,7DV.1.50  
Menner, R.,3AO.7.5  
Menossi, D.,3AO.7.4,  
3DV.2.118, 3BO.9.5  
Menozzi, R.,3BO.10.1  
Menzel, R.,2BO.1.5  
Mercaldo, L.V.,3DV.2.76,  
2AV.3.16, 2AV.3.18  
Merino, R.,5DV.3.9  
Mertens, K.,6BV.2.10, 5BV.4.64  
Mertens, V.,2AO.6.5  
Merz, R.,5DV.3.54  
Mes, J.,6BV.2.11  
Messaoudi, C.,5BV.4.58  
Messerschmidt, M.,6BV.2.29  
Messmer, C.,2BO.4.2  
Messous, M.Y.,3CV.1.47  
Mette, A.,2CO.9.6  
Metzner, C.,3CV.1.17, 3CV.1.16,  
3CV.1.13  
Meuris, M.,3BO.11.4, 3BO.11.5  
Meyer, E.L.,3DV.2.81,  
3DV.2.103, 3DV.2.8  
Meyer, N.,3DV.2.34  
Meyer, S.,3DV.2.65  
Meyer, S.,2AV.2.46, 2AO.5.5  
Meyer, T.,3DV.2.113  
Meynen, H.,2CV.2.92  
Meziani, S.,2CV.2.32  
Miasnikov, K.,3CV.1.58  
Micale, G.,7DV.1.21  
Michael, S.,4CV.4.3  
Michel, T.,2CV.2.76  
Michl, B.,2CO.10.4, 2BO.2.4  
Miclea, P.-T.,1CO.1.6, 3DV.2.21  
Miettunen, K.,3DV.2.47,  
3DV.2.78  
Míguez Novoa, J.M.,2AV.2.9  
Mihailitchi, V.D.,2CV.2.23,  
2AO.5.6, 2AV.2.12  
Mihaljevic, A.,5DV.3.17,  
5DV.3.18, 6BV.1.35, 6BV.2.21  
Mihaylov, B.,5BO.6.6  
Milesi, F.,2CV.2.76  
Miletic, Z.,5DV.3.45  
Miliciani, M.,2AV.3.29  
Miller, B.,4DO.4.1  
Min, B.K.,2AV.2.51  
Min, Y.-K.,5DV.3.6, 5BV.4.36  
Minarini, C.,1CV.3.92

- Mincuzzi, G.,3CO.4.2  
Minderhoud, T.,6DP.2.2, 6DO.10.5  
Minemoto, T.,3DV.2.64, 1CV.3.83, 3DV.2.104  
Mintairov, M.A.,4CV.4.16  
Mintairov, S.A.,4CV.4.25, 4CV.4.16  
Mirbagheri Golroodbari, S.Z.,6BV.1.49  
Mirhosseini, S.H.,3CV.1.38  
Miscioscia, R.,1CV.3.92, 7DV.1.30  
Mitchell, B.,2BO.2.5  
Mitchell, J.,2CV.2.25  
Mitra, M.,6BV.2.42  
Mitra, S.,1CV.3.20  
Mittag, M.,1AO.2.3, 1CO.1.4, 5DO.5.5  
Mitterer, C.,3CV.1.32  
Miyadera, T.,3DV.2.49  
Miyano, K.,3DV.2.61  
Mizuno, H.,1AO.3.1  
Mo, J.,1CV.3.87  
Mocelin, A.R.,6BV.2.4, 5DV.3.43  
Mochizuki, T.,2CV.2.25  
Modes, T.,3CV.1.17, 3CV.1.16, 3CV.1.13  
Modestino, M.A.,1CO.2.2  
Moen, M.,5EO.1.5, 2AV.1.18  
Mohammed Niyaz, H.,5CO.8.6, 5DV.3.20  
Mohielden, Y.E.,6BV.3.32  
Mohr, A.,2CO.9.6  
Moldovan, A.,2AV.3.9, 2DO.1.3, 2CO.11.1  
Molefe, F.V.,1CV.3.63  
Molin, A.,6BV.2.33  
Molin, E.,6BV.2.33  
Molinas Cabrera, M.M.,6EO.2.2  
Möller, H.J.,2AV.1.19  
Mollick, J.,7DV.1.3  
Molnar, K.,6BV.2.19  
Molpeceres, C.,2CV.2.11  
Monakhov, E.,1CV.3.85  
Moncho, G.,6BV.3.21  
Monchoux, J.P.,2AV.1.15  
Mondal, A.,5DV.3.36  
Mondal, S.,7DO.9.3  
Mongstad, T.T.,2AV.1.4, 2AV.1.5  
Monna, R.,2AV.2.38  
Monnard, R.,3DO.7.5  
Monokroussos, C.,5CO.7.5  
Montes, C.,3DV.2.56, 3DV.2.71, 6BV.3.21  
Montes-Romero, J.,4CV.4.30  
Montiel-Chicharro, D.,5DV.3.21  
Moon, D.G.,3CV.1.42  
Moon, J.,3CV.1.28  
Moon, S.-J.,3DO.7.5, 3CO.4.6  
Moore, A.,3CP.1.3  
Moore, J.,6BV.3.84  
Moore, S.,5DV.3.78  
Moraitis, P.,6BO.7.5  
Morales, C.,6BV.2.12  
Morales, C.,4DO.4.3  
Morales, M.,2CV.2.11  
Morales Udaeta, M.E.,6BV.2.40, 7DV.1.7, 7DV.1.46, 6BV.3.10  
Morales-Vilches, A.B.,2AV.3.3  
Morar, I.,5DV.3.45  
Morelj, D.,5DV.3.56  
Moretón, A.,6CO.15.4  
Morgado-Dias, F.,6BO.7.6  
Mori, K.,5BV.4.70  
Morikawa, K.,6BV.1.10  
Morishige, A.E.,2CV.2.30  
Morita, H.,5BV.4.70  
Morita, K.,5BV.4.68  
Moriya, M.,2CV.2.25, 2AV.2.16  
Mork, K.,2AV.1.18, 5EO.1.5  
Morlier, A.,5CO.5.2  
Mortazavi, S.,3CV.1.39  
Mosel, F.,2AV.1.11  
Moser, C.,1CO.2.2  
Moser, D.,6BV.3.16, 6CO.14.3, 7DV.1.48, 6EO.2.1, 5BV.4.14, 6BV.3.65, 6DO.11.2, 6BO.7.2, 6BV.3.75  
Mothudi, B.M.,1CV.3.63  
Mou, Z.,5BV.4.51  
Moumen, A.,3CV.1.29  
Mounir, S.,6BV.2.52  
Mourad, S.,7DO.9.4  
Moussi, A.,2CV.2.32  
Moustafa, A.,2DO.1.2  
Moustafelou, I.,6BV.3.78  
Mrcarica, M.,1CV.3.35  
Mu, M.,1CV.3.87  
Mucha, J.,6BV.1.46, 3DV.2.45  
Mücke, D.,3AO.8.3  
Mudrick, J.,4DO.4.1  
Muguerou, P.,3BO.10.1  
Mühleisen, W.,6BV.1.34, 6BO.8.3, 5BV.4.72, 5BV.4.73, 5DV.3.17, 6BV.1.35, 6BV.2.21  
Mujumdar, P.D.,5BV.4.80  
Mukherjee, S.,1CV.3.39, 1CV.3.21  
Mukhopadhyay, I.,2AV.3.38  
Mukhopadhyay, S.,1CV.3.52  
Müllejans, H.,5BO.6.1, 5CO.7.4, 5BV.4.5  
Müller, D.,2CO.12.3  
Müller, J.W.,2CO.9.6, 5CO.6.4, 2AO.6.5  
Müller, M.,2CV.2.36  
Müller, R.,2DO.3.1, 2DO.2.1, 2AO.4.3, 2DO.2.5  
Müller-Karpe, Z.,2CO.12.5  
Müller-Windisch, S.,7DO.8.6  
Munkhammar, J.,6BV.3.86  
Muñoz, D.,3DV.2.62, 2DO.1.2, 2CV.2.72  
Muñoz, M.,6BV.2.45, 6EO.2.3, 6BV.3.94  
Munshi, A.,3CP.1.3  
Münter, S.,5BV.4.30  
Muntwyler, U.,6CO.16.2, 6BV.3.92, 6CO.15.6  
Munzke, N.,6CO.16.3  
Mur, P.,4DO.4.3  
Murakami, T.,3DV.2.49  
Muralidharan, P.,2DO.1.6  
Muramatsu, K.,2AV.2.30  
Murphy, M.,6BV.1.43  
Muscorel, V.-F.,1CV.3.85  
Musolino, V.,6BV.3.60  
Mustafa, A.,7DO.9.4  
Muthukumar, V.A.,6DO.6.6  
Mütter, G.,6BV.2.36  
Mutubuki-Makuyana, C.S.,7DV.1.11
- N**
- Na, S.-I.,3DV.2.115, 3DV.2.119  
Naber, R.C.G.,2DO.3.6  
Nacke, B.,6BV.1.29  
Nagaoka, A.,3DV.2.24  
Nagayama, T.,5BV.4.13  
Nagayama, N.,6BV.1.10  
Nagayoshi, H.,2AV.2.43  
Nagel, H.,2AO.6.5, 2AV.2.5  
Naghavi, N.,3AO.9.6  
Naima, K.,3CV.1.22  
Naimi, Z.,6BV.2.2, 1CV.3.72, 6BV.2.6, 5BV.4.58, 3DV.2.79, 6BO.7.4, 2CV.2.12, 5DV.3.31, 7DV.1.23, 5BV.4.26  
Najaf, A.,6BV.1.21  
Najafi, G.,6BV.3.56  
Najafi, M.,3DO.7.3  
Nakada, K.,3AO.7.1, 3BO.10.3  
Nakadoa, T.,4DO.4.6  
Nakahama, H.,5BV.4.82  
Nakajima, Y.,2AV.1.12



- Nakamura, K.,2AV.2.30, 2AV.1.27  
 Nakamura, T.,6BV.1.10  
 Nakamura, Y.,5DV.3.24  
 Nakane, A.,3AO.7.2  
 Nakanishi, H.,2CV.2.25  
 Nakanishi, N.,2BP.1.1  
 Nakano, Y.,1AO.1.4, 1CV.3.22  
 Nakatsuka, S.,1CV.3.83  
 Nakayama, R.,2AV.1.12  
 Nam, D.,3CV.1.42  
 Nam, J.,2AV.2.51  
 Narbey, S.,3CO.4.6  
 Naruseviciute, D.,7EO.3.3  
 Narvarte, L.,6BV.1.25, 6BV.2.14, 6BV.1.26, 6BV.1.27, 6BV.1.24  
 Nasser, H.,2CV.2.66, 2CV.2.8  
 Nastochkin, S.,3CV.1.58  
 Naumann, V.,5BV.4.52, 5DV.3.27  
 Nawara, W.,5CO.7.1  
 Nawaz, S.F.,6BV.2.20  
 Nayfeh, A.,2AV.3.41  
 Nazeeruddin, M.K.,3DV.2.101, 3DV.2.100  
 Nazififard, M.,6BV.1.47  
 Ndiaye, A.,7DV.1.41  
 Ndiaye, M.L.,7DV.1.41  
 Neder, V.,1AO.3.5  
 Neff, T.,1CO.1.4  
 Negrila, C.C.,1CV.3.57  
 Neitzert, H.C.,2CV.2.56, 2CV.2.7  
 Nekarda, J.-F.,2CO.10.6, 2CO.9.5  
 Nelson, G.,4CV.4.6  
 Nemitz, W.,6BV.3.57  
 Nenna, G.,3CV.1.48, 1CV.3.92  
 Neshina, E.G.,5BV.4.34  
 Nesswetter, H.,4DO.4.4  
 Neuhaus, H.,2CV.2.36, 2CO.11.3  
 Neumaier, L.,6BO.8.3, 5DV.3.17, 6BV.2.21, 5DV.3.18, 6BV.1.34, 6BV.1.35, 5BV.4.73, 5BV.4.72  
 Neumüller, A.,2AV.3.13  
 Neusel, L.,2BO.4.2  
 Nevyhosteny, R.,1CV.3.26  
 Newman, B.,5BV.4.39, 5BV.4.50  
 Nguyen, C.T.,2AV.3.37  
 Nguyen, H.S.,7DV.1.19, 7DV.1.20  
 Nguyen, H.T.,2AO.4.1, 2BO.2.5  
 Nguyen, V.K.,7DV.1.29  
 Ni, J.,5DV.3.38  
 Ni, Z.,5BV.4.51  
 Nicoara, N.,3BO.10.1  
 Nicolay, S.,3DO.7.5, 2DO.2.4, 3CO.4.6, 2DO.1.1  
 Niebergall, L.,2CO.9.6  
 Niederberger, S.,2AV.1.24  
 Niedrist, M.,6EO.2.4  
 Nielsen, O.,2CV.2.72  
 Niepelt, R.,1AP.1.2  
 Niesen, B.,3DO.7.5, 3CO.4.6, 3DO.7.1  
 Niesen, T.P.,3BO.9.1  
 Niesing, H.,7DV.1.26  
 Niewelt, T.,2BP.1.4  
 Niki, S.,3AO.7.2, 3BO.10.5  
 Niklas, J.R.,2CV.2.29  
 Nikolettatos, I.,7DV.1.2  
 Nishihara, T.,2AV.1.41  
 Nishikawa, S.,6BV.1.45  
 Nishimura, F.,2CO.10.5  
 Nishimura, T.,3AO.7.1  
 Nishinaga, J.,3BO.10.5, 3AO.7.6  
 Nishiwaki, S.,3DO.7.4  
 Nivelle, P.,1CO.2.4  
 Nkhaili, L.,3DV.2.58, 1CV.3.14, 3DV.2.2  
 Noda, T.,2CV.2.57  
 Noël, T.,1AO.2.2  
 Nofuentes Garrido, G.,5BV.4.14  
 Nogay, G.,2AO.4.2, 2AV.3.4, 2BO.4.3, 2BO.4.1  
 Noh, Y.-J.,3DV.2.115, 3DV.2.119  
 Noja, G.,5DV.3.66, 5EO.1.4  
 Nold, S.,2AO.6.1  
 Nordmann, T.,6BV.3.74  
 Nordmark, A.,5DV.3.71  
 Nordseth, O.,1CV.3.85, 2AV.1.5  
 Noris, F.,7DV.1.29  
 Norouzi, M.H.,2CO.11.3  
 Norwood, Z.,6DO.10.3  
 Nose, Y.,1CV.3.83, 3DV.2.24  
 Notholt, J.A.,6BV.2.9  
 Nouri, B.,6DO.6.5  
 Novaes, K.,6BV.2.4  
 Nowack, A.,2AV.2.2  
 Nowak, S.,7EP.1.2, 7EO.3.4  
 Nüesch, F.,3DV.2.113  
 Nunes de Carvalho, C.,1CV.3.76  
 Nunomura, S.,2AV.3.43, 2AV.3.20  
 Nussbaumer, H.,5DV.3.16, 1CV.3.69, 5BV.4.28  
 Nya, M.,3CV.1.47  
 Nyapshaev, I.,2AV.3.39, 2AV.3.12  
**O**  
 O'Donnell, B.,7DV.1.19, 7DV.1.49, 7DV.1.20  
 Oberbeck, L.,4DO.4.2  
 Oberholzer, S.,7EO.3.4  
 Ocaña, L.,3DV.2.71, 3DV.2.56  
 Oettershagen, P.,6BV.2.46  
 Offermann, P.,6BV.1.28  
 Offermans, T.,3DV.2.84  
 Øgaard, M.B.,5DV.3.34  
 Ogawa, K.,5BV.4.53  
 Ogbomo, O.,5DV.3.3  
 Ogihara, T.,3BO.10.3  
 Ogimoto, K.,6BV.3.14  
 Ogomi, Y.,3DV.2.104, 3DV.2.64  
 Ogura, A.,1CV.3.40  
 Ogura, A.,2AV.1.13, 2AV.1.12, 2AV.2.30, 2AV.2.23, 2AV.1.41, 2AV.1.27  
 Oh, J.,2BO.3.3  
 Oh, J.,6BV.3.33  
 Oh, K.S.,3DV.2.77  
 Oh, S.-Y.,5BV.4.35  
 Oh, W.,5BV.4.60  
 Ohdaira, K.,2AV.3.23, 2AV.3.10  
 Ohigashi, T.,7DV.1.44  
 Ohshima, H.,5BO.6.5  
 Ohshita, Y.,2CV.2.52, 2AV.1.27, 2AV.1.13, 4CV.4.28, 2CO.10.5, 2AV.2.23  
 Oka, N.,6BV.1.45  
 Okada, Y.,1CV.3.40, 4DO.4.5  
 Okel, L.A.G.,5CO.5.1, 5BV.4.50  
 Okhorzina, A.V.,6BV.2.24, 6BV.2.22  
 Okumura, K.,4DO.4.6  
 Olaerts, A.,6BO.7.3  
 Olariu, N.,6BV.3.98  
 Oldenkamp, H.,5DP.1.3  
 Olgun, A.,7DV.1.6  
 Oliva, F.,3DV.2.7  
 Oliveira Martins, A.C.,6BV.3.62  
 Olson, C.,7DV.1.9  
 Omondi, C.A.,3DV.2.107  
 Onishi, K.,2AV.1.41  
 Onno, A.,4DO.4.2  
 Ono, H.,2AV.1.12  
 Oozeki, T.,6BV.3.14  
 Opiyo, N.,7DV.1.43  
 Oppelt, K.,2CO.9.3  
 Oprea, A.,6BV.3.98  
 Ordóñez, F.,6BV.2.12  
 Orekhov, D.,2AV.3.39, 5BV.4.33, 2AV.3.12

Oreski, G.,5DV.3.11, 5DV.3.16,  
5DV.3.18, 7DV.1.48, 5DV.3.17  
Ornelas, M.,6BV.3.53  
Ortega, P.,2CV.2.19, 2CV.2.6,  
2CV.2.37  
Oshima, R.,1AO.3.1  
Osowski, M.L.,4CV.4.27  
Ossenbrink, H.,6BV.2.38  
Osvet, A.,3BO.12.1  
Oswald, F.,3CO.4.6  
Oswald, S.,6DO.11.4  
Otálora, C.A.,3CV.1.1, 3DV.2.31  
Otani, K.,5DV.3.24  
Ott, T.,2CO.9.3  
Ottersböck, B.,5DV.3.11  
Ouadjaout, D.,2AV.1.20  
Oudrhiri Hassani, F.,5BV.4.83  
Ouhbi, B.,7DV.1.23  
Oukarfi, B.,6BV.1.9, 6BV.2.39  
Ouknno, A.,5BV.4.83  
Outzourhit, A.,6BV.2.32,  
1CV.3.14, 3DV.2.2, 5DV.3.46,  
2CV.2.12, 3DV.2.58, 1CV.3.72,  
3DV.2.79  
Ouyang, L.,3CV.1.34, 3CV.1.43  
Ouyang, Z.,1CV.3.44  
Øvrelid, E.-J.,2AV.1.4  
Oyewo, A.S.,7DO.8.1  
Ozanne, A.-S.,2DO.1.2  
Özcelik, S.,3DV.2.22  
Özden, T.,6BV.3.24  
Ozimek, P.,2CV.2.80  
Özkol, E.,2CV.2.66, 2CV.2.8

**P**

Paap, S.M.,4DO.4.1  
Pachlhofer, J.,3CV.1.32  
Padilla, J.,3DV.2.53  
Padlewski, S.,5BO.5.6  
Padrón, M.,6BV.3.21  
Padros, A.,6CO.15.3  
Paduthol, A.R.,2AO.4.2, 2AO.5.3

Paetel, S.,3AO.7.5, 3BO.9.2  
Page, M.,5DO.5.4  
Paggi, M.,5BV.4.75  
Pain, S.,5BO.5.5  
Palinginis, P.,2CO.11.3  
Palitzsch, W.,5DV.3.64,  
5DV.3.70  
Pallarès Marzal, J.,3DV.2.88  
Palm, J.,3BO.9.1  
Palma, A.L.,3CO.4.2  
Palmans, J.,2DO.3.4  
Palmstrom, A.F.,3DO.7.6,  
2BO.4.6  
Pan, A.C.,7DV.1.50, 1CV.3.95,  
6BV.3.71  
Pan, C.,2CO.10.1  
Pan, J.,3DV.2.14, 3DV.2.19  
Panagiotou, K.,6CO.14.6  
Panckow, A.,3CV.1.49  
Panda, S.K.,6BV.2.26  
Pander, M.,5CO.8.3  
Pantelica, D.,1CV.3.57  
Papachristou, D.,7DV.1.35  
Papadakis, G.,6BV.1.23,  
6BV.3.39  
Papapetrou, M.,7DV.1.21,  
7DO.8.6  
Papet, P.,5DV.3.5, 2DO.1.4  
Papoutsi, M.,7DO.8.6  
Parashar, P.K.,2AV.3.40  
Pareige, P.,3BO.10.1  
Parent, E.,6BV.1.14  
Parikh, H.,6BV.2.29  
Parisi, J.,3AO.8.5  
Park, C.,5BV.4.35  
Park, D.H.,3CV.1.9  
Park, E.H.,1CV.3.98  
Park, G.S.,5EO.1.4, 5DV.3.66  
Park, H.,5BV.4.35  
Park, H.,2AV.2.51

Park, J.H.,3CV.1.56, 3CV.1.31,  
2CV.2.10  
Park, K.H.,4CV.4.9  
Park, N.,5BV.4.60  
Park, S.J.,2AV.2.51  
Park, S.H.,2CV.2.5  
Park, S.,2AV.2.51  
Park, W.-K.,4CV.4.9  
Parnham, E.,5BO.5.5  
Parra, V.,6BO.8.6, 6CO.15.4  
Parretta, A.,4CV.4.23  
Parvan, V.,3DV.2.20  
Parys, W.,6BV.3.49  
Pasmans, P.,1CV.3.35  
Passig, M.,2CO.9.1  
Passoni, M.,4CV.4.14  
Passow, K.,6BV.2.2  
Pati, R.,2AV.3.38  
Patrick, D.L.,1AO.2.1  
Patrikeev, L.N.,3DV.2.57  
Patrini, M.,4CV.4.14  
Paul, D.J.,2CV.2.50  
Pavanello, D.,5BV.4.5, 5BO.6.1,  
1AO.1.5, 6CO.15.1  
Paviet-Salomon, B.,2DO.1.1,  
2DO.2.4, 3DO.7.5  
Payne, D.,2AV.1.38, 2BO.2.3,  
2CV.2.48  
Pazos-Outón, L.,3DV.2.87  
Pearce, P.,7DO.9.5, 4CV.4.5  
Peche, R.,5EO.1.4  
Peck, J.H.,2CV.2.3  
Peeters, J.,5DV.3.63  
Peharz, G.,6BV.3.57  
Peibst, R.,2AV.2.20, 2DO.2.2,  
1AP.1.2  
Pellegrino, C.,2CV.2.7  
Pellereau, E.,3DV.2.85  
Pelletier, D.,2AV.1.15, 7DV.1.4  
Peng, C.-Y.,6BV.3.55  
Peng, C.-K.,2AV.2.45

Peng, G.,4CV.4.15, 4CV.4.4  
Peng, S.,3DV.2.19, 3DV.2.14  
Peng, S.,3CV.1.52, 3CV.1.14,  
3CV.1.17  
Peng, X.,3CV.1.34, 3DV.2.120,  
3CV.1.43  
Peng, Y.-W.,2CV.2.28  
Peng, Z.-W.,2AV.2.5, 2AV.2.12,  
5DV.3.8  
Penning, P.,4CV.4.26  
Peral Boiza, A.,2CV.2.31  
Perales, M.,4CV.4.25  
Pereira, E.M.D.,6BV.2.16  
Perez, L.,6BO.8.6, 6CO.15.4  
Pérez, B.,5DV.3.9  
Pérez, J.,6CO.15.4  
Perez Rodriguez, P.,1CO.2.6  
Pérez-Higueras, P.J.,4CV.4.30  
Perez-Rodriguez, A.,3DV.2.7  
Perez-Wurfl, I.,1CV.3.38  
Pernau, T.,2CO.9.4  
Perotto, A.,6BV.3.16  
Perret-Aebi, 6BV.3.60,  
1CV.3.78, 2CV.2.72, 6BV.3.62,  
5DV.3.5  
Pescetelli, S.,3CO.4.2  
Petcu, V.T.,6BV.3.98  
Peters, D.,6EO.2.6  
Peters, I.M.,2CV.2.31  
Peters, S.,2CO.9.6  
Petersen, M.,6BV.2.29  
Petit, F.,7DO.8.6  
Petlitskaya, T.V.,3CV.1.50  
Petmezas, T.,7DV.1.35  
Petreniene, L.,2AV.1.3  
Petres, R.,2AV.2.42  
Petrosyan, A.,2AV.1.44  
Petter, K.,2BO.3.2, 5CO.6.4  
Peuckert, F.,3BO.12.4  
Peyronnet, R.,2AV.2.37,  
2AV.2.21, 2AV.2.47

Pfau, C.,1CO.1.6  
 Pfeffer, M.,2CV.2.55, 2CV.2.64,  
 2AO.4.4  
 Pfeiffer, N.,5CO.5.2  
 Pfengler, D.,2CV.2.43  
 Pflugradt, N.,6CO.16.2  
 Philipp, D.,5DV.3.14  
 Philipps, S.P.,7DO.8.2  
 Phillips, L.J.,3CV.1.27  
 Phinikarides, A.,5BO.6.3  
 Phung, N.,3DV.2.4  
 Piatlitski, A.N.,3CV.1.50  
 Picard, E.,2AV.2.17  
 Piccinelli, F.,3DV.2.118  
 Pickel, T.,6BO.8.2, 5DO.5.3,  
 6BV.1.44  
 Pierro, M.,5BV.4.14, 6BO.7.2,  
 6BV.3.16  
 Pieters, B.E.,5CO.6.5, 3DV.2.10,  
 5BV.4.18  
 Pihan, E.,2AV.1.15  
 Pilat, E.,6CO.13.5  
 Pillai, S.,1CV.3.44  
 Pinedo Pascua, I.,6DO.6.1  
 Pinho Almeida, M.,6BV.2.31,  
 6BV.2.34  
 Pinter, G.,5DV.3.17, 5DV.3.11  
 Piquemal, F.,4CV.4.7  
 Piromalis, D.D.,6BV.1.23  
 Pirot, M.,2AV.2.17  
 Pisoni, S.,3DO.7.4, 3CO.4.3  
 Pistor, P.,3BO.11.1  
 Pitaval, S.,6BV.1.11  
 Pitta Bauermann, L.,5DV.3.14,  
 7DV.1.48  
 Pittson, R.,5DV.3.9  
 Pitz-Paal, R.,6DO.6.5  
 Placidi, M.,3BO.11.1  
 Plag, F.,5BO.6.2, 5BV.4.7,  
 5BO.6.4  
 Plakhotnyuk, M.,2CV.2.48,  
 2CV.2.27  
 Plank, M.,1CV.3.51  
 Platzer-Björkman, C.,3BO.10.4  
 Plentz, J.,2CV.2.13, 2CO.12.3,  
 1CO.2.1  
 Plessing, L.,5BV.4.73  
 Plesz, B.,3AO.8.3  
 Plissonnier, A.,6BV.3.100  
 Po, R.,3BO.12.5  
 Podlowski, L.,5DV.3.1, 6BV.1.36,  
 5BV.4.59  
 Poindexter, J.R.,2CV.2.30  
 Polain, L.,7EO.3.4  
 Pollard, M.E.,2AO.5.3  
 Polman, A.,1AO.3.5, 1CV.3.23  
 Polojärvi, V.,4CV.4.12  
 Poncho, C.,6BV.3.84  
 Pons, M.,6BV.3.34  
 Poodt, P.,3DV.2.82  
 Poortmans, J.,2AV.2.13,  
 2AO.5.1, 2AV.3.14, 1CO.2.4,  
 2CO.12.4, 5BV.4.45, 2AV.2.6,  
 3DV.2.105, 5BO.5.2, 2BO.3.4,  
 2AV.3.26  
 Pop, S.C.,5BO.5.1  
 Portier, X.,3CV.1.47  
 Poskela, A.,3DV.2.78  
 Pospischil, M.,2CO.9.3,  
 2AV.2.26, 1CO.1.3  
 Poulain, G.,2AV.2.21, 2AV.2.33  
 Pouliquen, S.,2CV.2.26,  
 2AV.2.47, 2AV.2.21, 2AV.2.37,  
 2AV.2.49  
 Poulsen, P.B.,6BV.2.29,  
 5DV.3.40, 5BV.4.78  
 Powalla, M.,3BO.10.1, 3BO.9.2  
 Prael, C.,6DO.6.5  
 Prakash, S.,6BV.2.41  
 Prasath, R.G.R.,2AV.1.32  
 Prathibha Jasti, N.,3DV.2.102  
 Pratt, J.,5DV.3.39

Pravettoni, M.,5BO.6.3,  
 6BV.2.37  
 Preet, S.,6BV.3.101  
 Preis, P.,2CV.2.77  
 Preissler, N.,2BP.1.5  
 Preston, T.J.,2AV.1.5  
 Preu, R.,2CO.11.1, 2CV.2.65,  
 2DO.1.3, 2CO.9.3, 2CV.2.33,  
 2AO.6.1, 7DO.9.4  
 Price, K.J.,3DV.2.17  
 Prina, M.G.,6EO.2.1  
 Procel Moya, P.,2DO.2.6,  
 2DO.2.3  
 Prunici, P.,3CV.1.49  
 Psaltis, D.,1CO.2.2  
 Psimopoulos, E.,6BV.3.81  
 Puerto, B.,6BV.3.53, 5DV.3.9  
 Puigdollers González,  
 J.,3DV.2.32  
 Pulles, L.,7DO.8.6  
 Purohit, Z.,5BV.4.55  
 Puska, M.,3BO.10.1  
 Puthen-Veetil, B.,1CV.3.38  
 Putra, D.,2AV.3.9  
 Pylinin, A.I.,3DV.2.57  
 Pysch, D.,2CO.9.1  
**Q**  
 Qiu, D.,2AV.3.24  
 Qiu, K.,2AV.3.17, 2AV.3.24  
 Qiu, W.,3CO.4.5, 3DV.2.90  
 Qu, F.,3CV.1.8, 3CV.1.30  
 Qu, Y.,1CV.3.42  
 Quaranta, S.,3DV.2.92  
 Quaschnig, V.,6BV.2.48  
 Queck, M.,5BV.4.10  
 Queißer, S.,2AV.2.15  
 Quesnel, F.,6DO.11.5, 1CV.3.56  
 Quiles, P.G.V.,6BV.3.35  
 Quinto, C.,3DV.2.71, 3DV.2.56

**R**  
 Raadik, T.,3CV.1.48  
 Raappana, M.,4CV.4.12  
 Rabanal-Arabach, J.,1CV.3.90,  
 2CV.2.44, 1CV.3.35, 5DV.3.27  
 Rabe, S.,7EO.3.4  
 Radfar, B.,2AV.2.48  
 Rafael, H.,2AV.1.24  
 Rafiee, M.,1CV.3.59, 1CV.3.74  
 Raghavan, S.,4CV.4.8, 1CV.3.47  
 Raghu, N.,4CV.4.18  
 Ragonesi, A.,2DO.1.2  
 Raguét, A.,7DO.8.6  
 Rahab, H.,2AV.1.20  
 Rahman, A.,7DV.1.3  
 Rahman, K.S.,1CV.3.65,  
 3DV.2.13, 3CV.1.53  
 Rahman, M.,6BV.2.20  
 Rahmani, A.,6BV.3.41  
 Rajamanickam, R.,3DV.2.114  
 Rakocevic, L.,3DV.2.105  
 Rakotoniaina, J.P.,7DV.1.4  
 Ramasamy, P.,3DV.2.114  
 Rametta, G.,3DV.2.76  
 Ramirez, L.,6DO.6.5, 6BV.3.2  
 Ramírez, A.A.,3DV.2.31  
 Ranabhat, K.,3DV.2.57  
 Ranjan, R.,1CV.3.47  
 Ransome, S.,5CO.7.6  
 Raoufi, M.,6BV.2.18, 5BV.4.17  
 Rashid, H.,1CV.3.65  
 Rashkeev, S.N.,2BO.4.4  
 Rataj, R.,2AV.1.33  
 Rau, B.,3DV.2.12  
 Rau, U.,5CO.6.5  
 Ravindra, M.,4CV.4.18  
 Rawat, K.,1CV.3.17, 3CV.1.45  
 Ray, A.,2AV.3.38  
 Rayson, M.,3CV.1.21  
 Razongles, G.,5BV.4.25

- Razuvaev, A.,4CV.4.25  
 Razykov, T.M.,1CV.3.68  
 Razzaq, A.,2CO.12.4  
 Realpe, A.M.,6BV.1.11  
 Récaman Payo, M.,2AV.2.6  
 Rech, B.,3DV.2.107, 2BP.1.5, 3DV.2.65, 3DO.7.2  
 Reddy, A.G.,1AO.1.4  
 Redinger, A.,3AO.9.1, 3AO.9.5  
 Reginevich, M.,3CV.1.58  
 Regragui, M.,6BO.7.4  
 Rehan, S.,3CV.1.42, 3CV.1.28  
 Rehman Ansari, I.,3DV.2.43  
 Reichel, C.,2DO.2.1, 2DO.2.5  
 Reijenga, T.,7DV.1.29  
 Reil, F.,5BV.4.20, 5CO.5.2  
 Reimann, C.,2AV.1.10, 2AV.1.6, 2BO.1.1  
 Rein, S.,2CO.9.5, 2CV.2.41, 2CV.2.43, 2BO.1.3  
 Reinders, A.H.M.E.,6BV.3.77  
 Reindl, T.,5BV.4.79, 6BV.2.26, 6DO.6.3  
 Reineke-Koch, R.,2DO.2.2  
 Reinhard, P.,3BO.10.1  
 Reininghaus, N.,5BV.4.74, 5DV.3.19  
 Reiter, S.,2DO.2.2  
 Remans, D.,6DO.12.2  
 Remo, T.,1CV.3.93  
 Remund, J.,6BV.3.2  
 Renes, M.R.,2CV.2.79  
 Renken, C.,6CO.15.6  
 Renné, D.,6BV.3.2  
 Rentsch, J.,2CV.2.72, 2DO.1.3, 2AV.3.9, 2AV.3.8, 2AV.3.6  
 Repins, I.,5CO.6.6  
 Reshme, M.,7DV.1.3  
 Rest-Hinterseer, H.,7DV.1.18  
 Reuter, M.,5BV.4.77  
 Revesz, M.,6DO.11.4  
 Revina, A.A.,3DV.2.57  
 Rey, E.,6BV.3.47  
 Rey, N.,2DO.1.5  
 Reza, A.,2AV.2.36  
 Rezaei, N.,3DV.2.18  
 Rhein, H.,2CO.12.5  
 Ribeiro Galvão, L.C.,7DV.1.7, 6BV.3.10, 6BV.2.40  
 Ribeiro Gomes, L.F.,7DV.1.50  
 Ribeyron, P.J.,2DO.1.2, 2CV.2.72  
 Richards, B.S.,2AV.2.50  
 Richter, A.,2DO.3.1, 2CO.10.4, 2DO.2.1, 2DO.2.5  
 Richter, J.,2BO.3.2  
 Richter, M.,6CO.14.3  
 Richter, M.,3AO.8.5  
 Ricklefs, U.,5EO.1.6  
 Rico, E.,7DV.1.29  
 Riechelmann, S.,5BV.4.7, 5BO.6.4, 5BV.4.8  
 Riedel, D.,3BO.12.1  
 Riedel, N.,6BV.2.29, 5DV.3.40, 5BV.4.78  
 Riekehr, L.,3BO.10.4  
 Riemann, H.,2BO.1.5  
 Rienäcker, M.,1AP.1.2  
 Riepe, S.,2DO.3.1, 2BO.1.3, 2BO.3.6  
 Rigole, P.-J.,7EO.3.4  
 Riley, D.S.,6BV.2.35, 6CO.13.3  
 Rimmelspacher, L.,5CO.5.2  
 Rimpipi, A.,3DV.2.37  
 Ringleb, F.,7DV.1.30, 3CV.1.48  
 Riou, O.,2AV.2.49  
 Riva, R.,2AV.1.23  
 Rivat, P.,5EO.1.5  
 Riverola, A.,2CV.2.50  
 Robert, S.,2AV.2.13  
 Roberts, M.B.,7DV.1.15  
 Robles, V.,3CV.1.36  
 Roca, F.,7DV.1.30, 1CV.3.92  
 Roca i Cabarrocas, P.,2AV.2.21  
 Roder, S.,2CO.9.5  
 Rodgers, S.,7DO.9.2, 6CO.16.5  
 Rodofili, A.,2CO.10.6  
 Rodrigues, G.K.L.,6BV.3.89  
 Rodrigues, S.,6BO.7.6  
 Rodríguez, J.,6BV.3.21  
 Rodríguez Gallegos, C.D.,6BV.2.26  
 Rodriguez Patarroyo, D.J.,6BV.3.7, 6BV.3.6  
 Rodríguez San Segundo, H.-J.,6BV.3.43  
 Rodríguez-Conde, S.,6CO.15.4  
 Roesch, A.,7DV.1.30, 7DO.8.6  
 Roesch, R.,7DO.8.3  
 Roescu, R.,2AO.5.6  
 Roest, S.,5CO.7.1  
 Rohde, J.,2CO.9.3  
 Rohit, R.,2CO.10.6  
 Roldán-Carmona, C.,3DV.2.100  
 Roligheten, R.,5EO.1.4, 2BO.1.2, 5DV.3.66  
 Roma, G.,3CO.3.4, 3DV.2.85  
 Román, E.,7DV.1.30  
 Romanyuk, V.,1CV.3.55  
 Romanyuk, Y.E.,3BO.11.6  
 Romeo, A.,3BO.9.5, 1CV.3.68, 3DV.2.118, 3AO.7.4  
 Romeo, N.,1CV.3.68  
 Romero, E.R.,3DV.2.31  
 Romero, P.,5DV.3.66, 5EO.1.4  
 Romijn, I.G.,2AO.4.6, 5BV.4.31, 2DO.3.2, 3DO.7.3  
 Rong, D.,5DV.3.38  
 Roozeman, R.,2CO.12.2  
 Roro, K.T.,6BV.1.16  
 Rosca, V.,5CO.5.1  
 Rosell, J.I.,4CV.4.22  
 Röth, J.,2CV.2.90  
 Rothacker, A.,1CO.2.5  
 Rotoli, P.,2DO.1.2  
 Rotter, S.,5DV.3.65  
 Rouby, F.,6DO.11.5  
 Rougieux, F.,2BO.2.5  
 Rounis, E.D.,6BV.3.50  
 Roux, C.,2DO.1.5, 2CO.10.2, 3DV.2.62  
 Roux, L.,2CV.2.76  
 Roy, S.,3AO.8.6  
 Roy Sharma, J.,1CV.3.52  
 Roy-Choudhury, K.,5DV.3.13  
 Rozanski, P.,2CV.2.80  
 Ruan, X.,2CV.2.87  
 Rudolph, D.,2AO.5.6, 1CV.3.90, 2CV.2.44  
 Rudolph, T.,2CO.9.6  
 Ruffini, F.,6DP.2.4  
 Ruiz, C.,7DO.8.3  
 Rüländ, E.,2CV.2.88  
 Rumolino, C.,7DO.8.6  
 Rumpler, M.,6BO.7.1, 6BV.2.3  
 Ruols, P.,6DO.11.5  
 Ruske, F.,3DO.7.2  
 Russell, R.,2BP.1.3  
 Rutsch, M.,6CO.15.6  
 Rutzinger, M.,4DO.4.4  
 Rynningen, B.,6BV.2.19  
 Ryu, S.,5DV.3.6, 5BV.4.36  
 Ryu, S.G.,2CV.2.3  
 Ryu, S.O.,3CV.1.9
- S**  
 Saad Hussein, N.,7DO.8.2  
 Saavedra, M.P.,4DO.4.1  
 Sacchetto, D.,3DO.7.5, 3CO.4.6  
 Sadewasser, S.,3BO.10.1  
 Sadono, A.,3BO.10.3  
 Sadovskaia, K.,7DO.8.1  
 Saelens, D.,6BV.3.49  
 Safarian, J.,2AV.1.1, 2AV.1.2

- Safieh, A.,5CO.5.4  
 Sagol, B.E.,7DV.1.24  
 Saha, H.,5DV.3.36  
 Sahbel, A.,6BV.1.41  
 Sahil, F.,3DO.7.5, 3CO.4.6  
 Sahoo, M.K.,1CV.3.41  
 Sai, H.,2AV.3.20  
 Saidi, M.N.,6BV.2.6  
 Saile, S.,7DV.1.48  
 Saint-Cast, P.,2CV.2.63, 2CO.11.1, 2CO.11.3, 2CV.2.65  
 Saito, T.,2AV.2.25  
 Sakata, I.,2AV.3.43  
 Sakhuja, M.,5BV.4.79  
 Sakuma, Y.,2CV.2.57  
 Sakurai, K.,5BV.4.53  
 Sala, G.,1AO.3.4  
 Salamo, G.J.,4DO.4.2  
 Salecki, S.,7DV.1.9  
 Salim Daher Vasconcelos, P.,5DV.3.47  
 Salis, E.,3BO.12.3, 5BV.4.6  
 Salles, M.,7DV.1.46  
 Salzberger, M.,4DO.4.4  
 Samain, L.,5DV.3.77, 3BO.11.3  
 Sampaio Garcia, L.,5DO.5.2  
 Sampath, W.,3CP.1.3  
 Sample, T.,5CO.7.3, 6CO.15.1  
 Samudra, G.S.,2AO.4.5  
 Sánchez, Y.,3BO.11.1  
 Sánchez López, J.G.,3DV.2.88  
 Sánchez-Friera, P.,5DV.3.9, 6BV.3.53, 6BV.3.54  
 Sánchez-Plaza, G.,7DV.1.30  
 Sanchiz, J.,6BV.3.21  
 Sancho-Martinez, D.,3CV.1.48  
 Sandholzer, M.,1CV.3.51  
 Sanfilippo, A.,7DV.1.10  
 Sankaran, M.,4CV.4.18  
 Sans, J.,2AV.1.6  
 Santamaría, F.,6BV.3.7  
 Santbergen, R.,2CO.12.1, 6CO.14.5, 6DO.6.6, 6BV.3.51, 2DO.3.2  
 Santhosh, N.,3DV.2.114  
 Santoleri, D.,1CO.2.5  
 Santos Oritz, P.,3DV.2.68  
 Sanvoisin, C.,5DV.3.73  
 Sanyal, A.,7DO.9.3, 5BV.4.80  
 Sanz Martinez, A.,5CO.5.3  
 Saraf, A.,3DV.2.19, 3DV.2.14  
 Saretta, E.,6BV.1.37  
 Sargent, E.H.,3CO.3.2  
 Sarikh, S.,6BV.2.18  
 Sartori, I.,6BV.3.69  
 Saßmannshausen, R.,6EO.2.6  
 Sato, A.,4DO.4.6  
 Sato, R.,5BV.4.76, 5DV.3.23, 5CO.6.3  
 Saucedo, E.,3AO.9.5, 3DV.2.17, 3DV.2.7, 3BO.11.1  
 Sauer, D.U.,6BV.1.38, 6CO.16.4  
 Sauer, R.,2AO.6.3  
 Saugar Gotor, E.,2CV.2.11  
 Savastru, D.,1CV.3.85  
 Savenije, T.,3CO.3.3  
 Savich, V.A.,5DV.3.32  
 Savin, H.,2CV.2.37, 2CV.2.30  
 Saykin, D.,2AV.3.12  
 Sayritupac, J.,6CO.13.5  
 Scalari, S.,2CV.2.72  
 Scardera, G.,2AV.2.42  
 Scarpulla, M.A.,3DV.2.24  
 Schaper, M.,2CO.9.6  
 Schaub, V.,5EO.1.6  
 Scheer, R.,3AO.9.3, 3CV.1.61  
 Scheerder, R.W.H.S.,2AV.3.2  
 Schenk, V.,5DV.3.16  
 Scherff, M.,5BV.4.41, 5BV.4.40  
 Schermer, J.J.,3CV.1.46  
 Scherrenburg, M.,6BV.1.31  
 Scheuerpflug, H.,6BV.1.44  
 Schichtel, J.,5DV.3.68  
 Schiebelsberger, B.,6DO.10.2  
 Schiepe, R.,2CV.2.36  
 Schindler, F.,2BO.2.4, 2BP.1.4, 2DO.3.1  
 Schlatmann, R.,2AV.3.3, 3DV.2.20, 3DV.2.65, 2BP.1.5, 3DV.2.12, 3AO.9.1  
 Schlegl, T.,7DO.8.2  
 Schlueter, A.,6DO.10.6  
 Schmeling, L.,6CO.14.4  
 Schmid, A.,1AO.2.3, 5BV.4.32  
 Schmid, A.,2BO.2.2, 2AV.1.40  
 Schmid, M.,7DV.1.30, 3CV.1.48  
 Schmidt, C.,6DO.12.4  
 Schmidt, J.,2AO.6.3, 2CO.9.4, 2BO.2.1  
 Schmidt, M.,3CO.4.2  
 Schmidt, M.,6BV.3.90  
 Schmidt, S.S.,3AO.9.1, 3AO.9.3  
 Schmidt, T.,6DO.6.5  
 Schmidt Davidsen, R.,5BV.4.78, 2CV.2.48, 2CV.2.27  
 Schmitz, D.,5BV.4.53  
 Schmitz, J.,2DO.3.2  
 Schmutz, N.,6BV.3.8  
 Schnabel, M.,1CV.3.93, 1AP.1.2  
 Schnabel, T.,3CV.1.51  
 Schneider, A.,5DV.3.8, 1CV.3.35, 1CV.3.90, 2CV.2.44, 5DV.3.9  
 Schneider, A.,6DO.11.4  
 Schneider, F.,3DV.2.65  
 Schneider, J.,5BV.4.49, 1CO.1.6, 2BO.3.2  
 Schneider, T.,3CV.1.61  
 Schneller, E.,2AO.6.6  
 Schnepf, J.,3AO.8.1  
 Schoen, T.,7DV.1.17  
 Schoenfelder, S.,2AO.5.5, 2BO.3.2, 2AV.1.22  
 Schoerg, F.,2CV.2.74  
 Schön, J.,2BO.4.2, 2BP.1.4, 2CV.2.36  
 Schönleber, L.,5DV.3.27  
 Schönmann, A.,2CO.9.6  
 Schoot, H.,3DV.2.6  
 Schorn, D.,3DV.2.5  
 Schorr, S.,3CV.1.41  
 Schouten, M.,2CV.2.49  
 Schram, W.,6DP.2.1  
 Schropp, R.E.I.,3CO.3.1  
 Schubert, C.,3BO.9.1  
 Schubert, M.C.,2CV.2.36, 2DO.3.1, 2BO.2.4, 2BP.1.4  
 Schüler, N.,2CV.2.29, 5BV.4.52  
 Schulte, M.,7EO.3.4  
 Schulte-Huxel, H.,2AV.2.20  
 Schultz, C.,3DV.2.65, 3DV.2.12  
 Schulze, A.,5BV.4.10  
 Schulze, R.N.,5BO.5.1  
 Schulze-Bubert, T.,5BV.4.8  
 Schuster, H.M.,6BV.3.98  
 Schüttauf, J.-W.,1CO.2.2  
 Schütze, M.,2CO.9.6  
 Schwabe, H.,2AV.1.22  
 Schwabedissen, A.,2CO.9.6  
 Schwanke, S.,2AV.1.6  
 Schwark, M.,6BV.2.21, 5DV.3.57, 5BV.4.56  
 Schwarz, B.,6CO.16.3  
 Schwarz, F.,3CV.1.49  
 Schweiger, M.,5CO.7.5, 5BV.4.20, 5CO.7.2  
 Schweitzer, A.,5BV.4.8  
 Scragg, J.J.S.,3BO.10.4  
 Sculati-Meillaud, F.,5DV.3.7  
 Sebbar, M.A.,5DV.3.33, 5DV.3.35, 4CV.4.24  
 Seckmeyer, G.,6DO.6.2

- Segadães, J.,6DO.11.6  
 Segawa, H.,3DV.2.63  
 Seidel, S.,2CV.2.7  
 Seidou Maiga, A.,1CV.3.25, 6BV.2.17  
 Seif, J.P.,2DO.2.4  
 Seifert, S.,5DV.3.72  
 Seitz, M.,5EO.1.4  
 Sellak, H.,7DV.1.23  
 Semenov, A.V.,2AV.3.12, 2AV.3.39  
 Semmache, B.,2AV.2.38  
 Sen, C.,2BO.2.3  
 Senaud, L.-L.,2DO.1.1  
 Sene, M.,6BV.2.17  
 Sengar, B.S.,1CV.3.39, 1CV.3.21  
 Sengupta, M.,6DO.6.4, 6BV.3.11  
 Senne, A.,2CO.9.3  
 Senthil Pandian, M.,3DV.2.114  
 Seo, I.,3CV.1.42  
 Sepali, M.M.I.,3DV.2.27  
 Sepers, T.,6DO.10.5  
 Sera, D.,6BV.2.29, 5CO.8.5, 5DV.3.53  
 Serameng, T.,6BV.1.16  
 Sérasset, M.,2AV.1.3  
 Serenelli, L.,2AV.3.18, 2AV.3.29, 2AV.3.30  
 Sergeev, O.V.,2AV.3.13, 5DV.3.32  
 Sergidou-Loizou, I.,7EO.3.4  
 Serpetzoglou, E.,3DV.2.52  
 Sethi, A.,1CV.3.81  
 Setkus, A.,2AV.2.36  
 Severino, N.,2AV.1.3  
 Seymen, R.,7EO.3.4  
 Shahahmadi, S.A.,3DV.2.27  
 Shakhray, I.,2AV.3.12  
 Shalvey, T.P.,3CV.1.27  
 Shanmugam, S.,3CO.4.5  
 Sharlandzhiev, I.,5BV.4.6  
 Sharma, A.,2AV.2.6  
 Sharma, R.,1CV.3.27  
 Sharp, G.D.,6BV.3.15  
 Shehzad, F.,7DV.1.8  
 Shelopin, G.,2AV.3.12, 2AV.3.39  
 Shen, H.,3CV.1.25  
 Shen, H.,2AV.3.24, 2AV.3.17  
 Shen, Q.,3DV.2.64, 3DV.2.104  
 Shen, Z.,2CV.2.84  
 Sheng, J.,2AO.6.4, 2CV.2.84  
 Sheng, Y.,1CV.3.18  
 Sherban, D.A.,3CV.1.41  
 Sherif, R.A.,6BV.1.21  
 Shi, J.,2AV.3.27  
 Shi, J.,5DV.3.38, 2CO.11.4, 2AV.2.11  
 Shi, L.,4CV.4.4  
 Shibata, H.,3BO.9.3, 3AO.7.2, 3BO.10.5, 5BV.4.53, 3AO.7.6  
 Shimura, S.,6BV.3.64  
 Shin, D.-Y.,1CV.3.98  
 Shin, G.S.,3CV.1.56, 2CV.2.10  
 Shin, H.-B.,4CV.4.9  
 Shin, M.,2CO.12.6, 2CV.2.9, 1CO.2.3  
 Shinde, N.M.,3CV.1.37  
 Shirai, Y.,3DV.2.61  
 Shirasawa, K.,2AV.2.25, 2CV.2.25, 2AV.1.30, 2AV.2.16  
 Shiripov, V.Y.,5DV.3.32, 3CV.1.58  
 Shishodia, G.,3CV.1.45  
 Shishodia, P.K.,1CV.3.17, 3CV.1.45  
 Shitanishi, H.,6BV.1.10  
 Shoji, Y.,1CV.3.40  
 Shvarts, M.Z.,4CV.4.16, 4CV.4.25  
 Si, F.T.,2CO.12.1, 2CV.2.14, 6BV.3.51  
 Siadat, M.,3CV.1.29  
 Sicot, L.,5BV.4.25  
 Siebentritt, S.,3AO.8.4, 3BO.10.1  
 Sieber, M.,2CO.9.1  
 Siegwart, R.,6BV.2.46  
 Siepchen, B.,3CV.1.52, 3DV.2.14, 3CV.1.14, 3CV.1.17, 3CV.1.16, 3CV.1.13, 3DV.2.19  
 Siew, Y.F.,6BV.3.19  
 Silva, A.M.,6BV.1.8  
 Silva, C.,6BV.3.53, 6BV.3.54  
 Silva, F.,2AV.2.37, 2AV.2.21  
 Silva, V.O.,6BV.3.10, 7DV.1.46, 6BV.2.40  
 Silva Simplicio, R.,6CO.13.2, 6BV.1.5, 6BV.3.64  
 Silverman, T.,5CO.6.6  
 Silvestre, S.,3DV.2.32  
 Simashkevich, A.V.,3CV.1.41  
 Simayi, S.,2AV.2.16  
 Simor, M.,3CV.1.7  
 Sinapis, K.,6CO.13.1, 6DO.12.6  
 Singh, A.K.,5DV.3.15  
 Singh, F.,3CV.1.45  
 Singh, R.,5DV.3.15  
 Singh, S.,2AV.2.6  
 Singh Rajput, A.,5BV.4.79  
 Sinha, A.,3AO.8.6, 5CO.8.6, 5DV.3.20  
 Sinha, P.,5DP.1.4, 5EO.1.1  
 Sinton, R.,2AO.6.6  
 Sisó, G.,4CV.4.22  
 Sissoko, G.,1CV.3.4, 1CV.3.3  
 Sites, J.R.,3CP.1.3  
 Sittinger, V.,3DV.2.5  
 Sivaramakrishnan Radhakrishnan, H.,2AV.3.14, 2CO.12.2, 2AV.1.3, 2BO.3.4, 2AV.3.26, 2CO.12.4  
 Skoczek, A.,6BV.2.37  
 Skorka, D.,2AV.1.40, 2BO.2.2  
 Skripkin, K.S.,3DV.2.57  
 Slade, R.,7DO.9.5  
 Slamberger, J.,5BV.4.56  
 Slavney, A.,3CO.3.3  
 Slivkin, E.V.,2AV.1.14  
 Slocum, M.A.,4CV.4.6  
 Slooff, L.H.,6DO.10.5, 6BV.3.42  
 Slostowski, C.,5DV.3.73  
 Smail, B.,4CV.4.20  
 Smets, A.H.M.,2CO.12.1, 1CO.2.6, 5BV.4.21, 6DO.6.6, 3DV.2.4  
 Smirnov, A.,1CV.3.11, 2AV.3.12  
 Smit, J.,6EO.2.6  
 Smith, W.,1CO.2.6  
 Smith, Y.R.,5DV.3.67  
 Smolders, F.,6BO.7.3  
 Snaith, H.,1CV.3.15  
 So, W.-S.,5BV.4.35  
 Soares dos Reis, F.,1CV.3.95, 6BV.3.71  
 Sobayel, K.,3DV.2.13  
 Sodabanlu, H.,1CV.3.22  
 Sode, M.,3BO.9.1  
 Söderström, K.,6BV.3.60  
 Söderström, T.,5DV.3.5, 2CV.2.72  
 Sofronova, E.A.,3DV.2.57  
 Soha, M.,2AV.2.13  
 Solodovnyk, A.,3BO.12.1  
 Solodukha, V.A.,3CV.1.50  
 Soltanpoor, W.,3DV.2.75, 3DV.2.73  
 Sommeling, P.M.,7DV.1.30, 1CO.1.2  
 Son, D.I.,1CV.3.75  
 Song, D.,5DV.3.38, 2CO.11.4, 2AV.2.11  
 Song, H.-E.,2BO.3.3  
 Song, H.,1CV.3.98  
 Song, W.M.,2CV.2.59

- Sonne, M.,7DV.1.9  
 Sonnleitner, H.,6BV.1.34, 6BO.8.3  
 Sonntag, P.,2BP.1.5  
 Sopian, K.,3DV.2.27, 3CV.1.53  
 Sorensen, J.,6BV.2.2  
 Sørnes, K.,6BV.3.69  
 Soubdhan, T.,6BV.3.12  
 Soulima, V.,5DV.3.37  
 Souren, F.,2CV.2.79  
 Sousa, D.,6BV.3.53  
 Souza, A.C.,6BV.1.8  
 Souza da Silva, R.,7DV.1.50  
 Soytas, U.,6BV.1.17  
 Sozzi, G.,3BO.10.1  
 Spada, F.,6BV.3.16  
 Spataru, S.V.,5CO.8.5, 5DV.3.53, 6BV.2.29  
 Späth, B.,3CV.1.16, 3CV.1.13, 3CV.1.52, 3CV.1.14, 3CV.1.17  
 Sperber, D.,2AV.1.39  
 Spielberg, M.,6BV.1.34, 6BO.8.3  
 Spiliotis, K.,5BV.4.9  
 Spinelli, P.,2AV.3.7, 2CO.11.6, 2AV.3.2  
 Sporleder, K.,2CV.2.47  
 Spribille, A.,2CV.2.70  
 Sproul, A.B.,6BV.3.104  
 Sraisth, S.,2CV.2.93  
 Stadlbauer, E.A.,5EO.1.6  
 Stahr, F.,2AV.3.15  
 Stanchik, A.V.,3CV.1.50  
 Stange, H.,3AO.9.1, 3AO.9.3  
 Stangl, R.,2AO.4.5, 3DV.2.98  
 Stannowski, B.,2AV.3.3, 3DO.7.2, 3CV.1.59  
 Steckenreiter, V.,2CO.9.4  
 Stefancich, M.,5CO.5.4  
 Stegemann, B.,3DV.2.65, 3DV.2.12  
 Stein, J.S.,6BV.3.28, 6BV.2.35, 6CO.13.3  
 Steiner, M.,1CV.3.93  
 Steinhauser, B.,2DO.3.3, 2CO.10.4  
 Steinkemper, H.,2CV.2.36  
 Stellbogen, D.,3AO.8.1, 5DV.3.25  
 Stendera, J.,2DO.1.2  
 Sterian, P.,1CV.3.85  
 Stern, E.,3BO.12.1  
 Steunou, N.,3DV.2.85  
 Stevens, H.G.,5EO.1.6  
 Stika, K.M.,5DV.3.13  
 Stöckli, U.,6BV.2.48  
 Stodolny, M.K.,2AO.4.6, 2DO.3.2  
 Stoicescu, L.,5BV.4.77  
 Stokkan, G.,2BO.1.2  
 Stollenwerk, J.,3DV.2.6  
 Stolt, L.,3BO.10.4, 3AO.9.2, 3CP.1.2, 3BO.10.2  
 Stolz, P.,5EO.1.3, 5DP.1.4  
 Stölzel, M.,3BO.9.1  
 Strachala, D.,6BV.1.46, 3DV.2.45, 5DV.3.22  
 Stradins, P.,1AP.1.2  
 Strahm, B.,2DO.1.4, 5DV.3.5, 2CV.2.72, 2DO.2.4  
 Stratakis, E.,3DV.2.52  
 Sträter, H.,2CV.2.36  
 Straub, B.,2AV.2.15  
 Strauch, T.,2BO.1.3  
 Stridh, B.,6BV.2.33  
 Strinitz, F.,2CV.2.74  
 Strobel, C.,2AV.3.15  
 Strobel, M.B.,5CO.6.4  
 Stroe, D.,5DV.3.53  
 Strueben, J.,1CV.3.71  
 Stuckelberger, J.,2BO.4.3, 2AV.3.4, 2BO.4.1  
 Sturm, M.,5DV.3.22  
 Stutterheim, S.,7DV.1.29  
 Su, W.-F.,3CO.4.4  
 Su, X.,2AV.2.9, 2CO.10.1  
 Sugaya, T.,1AO.3.1  
 Sugimoto, H.,3CP.1.1  
 Sugita, T.,3DV.2.49  
 Sugiura, H.,3AO.7.1  
 Sugiyama, M.,1CV.3.22, 1AO.1.4  
 Suh, D.,2AV.2.51  
 Sukhareva, N.,4CV.4.25  
 Sumita, I.,2AV.2.23  
 Sumner, M.,6BV.3.79, 6CO.14.6  
 Sun, H.,2AV.3.31  
 Sun, K.,3BO.11.2  
 Sun, Q.,3BO.9.4, 4CV.4.4, 4CV.4.15  
 Sun, R.,3CV.1.43, 3CV.1.34  
 Sun, Y.,5BV.4.23  
 Sunder, K.,2AV.1.33  
 Surguy, P.,7DV.1.29  
 Sütthoff, L.,5DV.3.1  
 Sutou, Y.,2AV.2.25  
 Sutta, P.,1CV.3.16  
 Sutterluetli, J.,6BV.2.13  
 Suvorov, D.V.,6BV.3.80, 2AV.1.14  
 Suzuki, N.,2AV.1.30  
 Suzuki, R.,2AV.1.41  
 Svensson, B.G.,1CV.3.85  
 Svetozarevic, B.,6DO.10.6  
 Swanson, D.,3CP.1.3  
 Sweatt, W.C.,4DO.4.1  
 Symonowicz, J.K.,5DV.3.40  
 Syu, H.-J.,2AV.3.36  
 Syvertsen, M.,2AV.1.19, 2CO.12.2, 5DV.3.71  
 Szczepanik, W.,1CO.1.6  
 Szlufcik, J.,2CV.2.45, 1CO.2.4, 2BP.1.3, 2AV.2.6, 2BO.3.4, 2AV.2.13, 2AO.5.1, 2AV.3.14, 5BV.4.45, 5BO.5.2, 2AV.3.26
- T**  
 Tabakovic, M.,7DV.1.32  
 Tabet, N.,1CV.3.65, 2CV.2.24, 2BO.4.4  
 Tachibana, S.,2AV.1.13  
 Taguchi, N.,3BO.9.3  
 Taha, M.,6BV.1.41  
 Tahir, A.,7DV.1.8  
 Tahzib Enam, F.M.T.,3DV.2.13, 3CV.1.53  
 Tai, K.F.,3CP.1.1  
 Takahashi, H.,3AO.7.6  
 Takahashi, I.,2AV.3.11  
 Takahashi, Y.,5BV.4.24, 6BV.1.45  
 Takahashi, Y.,2BP.1.1  
 Takata, N.,3DV.2.103  
 Takato, H.,1AO.3.1, 2CV.2.25, 2AV.1.30, 2AV.2.16  
 Takenouchi, T.,5BO.6.5  
 Taleb, A.,1CV.3.60  
 Tallián, M.,2CV.2.72  
 Tamaki, R.,4DO.4.5  
 Tamakoshi, M.,3DV.2.49  
 Tamboli, A.,1CV.3.93, 1AP.1.2  
 Tampo, H.,3AO.7.2  
 Tamtaoui, A.,6BV.2.6  
 Tan, H.,3CO.3.2, 2CO.12.1  
 Tan, M.,4CV.4.13  
 Tan, X.,3DV.2.14, 3DV.2.19  
 Tanahashi, K.,2AV.1.30, 2AV.2.16, 2CV.2.25  
 Tanahashi, T.,5CO.8.4  
 Tanaka, A.,2AV.2.30  
 Tanaka, S.,3BO.9.3  
 Tanaka, T.,5BV.4.13  
 Tanaka, T.,6BV.3.84  
 Tanase, T.,5BV.4.24  
 Tang, M.,4DO.4.2  
 Tang, W.-C.,1AO.2.4  
 Tang, Y.,4CV.4.4

- Tao, K.,2AV.3.13  
 Tao, M.,5DV.3.68, 6BV.3.93  
 Tarabrin, D.Y.,2AV.1.14  
 Tarasov, V.,2AV.3.12  
 Tauke-Pedretti, A.,4DO.4.1  
 Tauqeer, T.,2CV.2.66  
 Tavares Pinho, J.T.,5DV.3.43, 6BV.2.16, 6BV.1.22, 6BV.2.4  
 Tay, A.,2CV.2.59  
 Tay, H.C.S.,5BV.4.2  
 Tayagaki, T.,1AO.3.1, 3BO.10.5  
 Taylor, J.,6BV.3.19  
 Taziwa, R.,3DV.2.81, 3DV.2.103, 3DV.2.8  
 te Heesen, H.,6BO.7.1, 6BV.2.3  
 Teale, L.,2BO.1.1  
 Tedeschi, G.,3DV.2.118  
 Telle, J.-S.,6BV.3.96  
 Temmler, J.,2AV.3.9  
 ten Haaf, S.,3CP.1.2  
 Teppe, A.,2CO.9.2  
 Terashima, S.,2AV.3.37  
 Terashita, T.,2BP.1.1  
 Terukov, E.I.,2AV.3.39, 5BV.4.33, 2AV.3.12  
 Terukova, E.,2AV.3.12  
 Tetzlaff, D.,2DO.2.2  
 Teubner, J.,5DV.3.1  
 Teubner, T.,2CV.2.15  
 Teunissen, E.,7DV.1.31  
 Tevi, G.-J.-P.,6BV.2.17  
 Teymouri, A.,1CV.3.44  
 Thalfeldt, M.,6BV.3.46  
 Thaller, D.,5DV.3.9  
 Theelen, M.,3CV.1.39, 3CV.1.46, 3CV.1.2, 3CV.1.62  
 Thellen, C.,1CO.2.5  
 Theobald, J.,2AO.5.6, 2AV.2.12, 2CV.2.23, 2CV.2.91  
 Theocharides, S.,6DP.2.3  
 Theophil, L.,2AV.1.29  
 Theristis, M.,4CV.4.30  
 Thersleff, T.,3AO.9.2  
 Thevenin, P.,3CV.1.29  
 Thi-Trinh, C.,2BP.1.5  
 Thomas, D.,6BV.3.99  
 Thomas, J.,6BV.3.87  
 Thomas, R.,7DV.1.4, 7DV.1.25  
 Thomson, A.,1CO.1.5  
 Thorseth, A.,5BV.4.78, 6BV.2.29  
 Thorsteinsson, S.,6BV.2.29, 5DV.3.40, 5BV.4.78  
 Thurnheer, J.,1CV.3.69  
 Tian, G.,2AV.3.34  
 Tian, K.-Y.,3CO.4.4  
 Tian, P.,2CO.9.2  
 Tian, Y.,1CV.3.16  
 Tien, C.-H.,4CV.4.1  
 Tiihonen, A.,3DV.2.78, 3DV.2.47  
 Tilli, F.,6BV.3.36, 7EO.3.1  
 Timakov, V.,2AV.3.12  
 Timmel, S.,2AV.2.46  
 Timò, G.,4CV.4.14  
 Timoshina, N.K.,1CV.3.11  
 Tippabhotla, S.K.,2CV.2.59  
 Tirapu, M.,6CO.15.3  
 Titov, A.,2AV.3.12, 5BV.4.33  
 Tiwari, A.N.,3CO.4.3, 3DO.7.4, 3BO.11.6, 3CV.1.60, 3BO.10.1  
 Tjaden, T.,6BV.2.48  
 Toki, S.,3AO.7.1  
 Tokuda, S.,5BV.4.53  
 Toledo Arias, C.A.,6BV.3.59, 3DV.2.53  
 Tomasella, E.,1CV.3.14  
 Tomasi, A.,2DO.2.4  
 Tomchinsky, A.,2AV.3.12  
 Tominaga, H.,3DV.2.23, 3DV.2.104  
 Tomita, H.,5BV.4.53  
 Tondelier, D.,3CO.3.4, 3DV.2.85  
 Tonezzer, M.,4CV.4.17  
 Tonini, D.,1CO.1.1  
 Tonnhöfer, M.,6DO.11.3  
 Tonouchi, M.,2CV.2.25  
 Toor, F.,6BV.2.35, 6CO.13.3  
 Topic, M.,3BO.12.1, 7DV.1.48, 5BV.4.63, 5DV.3.56, 5BV.4.57, 1AO.1.3  
 Torardi, C.C.,2AV.2.42  
 Tornabene, D.,7EO.3.4  
 Törndahl, T.,3BO.10.2  
 Tosi Furtado, A.,7DV.1.47  
 Tous, L.,2BP.1.3  
 Toyoda, T.,3DV.2.104, 3DV.2.64  
 Toyosaki, M.,6BV.1.10  
 Tracy, J.,5BO.5.3  
 Tran, S.,2AV.2.38  
 Tranell, G.,2AV.1.1  
 Travesset-Baro, O.,6BV.3.34  
 Treideris, M.,2AV.2.36  
 Trempa, M.,2AV.1.10, 2BO.1.1  
 Trentmann, J.,6BV.3.4  
 Trespido, F.,4CV.4.14  
 Treyer, D.,2AV.1.24  
 Tri Hai, H.,2AV.2.25  
 Trigo, J.F.,3CV.1.36, 7DV.1.30  
 Trimmel, H.,6DO.11.4  
 Tripathi, B.,5BV.4.55  
 Trout, T.-J.,5BO.5.6, 5DV.3.13  
 Trube, J.,2AO.6.1  
 Trupke, T.,5BV.4.65, 2AO.4.2, 2AO.5.3  
 Tsafarakis, O.,6CO.13.1, 6BV.2.30  
 Tsai, M.-A.,5BV.4.42, 3BO.12.6  
 Tsai, S.Y.,3CV.1.3  
 Tsanakas, I.,5DV.3.34  
 Tsao, C.-P.,2AV.2.3  
 Tselepis, S.,7EO.3.4, 7DV.1.2  
 Tsukamoto, D.B.,6BV.1.8  
 Tsuno, Y.,5BV.4.68  
 Tsutagawa, M.,4CV.4.3  
 Tu, J.,1CV.3.18  
 Tucci, M.,4CV.4.23, 2AV.3.30, 2AV.3.29, 2AV.3.18, 2CV.2.72  
 Tucher, N.,1AP.1.3, 2AO.5.4  
 Tugaenko, V.,4CV.4.25  
 Tukiainen, A.,4CV.4.12  
 Tummers, P.,1CV.3.77  
 Tunheim, K.,6BV.3.69  
 Turan, R.,2AV.2.48, 7DV.1.30, 2CV.2.66, 1CV.3.42, 2AO.4.3, 2CV.2.8  
 Turchetti, S.,2BO.1.6  
 Turconi, R.,5DV.3.77  
 Turek, M.,2CO.11.2, 2CV.2.47, 5BV.4.71, 5BV.4.49, 1CO.1.6  
 Turkay, D.,3DV.2.73  
 Turpin, M.,6BV.3.8  
 Tutsch, L.,2AV.3.8  
 Tyagi, R.,4CV.4.8  
 Tzikas, C.,5BV.4.21, 6BV.3.42  
**U**  
 Uchida, S.,3DV.2.63  
 Uddin, S.,3DV.2.43  
 Uebel, D.,2CV.2.15  
 Ueno, Y.,3AO.7.6  
 Uithol, J.,6BV.1.31  
 Újvári, G.,5BV.4.4  
 Ulbikas, J.,7EO.3.3  
 Ullmann, I.,1CV.3.90, 2CV.2.44  
 Ulrich, B.,6BV.3.92  
 Ulyashin, A.G.,5DV.3.71, 2AV.1.3, 2CO.12.2, 2AV.1.19, 2AV.1.18, 2AV.2.43  
 Uma, B.R.,4CV.4.18  
 Uma, R.,1CV.3.27  
 Umer, M.,2AV.3.26, 2CO.12.4  
 Ünalán, H.E.,1CV.3.42  
 Underwood, C.I.,3CV.1.12  
 Unger, E.,3DV.2.107



- Uno, F.,6BV.3.14  
 Unold, T.,3AO.9.1, 3AO.9.5  
 Urabe, S.,4DO.4.6  
 Urazov, K.A.,3DV.2.22  
 Urban, T.,5BV.4.71  
 Urbina, A.,6BV.3.59, 3DV.2.53  
 Uredat, S.,2CV.2.85  
 Usami, N.,2AV.3.11  
 Usatii, I.,2AV.3.16, 2AV.3.18  
 Uto, T.,2BP.1.1  
 Utsunomiya, S.,2AV.2.16
- V**  
 Vachhani, L.,6BV.2.42  
 Vainikka, P.,7DO.8.1  
 Väisänen, K.-L.,3BO.12.5  
 Vaissiere, N.,2AV.2.21  
 Valckenborg, R.M.E.,6DO.10.4, 7DV.1.31  
 Välimäki, M.,3BO.12.5  
 Valkealahti, S.,6CO.13.6  
 Valla, A.,2DO.1.2  
 Vallavanti, R.,6BV.2.36  
 Vallerotto, G.,1AO.3.4  
 Vallés, M.,7DV.1.21  
 Van Aken, B.B.,5BV.4.39, 5BV.4.31  
 van Beurden, S.,7DO.8.6  
 van Dam, D.,1AO.1.2  
 van de Groep, J.,1CV.3.23  
 van de Loo, B.W.H.,2AV.3.2, 2DO.3.2, 2AV.3.7, 2CO.11.6  
 van de Wall, W.,7DV.1.31  
 van de Zande, M.,4CV.4.26  
 van Deelen, J.,3CV.1.6, 1CV.3.6, 3CV.1.7, 1AO.2.6  
 van den Bossche, M.,2DO.1.5  
 Van den Broeck, G.,5BV.4.9  
 van den Bruele, F.,3DV.2.82, 3CV.1.46  
 van den Donker, M.N.,5BV.4.21, 6DO.12.6, 6DO.10.1, 6BV.3.44  
 van den Hurk, L.,7DV.1.31  
 Van der Giessen, A.,7DV.1.26  
 van der Graaf, D.,6DO.12.3  
 van der Heide, A.,5BO.5.2, 2AO.5.1  
 van der Heide, O.,3CV.1.26  
 van der Horst, A.J.C.,2CV.2.65  
 van der Lugt, R.,7DO.9.6  
 van der Meer, D.,6BV.3.86  
 van der Ree, B.,7DO.9.6  
 van der Sluys, M.,6BV.3.20  
 van der Werf, K.,3CV.1.7  
 van Deursen, A.,7DV.1.31  
 van Doorene, S.,1CV.3.16  
 van Duijnhoven, F.,5DV.3.12  
 van Dyk, E.E.,6BV.1.16, 6BV.3.15  
 van Gils, R.,3CO.3.1  
 van Heesbeen, J.,7DO.9.6  
 van Hemel, C.,7DO.9.6  
 van Hoof, N.J.J.,1AO.1.2  
 van Hoolwerff, M.,6BV.2.30  
 Van Iseghem, M.,7DV.1.48  
 van Kan, P.J.M.,6BV.3.20  
 van Lith, B.,6BV.1.31  
 van Maaren, R.,7DO.8.6  
 van Mechelen, X.,6BV.2.11  
 Van Nieuwenhuysen, K.,2BO.3.4, 2CO.12.4, 2AV.3.14, 2CO.12.2, 2AV.3.26, 7DV.1.30  
 van Noord, M.,6BV.1.43  
 van Put, M.,6DO.12.2  
 Van Roosmalen, J.A.M.,6DO.10.5  
 van Rooy, W.L.,6BV.1.3  
 van Sark, W.G.J.H.M.,6BV.1.49, 6BV.3.102, 6BV.1.31, 7DO.9.6, 6BV.2.30, 7DV.1.32, 6EO.2.5, 6BO.7.5, 7DV.1.31, 6CO.13.1, 6DP.2.1, 7DV.1.17, 6BV.3.13  
 van Schie, R.,2CV.2.14  
 van Swaaij, R.A.C.M.M.,2CV.2.14, 2CO.12.1  
 van Til, M.,6BV.2.30  
 van Veldhoven, R.P.J.,1AO.1.2  
 van Vliet, D.,6DO.12.2  
 van Voorden, E.,7DO.9.6  
 van Zomeren, A.,5DV.3.72  
 Vanek, J.,6BV.1.46, 3DV.2.45, 5DV.3.22  
 Vannier, G.,6BV.2.27, 5DV.3.37  
 VanSant, K.,5CO.6.2  
 Vanstreels, K.,2BO.3.4  
 Varache, R.,2CO.10.2, 2DO.1.5  
 Vardavoulis, M.,2AV.1.18  
 Varela, C.,7DV.1.26  
 Vargas Castrillon, C.,2AV.1.38  
 Vartiainen, E.,7DO.8.4  
 Vasileska, D.,2DO.1.6  
 Vasiliu, C.,1CV.3.85  
 Vasudevan, R.,1CO.2.6  
 Vauche, L.,4DO.4.3  
 Veau, A.,2CV.2.76, 2AV.2.38  
 Vedde, J.,6BV.2.29  
 Veeken, T.P.N.,1CV.3.23  
 Veenstra, S.C.,7DV.1.30, 3CO.4.5, 3DO.7.3, 3DV.2.90, 3DV.2.82, 3DV.2.70  
 Vehse, M.,5BV.4.74, 5DV.3.19, 2AV.3.13  
 Veiga Gimenes, A.L.,7DV.1.7, 7DV.1.46, 6BV.3.10, 6BV.2.40  
 Veinberg Vidal, E.,4DO.4.3  
 Veirman, J.,2AV.1.34, 2CO.10.2, 2DO.1.5  
 Velasco, A.,6CO.15.4, 6BO.8.6  
 Velet, N.,2AV.1.23  
 Velzeboer, I.,5DV.3.72  
 Venâncio Camillo, E.,7DV.1.47  
 Venema, P.R.,2BP.1.2, 2CV.2.79  
 Venizelou, V.,6DP.2.3  
 Verbeek, G.,6BO.7.3  
 Verdilio, D.,4CV.4.24  
 Verhees, W.,3DO.7.3, 3DV.2.70  
 Verheijen, M.A.,1AO.3.3  
 Verissimo, J.,6BV.2.16  
 Verkuilen, S.,6BV.3.42  
 Verlinden, P.J.,5CO.6.2, 5BV.4.43, 2CO.11.5  
 Verma, A.,3DV.2.113  
 Verma, R.,3BO.9.1  
 Vermang, B.,3CV.1.62, 3BO.11.4, 3BO.11.5  
 Vernay, C.,6BV.1.11  
 VerNooy, P.D.,2AV.2.42  
 Verpaalen, G.,7DV.1.31  
 Versluijs, J.P.,6BV.2.30  
 Vervaart, M.,6CO.15.2  
 Vesce, L.,3CO.4.2  
 Veschetti, Y.,6CO.13.5  
 Vetter, A.,3AO.8.2  
 Vetter, M.,2CV.2.19  
 Victoria Pérez, M.,1AO.3.4  
 Vidal Lorbada, R.,3AO.8.3  
 Vieira, M.,1CV.3.76, 2CV.2.16  
 Vignal, R.,5DV.3.77  
 Vigneron, J.,3DV.2.85  
 Vijay, V.,6BV.3.17  
 Vilalta-Clemente, A.,3BO.10.1  
 Vilarrubi, M.,4CV.4.22  
 Vilella, M.,6BV.3.34  
 Vilkmán, M.,3BO.12.5  
 Villani, F.,3CV.1.48, 1CV.3.92  
 Vincenzi, D.,4CV.4.17  
 Virtuani, A.,7DV.1.41, 5DV.3.7, 6BV.2.37, 6BV.3.62  
 Visentin, A.,7DV.1.24  
 Vismara, R.,1CV.3.16, 1AO.3.6, 3AO.7.3  
 Viterisi, A.,3DV.2.88  
 Vlasov, A.,1CV.3.11  
 Vlieg, E.,3CV.1.46

Vlooswijk, A.H.G.,5BV.4.39,  
2CO.11.6  
Vogl, M.,3CP.1.2  
Voicu, N.,1CV.3.77  
Voigt, O.,2CO.9.2  
Völker, R.,6BV.3.96  
Vollert, N.,6BV.2.21, 6BV.1.35  
von Gastrow, G.,2CV.2.37  
von Maydell, K.,6EO.2.6,  
6CO.14.4, 6BV.3.96  
Voronko, Y.,6BO.8.3, 5DV.3.17,  
6BV.2.21, 5DV.3.18, 6BV.1.35,  
6BV.1.34, 5BV.4.72, 6DO.11.3  
Voroshazi, E.,5BO.5.2,  
5BV.4.45, 1CO.2.4, 5CO.6.1,  
2CV.2.45, 2AO.5.1  
Vorster, F.J.,6BV.1.16  
Voss, H.,6BV.2.29  
Vossen, F.,6DO.10.1  
Vosteen, K.,2CO.9.1  
Voswinkel, S.,5BV.4.30  
Voznyy, O.,3CO.3.2  
Vrenegor, M.,3AO.8.5  
Vroon, Z.,7DV.1.31, 3DV.2.18,  
3DV.2.4, 3CV.1.7  
Vuilleumier, L.,6DO.6.5  
Vygranenko, Y.,2CV.2.16,  
1CV.3.76

**W**

Wächter, R.,3BO.10.1  
Wäckelgård, E.,6BV.2.33  
Wackerlin, A.,3DO.7.4  
Wade, A.,5DP.1.4, 5EO.1.1,  
5EO.1.2  
Wägele, L.A.,3AO.9.3  
Wagner, M.,2AV.1.37  
Wagner, R.,6BV.3.41  
Wahl, T.,3DV.2.74  
Wahlmüller, J.,7DO.8.6  
Walla, T.,7EO.3.4  
Wallendorf, T.,3DV.2.5  
Wallin, E.,3CP.1.2, 3AO.9.2

Walls, J.M.,3BO.9.5  
Walsh, A.,1AP.1.1, 1CV.3.29  
Walsh, W.,6DO.6.3  
Wälten, J.,6CO.15.6  
Walter, A.,3DO.7.5, 3CO.4.6  
Walter, D.,3DV.2.80  
Walter, D.C.,2CO.9.4, 2BO.2.1  
Walter, T.,3AO.8.3  
Wambach, K.,2BO.1.2,  
5DV.3.66, 5EO.1.4  
Wang, C.-C.,2AV.2.3  
Wang, E.-Y.,3BO.12.6, 5DV.3.10  
Wang, E.C.,2BO.4.5  
Wang, F.,6BO.8.1  
Wang, H.,4CV.4.15, 3BO.9.4,  
4CV.4.4  
Wang, H.,6BO.8.1  
Wang, H.,2AV.2.11  
Wang, J.-C.,2AO.6.2  
Wang, L.,3CV.1.11, 3CV.1.48  
Wang, L.,4CV.4.28  
Wang, L.-T.,2AV.2.27  
Wang, L.,4CV.4.4  
Wang, Q.,2AV.1.7, 2AV.1.8  
Wang, S.,3DV.2.55  
Wang, S.,2AV.1.36  
Wang, T.Y.,2AV.1.28  
Wang, T.,1CV.3.29, 1AP.1.1,  
1CV.3.15  
Wang, T.,2CO.10.1  
Wang, W.,2AO.6.4, 2CV.2.84  
Wang, W.,3CV.1.30, 3CV.1.8  
Wang, X.,5BO.5.1  
Wang, Y.,3CO.3.6  
Wang, Y.,5CO.6.2  
Wang, Y.,2AV.2.11  
Wang, Z.,3CO.3.6  
Wang, Z.,5CO.6.2  
Wang, Z.,2BP.1.2, 2CO.11.4  
Wannop, S.,7DO.8.6

Warcoin, E.,7DV.1.20, 7DV.1.49  
Ward, J.S.,1CV.3.93  
Warren, E.,1AP.1.2  
Wasmer, S.,2CV.2.41, 2CO.11.1,  
2CV.2.65, 2CV.2.43  
Watanabe, K.,1CV.3.22,  
1AO.1.4, 1CV.3.40  
Watts, A.,6DO.12.4  
Weber, ,3BO.9.1  
Weber, J.,3CV.1.49  
Weber, J.,2AV.2.14, 2CO.11.1  
Weber, T.,5BV.4.59  
Weber, W.,6DO.10.2  
Weeber, A.W.,2AV.3.19,  
3CV.1.39, 2DO.2.3, 3DO.7.3  
Weeke, S.,3CP.1.2  
Wefringhaus, E.,2CV.2.77  
Wehmeier, N.,2AV.2.2  
Wei, S.-H.,3CV.1.5  
Wei, Y.,3CV.1.43, 3CV.1.34  
Weigand, H.,5EO.1.6  
Weigand, W.,2AV.3.27, 2DO.1.6  
Weihrauch, A.,2CO.9.6  
Weihs, P.,6DO.11.4  
Weiss, I.,7DO.8.6, 7DV.1.32,  
7DV.1.29  
Weiß, K.-A.,7DV.1.48, 5BV.4.16  
Weiss, L.,6BV.2.44  
Weiss, T.,3BO.10.1  
Weissmann, M.,6BV.1.28  
Wen, C.-C.,2AO.6.2  
Wen, Y.-H.,1AO.2.4  
Wende, L.,2CO.9.3  
Wendlandt, S.,5DV.3.1  
Wenham, S.R.,2CO.10.3,  
2AV.1.38, 2AV.1.36, 2BO.2.3,  
2BO.2.6  
Werling, T.,2CO.9.2  
Werlings, G.-C., 7EP.1.3  
Werner, C.,7DV.1.1, 7DO.9.1  
Werner, F.,3BO.10.1, 3AO.8.4

Werner, J.,3DO.7.5, 3CO.4.6  
Werner, S.,2CO.11.3, 2AV.2.14,  
2CO.11.1, 2CV.2.65  
Werth, M.,3DO.7.2  
Wesselak, V.,5BV.4.30  
Western, N.J.,2AV.2.28, 2AV.2.8  
Whitehead, A.,5BO.5.5  
Wibowo, R.A.,3DV.2.15,  
3DV.2.68  
Widdra, W.,3CV.1.61  
Widén, J.,6BV.3.81, 6BV.3.86  
Wiegold, S.,2CV.2.30  
Wiese, M.,6BV.3.63, 1AO.2.3  
Wiesmann, R.,6EO.2.6  
Wiesmeier, S.,5BV.4.16  
Wietler, T.,2DO.2.2  
Wiillsch, B.,2AO.4.4  
Wikman, K.,7EO.3.4  
Wilbert, S.,6DO.6.5, 6BV.3.2  
Wilkinson, B.M.W.,3DV.2.66,  
3CO.4.1  
Wilks, R.G.,3BO.10.1, 3BO.11.5  
Willenbacher, N.,1CO.1.3  
Williatte, S.,1CV.3.56  
Wilson, G.J.,3DV.2.117  
Wilson, H.R.,6DO.11.1,  
6BV.3.63  
Wilson, T.,4CV.4.11, 4CV.4.5  
Wilterdink, H.,2AO.6.6  
Wimmer, A.,6BV.3.46  
Winkler, J.,3CV.1.32  
Winkler, T.,5CO.8.2  
Winter, S.,5BV.4.5, 3DV.2.91,  
5BO.6.2, 5BO.6.4, 5BV.4.8  
Wirtz, T.,2CV.2.55  
Wischmann, W.,3AO.7.5  
Wismeijer, D.,6DO.12.2  
Wissen, D.,2CO.9.6  
Witt, F.,5BV.4.8, 5BO.6.2  
Witte, W.,3BO.10.1, 3BO.9.2  
Witteck, R.,2AV.2.20

Woess-Gallasch, S.,7DV.1.18  
 Wohlfart, P.,2AO.6.5, 2AV.2.5  
 Wöhrle, N.,2CV.2.33, 2CV.2.63  
 Wolf, A.,2CO.11.3, 2AV.2.14, 2CO.11.1  
 Wolf, P.,5BV.4.48  
 Wolfers, T.,7DO.9.6  
 Wolke, W.,2CO.10.6, 2AV.3.6  
 Wolny, F.,2AV.1.37  
 Wolter, M.H.,3BO.10.1  
 Won, C.-S.,6BV.1.40  
 Wong, J.,5BV.4.79  
 Woodhouse, P.,1CV.3.93  
 Worrell, E.,6BV.3.102  
 Wörther, G.,7EO.3.4  
 Wu, H.,2AO.4.1  
 Wu, H.-S.,5BV.4.42, 5BV.4.67, 5DV.3.10  
 Wu, J.,4DO.4.2, 3CO.3.6  
 Wu, J.-L.,3CP.1.1  
 Wu, L.-G.,2CV.2.40  
 Wu, L.Q.,1CV.3.87  
 Wu, T.-C.,3BO.12.6, 5BV.4.1, 5BV.4.42, 5BV.4.67  
 Wu, W.,2AV.3.17  
 Wu, X.,3AO.8.6  
 Wu, Y.C.,2BO.1.4  
 Wu, Y.,3DV.2.70  
 Wu, Y.-R.,1AO.2.5  
 Wubishet Amdemeskel, M.,5BV.4.78  
 Würzner, S.,2BO.1.2  
 Wyller, G.M.,2AV.1.5  
 Wyrsh, N.,7DV.1.30, 7DV.1.41  
 Wyss, P.,2AV.3.4, 2BO.4.3, 2BO.4.1  
**X**  
 Xia, S.,3DV.2.19, 3DV.2.14  
 Xiang, B.,1CV.3.87  
 Xiao, Z.B.,3BO.9.4  
 Xiao, Z.,4CV.4.4

Xiao, Z.,2CV.2.73  
 Xie, Y.,5BV.4.43  
 Xie, Y.,6DO.6.4  
 Xu, C.,2CV.2.87  
 Xu, G.,2CO.11.5  
 Xu, ,2BO.1.6  
 Xu, J.,2CV.2.87  
 Xu, J.J.,5DV.3.12  
 Xu, J.,5BV.4.43  
 Xu, M.,2BO.3.4, 2AV.3.14, 2CO.12.4  
 Xu, Q.,2CV.2.87  
 Xu, Y.,2AV.2.40  
 Xu, Z.,2AV.2.11  
 Xue, C.,4CV.4.4  
 Xue, H.,3DV.2.98  
**Y**  
 Yadav, R.G.,2AO.6.1  
 Yagioka, T.,3CP.1.1  
 Yamada, A.,3AO.7.1, 3BO.10.3  
 Yamada, F.,2CV.2.52  
 Yamada, H.,1AO.1.1  
 Yamada, N.,1AO.3.1  
 Yamagoe, K.,5BO.6.5  
 Yamaguchi, E.,3DV.2.64  
 Yamaguchi, M.,1AO.1.1, 4DO.4.6, 4CV.4.28  
 Yamamoto, K.,2BP.1.1, 3BO.10.3  
 Yamasuso, D.,3DV.2.64  
 Yamaya, H.,7DV.1.44  
 Yan, C.,3BO.11.2, 5DV.3.78  
 Yan, W.,2AV.2.50  
 Yanagida, M.,3DV.2.61  
 Yanagidaira, T.,5BV.4.13  
 Yang, A.,2AV.1.17, 2BO.1.4  
 Yang, C.-F.,2AV.1.17, 2BO.1.4  
 Yang, G.,6BV.3.51, 2DO.2.6, 2DO.2.3, 2CO.12.1, 2AV.3.19  
 Yang, H.,6BO.8.1  
 Yang, H.,4CV.4.13

Yang, H.-S.,2CV.2.5  
 Yang, J.,2AO.6.4, 2CV.2.84  
 Yang, J.-F.,3CV.1.55, 3CV.1.57  
 Yang, J.,2AV.2.51  
 Yang, M.-H.,4CV.4.25  
 Yang, O.-B.,1CV.3.50  
 Yang, W.-L.,5BV.4.67  
 Yang, X.,2AV.1.8, 2AV.1.7  
 Yang, Y.T.,3BO.9.4  
 Yang, Y.,2AO.6.4, 2CV.2.84  
 Yang, Y.,2CO.11.5  
 Yang, Z.,3DV.2.96  
 Yao, H.,3CV.1.8  
 Yao, L.,4CV.4.4, 4CV.4.15, 3BO.9.4  
 Yao, Y.,5DV.3.5  
 Yasser, Z.,6DO.6.5  
 Yasunas, A.,3CV.1.58  
 Yatimi, H.,6BV.1.7  
 Ye, Q.,2AO.6.4, 2CV.2.84  
 Ye, Z.,5BV.4.2  
 Yedra, L.,2CV.2.55  
 Yerci, S.,3DV.2.73, 3DV.2.75, 1CV.3.42  
 Yeshchenko, O.A.,1CV.3.46  
 Yilmaz, O.,3DV.2.75  
 Yin, A.,5BV.4.79  
 Ylikunnari, M.,3BO.12.5  
 Yokoyama, K.,2BO.3.4  
 Yonaha, A.,3DV.2.64  
 Yoo, J.S.,3CV.1.56, 3CV.1.31, 2CV.2.10  
 Yoon, J.,6BV.2.49  
 Yoon, J.,2CV.2.2  
 Yoon, K.H.,3CV.1.56  
 Yoon, S.,6BV.1.33  
 Yordanov, G.H.,5BV.4.9, 6BO.7.3  
 Yoshida, H.,2CO.10.5

Yoshida, K.,4DO.4.5  
 Yoshida, W.,2BP.1.1  
 Yoshikawa, K.,2BP.1.1  
 Yoshimi, M.,2BP.1.1  
 Yoshimura, Y.,5DV.3.23  
 Yoshino, K.,3DV.2.23, 3DV.2.104, 3DV.2.64, 3DV.2.24  
 Yoshino, Y.,2AV.2.23  
 You, B.-J.,1CV.3.61, 2CV.2.61  
 You, D.,4CV.4.10  
 Young, D.L.,1CV.3.93  
 Youssef, A.,2CV.2.30, 2CV.2.31  
 Yu, B.-L.,5DV.3.13  
 Yu, C.,2CV.2.87  
 Yu, C.-Y.,2CV.2.40  
 Yu, H.J.J.,7DV.1.12  
 Yu, P.,2AV.2.45  
 Yu, Z.J.,2BO.4.6, 2AV.3.27, 3DO.7.6  
 Yu, Z.,3CV.1.35  
 Yu Jeco, B.M.F.,4DO.4.5  
 Yuan, J.,2AV.3.34  
 Yüce, C.,1CO.1.3  
 Yue, Z.,2CV.2.73  
 Yuldashev, R.,1CV.3.68  
 Yun, J.H.,3CV.1.31, 3CV.1.56  
 Yun, S.J.,2CO.12.6, 2CV.2.9  
 Yurchenko, A.V.,6BV.2.24, 6BV.2.22  
 Yurrita, N.,5CO.5.3  
 Yusoff, Y.,3DV.2.27  
**Z**  
 Zaiman, W.,6CO.15.1, 5BO.6.1, 5BO.6.3, 5BV.4.5  
 Zabek, P.,1CO.1.6  
 Zadeed, T.I.M.R.,7DV.1.3  
 Zafirovska, I.,2BO.2.3, 5BV.4.65  
 Zahren, C.,5CO.6.5  
 Zähringer, F.,2BO.4.2  
 Zakaria, Z.,3DV.2.27  
 Zamini, S.,7DV.1.30, 6DO.11.4

- Zammit, Y.,6BV.3.45  
 Zandi, M.,1CV.3.1  
 Zanetti, I.,6DO.10.1  
 Zaoui, Z.,7DV.1.38  
 Zapico, A.,6BV.3.54, 6BV.3.53  
 Zardetto, V.,3CO.3.1, 3DO.7.3, 3DV.2.82  
 Zaretskaya, E.P.,3DV.2.22  
 Zarzalejo, L.,6DO.6.5  
 Zauner, A.,2CV.2.26, 2AV.2.37, 2AV.2.47, 2AV.2.21  
 Zawaydeh, S.,7DV.1.39, 7DV.1.22  
 Zech, T.,6DO.12.4, 5DO.5.5  
 Zehender, M.,2AO.4.4  
 Zelenina, A.,3AO.8.4  
 Zeman, M.,2DO.2.3, 1CO.2.6, 5BV.4.22, 3AO.7.3, 3DV.2.18, 3DV.2.4, 2CO.12.1, 6CO.14.5, 6DO.6.6, 6BV.2.30, 2DO.2.6, 1AO.3.6, 6BV.3.51, 1CV.3.16, 2AV.3.19, 2CV.2.14  
 Zenan, A.H.,6BV.3.79  
 Zeng, Y.,2CV.2.48  
 Zetzmann, C.,6BO.8.2  
 Zha, J.,2CO.10.1  
 Zhai, J.Y.,2CO.11.4, 2BP.1.2  
 Zhai, Z.,3CV.1.25  
 Zhan, C.,3DV.2.51  
 Zhan, S.,3CV.1.43  
 Zhang, C.,2AO.6.4, 2CV.2.84  
 Zhang, D.,3DV.2.70, 3DO.7.3  
 Zhang, G.,6BV.3.51  
 Zhang, H.,3CV.1.30  
 Zhang, H.,4CV.4.4, 4CV.4.15, 3BO.9.4  
 Zhang, H.,2CV.2.84  
 Zhang, L.,3CV.1.43, 3CV.1.34  
 Zhang, P.,3CO.3.6  
 Zhang, Q.,4CV.4.15, 4CV.4.4  
 Zhang, Q.,2CO.9.2  
 Zhang, X.Y.,5CO.7.5  
 Zhang, S.,5BV.4.43  
 Zhang, T.,2BO.4.4  
 Zhang, W.,1CV.3.18  
 Zhang, W.,5BV.4.51  
 Zhang, W.,2AV.3.34  
 Zhang, X.,2CO.9.2  
 Zhang, X.,1CO.1.5  
 Zhang, X.,2CO.11.5  
 Zhang, Y.,5CO.7.5  
 Zhang, Y.,2BO.1.6  
 Zhang, Y.,2DO.2.3  
 Zhao, F.,1AO.2.2  
 Zhao, L.,6DO.6.3  
 Zhao, M.,3CV.1.34, 3DV.2.120, 3CV.1.43  
 Zhao, P.,6BO.8.1  
 Zhao, X.,2AV.2.40  
 Zhao, Y.,2AV.3.17  
 Zhao, Y.,3CV.1.35  
 Zhavnerko, G.K.,5DV.3.32  
 Zheng, J.,2CV.2.84, 2AO.6.4  
 Zheng, P.,1CO.1.5  
 Zhou, A.,5CO.7.5  
 Zhou, C.,2CV.2.78  
 Zhou, H.,3DV.2.55  
 Zhou, Z.,5DV.3.2  
 Zhou, J.,2AV.3.17  
 Zhou, L.,2CV.2.73, 2AV.3.34  
 Zhou, L.,5DV.3.2  
 Zhou, R.,2BO.1.6  
 Zhou, S.,1CV.3.28  
 Zhou, S.,2CO.9.2  
 Zhou, X.,2AO.6.4, 2CV.2.84  
 Zhu, J.,5DV.3.21  
 Zhu, L.,1AO.1.4  
 Zhuang, D.-M.,3CV.1.43, 3CV.1.34, 3DV.2.120  
 Zhukova, M.,3BO.11.3  
 Zhurminsky, I.,3DV.2.84  
 Ziar, H.,5BV.4.22  
 Zielke, D.,2AO.6.3  
 Zilles, R.,6BV.2.34, 6BV.2.31, 5DV.3.43, 6BV.2.4  
 Zillner, T.,7EO.3.4  
 Ziltener, R.,3CO.4.3  
 Zimmermann, A.,5BV.4.73  
 Zimmermann, C.G.,4DO.4.4  
 Zimmermann, I.,3DV.2.100  
 Zink, O.,2CV.2.72  
 Zitouni, H.,6BO.7.4  
 Zou, C.,5CO.7.5  
 Zou, S.,2AV.2.9  
 Zou, Y.,2CV.2.34  
 Zubillaga, O.,5CO.5.3  
 Zucker, A.,6BV.3.78  
 Zuehlke, H.-U.,2BO.3.4  
 Zurmühlen, S.,6BV.1.38, 6CO.16.4  
 Zuschlag, A.,2AV.2.7, 2AV.1.40, 2BO.2.2  
 Zywitzki, O.,3CV.1.17, 3CV.1.16, 3CV.1.13

NOTES

- .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....  
 .....





## PARALLEL EVENTS

For more information please refer to  
[www.photovoltaic-conference.com/programme/parallel-events](http://www.photovoltaic-conference.com/programme/parallel-events)



etaflorence ✶ renewableenergies



## PARALLEL EVENTS

The EU PVSEC Parallel Events are open to all registered Conference Participants of the EU PVSEC 2017.

For detailed information and programme please visit  
[www.photovoltaic-conference.com/programme/parallel-events](http://www.photovoltaic-conference.com/programme/parallel-events).

### Monday, 25 September 2017

13:30 - 17:30

#### New and Emerging PV Applications

prepared by the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) – IEA PVPS Task 1 in cooperation with IRENA

### Tuesday, 26 September 2017

08:30 - 12:30

#### PV System Performance and PV Module Reliability

jointly with the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) – IEA PVPS Task 13

08:30 - 13:30

#### PHOTOVOLTAICS | FORMS | LANDSCAPES Designing Energies in High Density Areas

jointly with EC-JRC, ENEA, ETA-Florence Renewable Energies, Wageningen University, Amsterdam Academy of Architecture, Amsterdam Institute for Advanced Metropolitan Solutions, ECN

13:30 - 16:45

#### BIPV – Bridging the Gap between PV Industry Supply and Construction Industry Demand

jointly with the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) – IEA PVPS Task 15 and the Zuyd University of Applied Science

Detailed Programme Outlines on the following pages.

## New and Emerging PV Applications

prepared by the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) – IEA PVPS Task 1 in cooperation with IRENA

**Day:** Monday, 25 September 2017

**Time:** 13:30 - 17:30

**Site:** Auditorium G106, First Floor

**Access:** Open to all Conference participants (on days registered)

Costs of solar electricity have fallen so rapidly that new markets, applications and business models are being unlocked faster than is generally realised. The emergence of new applications which have not been on the market development radar before now is offering exciting opportunities to expand the deployment of solar PV.

This event will first discuss the rapid PV market and cost developments in the global and European PV sector, before moving on to highlight the possibilities new and disruptive applications that PV will offer in the years to come.

Comparing PV applications development with the internet development, there might be parallels in how fast new applications might develop, especially with the digitisation of the electricity sector about to start in earnest. Could we see similar developments to what happened after only 10 years of broad use of the internet? Ten years ago, today's highflyers such as Google, Facebook, Twitter were just getting started and many others have acquired a dimension that no incumbent player was able to reach. And technological advances are providing rapid positive feedback loops: smartphones unlocked new business models like UBER, while in mobile money in Africa has made pay-as-you-go solar home systems affordable. In the same way, how will cheap PV unlock distributed energy applications and change the face of the energy system? Low cost batteries might be one of the catalysers for these new applications with direct use of solar electricity consumption increasing. And PV roads could pave the way for a diverse future. In a nutshell, PV-powered buildings, cars, farm applications, water-pumping applications, roads and much more could be the future of energy consumption creating a radically different electricity sector landscape, with significant economic, social and environmental benefits.



## Programme Outline

**13:30 Welcome Speech & the Role of the IEA PVPS Program**  
Stefan Nowak, IEA-PVPS Chairman

**Session 1 – Costs and Market development – the beginning of a major growth era?**

**Key note and moderator:**  
**Cost evolution of PV and renewable energies**  
IRENA – Michael Taylor

**Energy Cost Scenarios**  
LUT – Christian Breyer (invited)

**Market Development in Emerging Countries**  
CWC - Chris Werner (invited)

**Asia as the Center of the PV World**  
RTS Corporation - Izumi Kaizuka

**Battery Storage Costs and Impact on PV Competitiveness**  
Fortum - Eero Vartiainen

**15:00 Coffee-Break**

**15:30 Session 2 – New and emerging PV-driven applications**

PV is expected to revolutionize several aspects of our daily lives. The whole new building controls which develop with sensors everywhere which need to be powered from time to time. Surplus production at noon has to be used: when the produced energy at a certain time of the day is almost for free some kids in the Silicon Valley may develop ideas what to do with free solar energy.

**Moderator: Gaëtan Masson – IEA-PVPS**

**PV in buildings, H&C management in smart buildings**  
NovaEnergie - Pius Hüsler

**Collective self-consumption**  
ENAMO – Aurélien Bertin

**Electrifying African Cities with PV and storage**  
Enerdeal – François Neu

**Innovative PV Applications**  
Angele Reinders – UT

**17:00 Closing Speech**  
Stefan Nowak, IEA-PVPS Chairman, Net Energy

Contact for further information:  
Gaëtan Masson, Task 1 Operating Agent [g.masson@iea-pvps.org](mailto:g.masson@iea-pvps.org)



## PV System Performance and PV Module Reliability

jointly with the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) – IEA PVPS Task 13

**Day:** Tuesday, 26 September 2017

**Time:** 08:30 - 12:30

**Site:** Auditorium G106, First Floor

**Access:** Open to all Conference participants (on days registered)

The parallel event “PV System Performance and PV Module Reliability”, organized by the International Energy Agency (IEA) Photovoltaic Power Systems Programme (PVPS) Task 13, will present information on state-of-the-art PV system performance, technical and financial models and quality of components as well as the achievements of the common work of the task experts over the last three years from the second phase of its work programme 2014 - 2017.



## Programme Outline

Moderation:  
Boris Farnung, Fraunhofer, ISE, Freiburg, Germany

08:30 - 08:40

### Short Introduction of IEA PVPS of Task 13

Boris Farnung, Task 13 OA

08:40 - 09:00

### PV Performance Modelling Methods and Practices

Joshua S. Stein, Sandia National Laboratories, NM, USA

09:00 - 09:20

### Uncertainties in Energy Yield Predictions

David Moser, EURAC, Italy, Christian Reise, Fraunhofer ISE, Germany

09:20 - 09:40

### Technical Assumptions used in PV Financial Models

Jan Vedde, Denmark, M. Richter, 3E, Mike Green, M.G.Lightning Electrical Engineering, Israel

09:40 - 10:00

### Feedback and Discussion

10:00 - 10:30

### Coffee and Networking Break

Moderation:  
Ulrike Jahn, TÜV Rheinland Energy, Cologne

10:30 - 10:50

### Recommended Practices for PV Module Characterization and Power Rating

Gabi Friesen, SUPSI, Switzerland, Christian Reise, Fraunhofer ISE, Germany

10:50 - 11:10

### Reliability and Failures of PV System Components (ST1\_ST3.4)

Ulrike Jahn, TÜV Rheinland, Marc Köntges, ISFH, Germany

11:10 - 11:30

### Improving Efficiency of PV Systems Using Statistical Performance Monitoring

Mike Green, M.G.Lightning Electrical Engineering, Israel

11:30 - 12:15

### Panel Discussion

Task 13 and invited experts

12:15 - 12:30

### Wrap-up & Closing Speech

Ulrike Jahn, Task 13 OA

**12:30 End of Workshop**

## PHOTOVOLTAICS | FORMS | LANDSCAPES

## Designing Energies in High Density Areas

jointly with EC-JRC, ENEA, ETA-Florence Renewable Energies, Wageningen University, Amsterdam Academy of Architecture, Amsterdam Institute for Advanced Metropolitan Solutions, ECN

**Day:** Tuesday, 26 September 2017

**Time:** 08:30 - 13:30

**Site:** Auditorium G105, First Floor

**Access:** Open to all Conference participants (on days registered)

PHOTOVOLTAICS | FORMS | LANDSCAPES is an event which takes place as a special side event at the series of European Photovoltaic Solar Energy Conference and Exhibition. It has been organised since 2011 in collaboration between ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development) and the European Commission's Joint Research Centre (scientific concept), together with ETA Florence and supported by the EU PVSEC.

PHOTOVOLTAICS | FORMS | LANDSCAPES addresses photovoltaic energy from the citizen's viewpoint: ever more photovoltaic systems are becoming visible in the environment, installed on roofs or facades, and larger systems in the landscapes we live, work and recreate. Architects, landscape architects and other environmental designers, as well as researchers, are given the floor to share their ideas on how to advance the realization of photovoltaic energy systems while establishing aesthetic qualities in our daily living environment.

PHOTOVOLTAICS | FORMS | LANDSCAPES @Amsterdam 2017 is co-organized by: ENEA, Wageningen University, Amsterdam Academy of Architecture, Amsterdam Institute for Advanced Metropolitan Solutions, ECN, and ETA Florence, with the support of the European Commission, JRC.

The topic has been selected keeping into account the specific features of the hosting country, the Netherlands: Designing energies in high density areas.



etaflorence \* renewableenergies



## Programme Outline

08.30

Welcome and research perspectives

**Heinz OSSENBRINK**

European Commission | Joint Research Centre | Ispra | Italy

**Wim SINKE**

ECN | Petten | The Netherlands

9.00

Photovoltaic patterns and landscapes

**Alessandra SCOGNAMIGLIO**

ENEA Italian National Agency for New Technologies, Energy and Sustainable Economic Development | Portici | Italy

9.15

Energy transition: A new dimension in the landscape

**Sven STREMKE**

Wageningen University | Amsterdam Academy of Architecture | Amsterdam Institute for Advanced Metropolitan Solutions | Amsterdam | The Netherlands

## PART ONE | VISIONS AND CONCEPTS

09.30

The national perspective energy and space: the Dutch discourse on sustainable energy transition, from a spatial perspective

**Dirk SIJMONS**

H + N + S Landscape Architects | Amersfoort | The Netherlands

10.00-10.30

## NETWORKING COFFEE AND PROJECTS DISCUSSION

10.30

Solar energy landscapes in the Netherlands: Design research across spatial scales

**Rens WIJNAKKER**

FABRICations | Amsterdam | The Netherlands

11.00

Post fossil city: Solar energy in public space

**Tom VAN HEESWIJK**

Wageningen University and Research | Wageningen | The Netherlands

11.30

Photovoltaics, buildings and design opportunities

**Ger GIJZEN**

UNStudio | Amsterdam | The Netherlands

12.00-13.00

## PART TWO | TECHNOLOGICAL CONCEPTS AND APPLICATIONS IN THE BUILT ENVIRONMENT

Selection of proposals from the Call for proposals

13.00-13.30

ROUND TABLE and CLOSING REMARKS

**Moderator Heinz Ossenbrink**

## BIPV – Bridging the Gap between PV Industry Supply and Construction Industry Demand

jointly with the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS) – IEA PVPS Task 15 and the Zuyd University of Applied Science

**Day:** Tuesday, 26 September 2017

**Time:** 13:30 - 16:45

**Site:** Auditorium G106, First Floor

**Access:** Open to all Conference participants (on days registered)

BIPV is seen as one of the key development tracks of PV towards mass application. One of the main challenges for the BIPV community is bridging the gap between the highly innovative and fast changing PV supply side and the solid construction industry demand side. In this interactive seminar, a number of international players from both the BIPV community and the construction industry will present the gaps and provide bridges to facilitate the increase of BIPV deployment.

As an official event of the 33rd EU PVSEC, this parallel event is jointly organised with IEA PVPS Task 15, Zuyd University of Applied Sciences, and the EU PVSEC.



## Programme Outline

13:30 - 15:00

**BIPV from a PV supply side perspective**

13:30 - 13:40

**Opening session 1**

Michiel Ritzen, IEA PVPS T15 Operating Agent, senior researcher  
Zuyd University

13:40 - 14:00

**Overview on European BIPV development**

Prof. Dr. Rutger Schlatmann, ETIP-PV, WG3

14:00 - 14:20

**BIPV development**

Álvaro Valverde, Onyx Spain

14:20 - 14:40

**BIPV: roadmap from demonstration to implementation on a large scale**

Stefan Dewallef, Product Development Manager Soltech

14:40 - 15:00

**MiaSolé thin film PV products: Applications and Challenges in BIPV**

Mrs A. Bayman, MiaSolé

15:00 - 15:15

Break

15:15 - 16:45

**BIPV from a building demand side perspective**

15:15 - 15:25

**Opening session 2**

Zeger Vroon, Zuyd University/Solliance

15:25 - 15:45

**How to implement BIPV into the housing industry**

Yoni de Boer, van Wijnen construction company

15:45 - 16:05

**Data and power generating glass, the intelligent building envelope (of the future)**

Ferdinand Ferdinand Grapperhaus, Physee

16:05 - 16:25

**Off road innovations to accelerate BIPV deployment**

Jos Lichtenberg

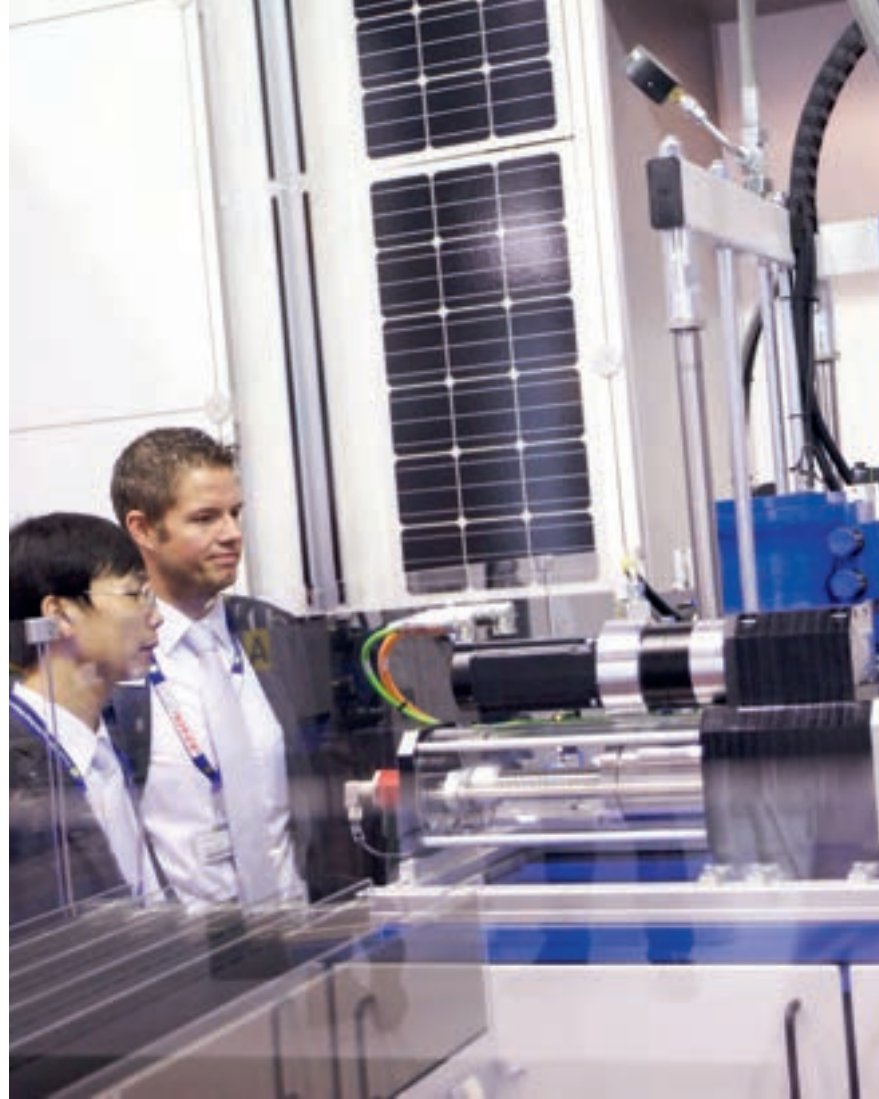
16:25 - 16:45

**Panel Discussion**

Jos Lichtenberg: BIPV

Contact for further information:

Michiel Ritzen, [Michiel.ritzen@zuyd.nl](mailto:Michiel.ritzen@zuyd.nl)



## **SOLAR INDUSTRY FORUM**

For more information please refer to  
[www.photovoltaic-conference.com/programme/solarindustryforum2017](http://www.photovoltaic-conference.com/programme/solarindustryforum2017)



## Organisers



Co-Organiser



Co-Organiser



Main Partner

## Supporters



## SOLAR INDUSTRY FORUM 2017

The Solar PV industry is worth 100 Billion EUR a year and growing at a rapid pace. With 75 GW installed in 2016, it has beaten year after year the most optimistic expectations and its potential remains largely untapped. However, this rapidly expanding market creates numerous challenges for industry leaders, in Europe and globally. Rapidly decreasing module and system prices happen in a context of price increases for wafers and cells, highlighting the complexity of industry development in a fast-changing world

CEO and CTOs in the solar PV industry must cope with evolving competitiveness conditions, new market players, choice about technologies and production capacities which will evolve rapidly towards 10 GW for the largest competitors.

Today, most fairs and conferences are focused on the downstream market, with a clear emphasis on where to sell PV modules, inverters, and services. However, the Solar PV industry is much more complex than PV manufacturers and develops its activities along the complete value chain.

While the Solar PV, market is expanding fast and could reach close to 100 GW by 2020, the questions of the future of the PV industry remains a fascinating challenge. Where to manufacture, when to increase production capacities, and how to identify disruptive innovations are some of the key questions that are not often debated in general PV conferences and fairs.

The evolution of the technology in laboratories is well understood and the policy aiming at developing the markets are better known but informing decision-makers within the manufacturing industry, from material suppliers to components producers remains a challenge.

The Solar Industry Forum will be the meeting point for all industry stakeholders to exchange cutting edge information and raise their knowledge about the future of the manufacturing industry in the Solar PV sector.

The Solar Industry Forum is an event embedded within the EU PVSEC, providing an alternative path for attendees with an industry background, allowing them to attend EU PVSEC's scientific sessions in parallel with the Solar Industry Forum sessions.

This two-days forum is targeting the PV industry stakeholders with a mix of presentations and roundtable discussions with key European and global speakers.

## Programme Outline

### Day 1 – Tuesday 26 September 2017

9:30

#### Introduction – The 4th Industrial Revolution

The 4th industrial revolution is ongoing and involves digitalization, smaller factories, and ad hoc products. How will it impact the PV industry? How will new materials and concepts change the processes and products in the coming years? European Commission

10:00

#### Session 1 – PV industry panel

*Chaired by Gaëtan Masson, Becquerel Institute (confirmed)*

*Panelists/Speakers: Xavier Daval, SER Kilowattsol (confirmed) – Frank Niendorf, Jinko Solar (confirmed) – David Feldman, US DoE (confirmed) – Milan Nitzschke, SolarWorld (confirmed) – Murray Cameron, APVIA (confirmed)*

In a changing global environment, what are the prospects for PV development, in which regions and for which technologies? What is the current state of the PV value chain in Europe and globally? Learn more about the environment in which your companies will evolve in the coming years.

11:00

#### Session 2 – Innovations and Technology potential: which technologies will have a chance to hit the market?

*Chaired by Nabih Cherradi, Desert Technologies (confirmed)*

*Panelists/Speakers: Martin Hermle, Fraunhofer ISE (confirmed) – Christophe Ballif, CSEM (confirmed) – Delfina Munoz, INES (invited) – Wim Sinke, ECN (confirmed) – Davide Polverini, European Commission DG GROW (confirmed) – Nicholas Dodd, European Commission DG JRC (confirmed) – Martin Green, UNSW (confirmed)*

PERC appears now as the next step for mass production. But which technologies have some potential in the short term and what is their potential for developing them right now? Innovations are leading to lower costs, higher margins, and innovative products. But is it a business model that copes with the rapid expansion of PV production capacities and the need for reduced costs?

12:10 **Lunch Break**

13:45

#### Session 3 – Cost of manufacturing and economy of the industry

*Chaired by Laurent Dumarest, ATKearney (invited)*

*Panelists/Speakers: Axel Metz, ITRPV (confirmed) – Henning Wicht, IHS Markit (invited) – Saif Islam, EuPD (confirmed) – Izumi Kaizuka, RTS Corporation (confirmed) – Gaëtan Masson, Becquerel Institute (confirmed) – Juan Fraga, Wynnertech (confirmed)*

Prices went down and companies across the value chain show diverse financial situations. What does it cost to manufacture PV today. What are the main cost differences between Europe, China and emerging countries. In general, is the industry financially robust.

15:00 **Coffee Break**

15:15

#### Session 4 – Crystalline silicon and wafer optimization

*Chaired by Nabih Cherradi, Desert Technologies (confirmed)*

*Panelists/Speakers: Stefan Reber, Nexwafe (confirmed) – Eivind Ovrelid, Sintef (confirmed) – Jozef Szułfcik, IMEC (invited) – Yuepeng Wan, GCL-Poly (confirmed) – Jörg Müller, Hanwha Q CELLS (invited)*

Crystalline silicon remains the dominant technology but how will it evolve? Different companies look at the future of wafers from different technology perspectives.

16:00

#### Session 5 – Mono, Multi or Heterojunction?

*Chaired by Mark Osborne, PV-Tech (confirmed)*

*Panelists/Speakers: Andre Richter, Meyer Burger (invited) – Thomas Kuenzl, Singulus (confirmed) – Philippe Malbranche, INES (confirmed) – Akira Terakawa, Panasonic (confirmed) – Estzer Voronashy, IMEC (invited) – Andrea Viaro, Jinko Solar (confirmed)*

Cells technologies are evolving fast and capacities are ramping up. How are they received in the market and what are the possibilities for high efficiency cells to find their way into the market in times of acute competition.

17:15

#### Session 6 – Manufacturing the PV modules of the future

*Chaired by Angele Reinders, University of Twente (confirmed)*

*Panelists: Lior Handelsman, SolarEdge (confirmed) – Eric Ast, Staubli (confirmed) – Chris Case, Oxford PV (confirmed) – Jean-Marie Siefert, Jabil (confirmed) – Stuart Brannigan, AEG (confirmed) – Roel Van Den Berg, AUTARCO (confirmed)*

Modules are the final product seen by consumers. But technologies can evolve. from bifacial to lightweight panels, from smart monitoring systems to intelligent connectors, will the future of modulating go through specialized companies? A review of the module business and technology.

18:30 **First day closure**

19:00 **Cocktail Reception**

**Day 2 – Wednesday 27 September 2017**

08:30

**Registration**

09:00

**Session 7 – Local vs. global manufacturing***Chaired by Gaëtan Masson, Becquerel Institute (confirmed)**Panelists/Speakers: Luc de Marliave, Total (confirmed) – Markus Fisher, Hanwha Q Cells (invited) – Fabrizio Bizzari, Enel Green Power (invited) – Nabih Cherradi, Desert Technologies (confirmed) – Eicke Weber, EUREC (confirmed) – Javier Sanz, KIC InnoEnergy (invited) – Frank Niendorf, Jinko Solar (confirmed) – Andreas Wade, First Solar (confirmed)*

Where to install new factories and for which components? Will protectionism hit the PV industry directly? Will it lead to local manufacturing and how? Will production size grant competitiveness?

10:00

**Session 8 – Manufacturing in Europe: Recommendations and policy proposals***Chaired by Adel El Gammal, EERA (confirmed)**Panelists: José Donoso, UNEF (confirmed) – Xavier Daval, SER (confirmed) – Eric Maiser, VDMA (invited) – Wim Sinke, ETIP-PV (confirmed) – Eric Ast, SOLARUNITED (confirmed) – Milan Nitzschke, SolarWorld (confirmed) – Stefan Nowak, NET Energy (invited)*

11:00

**Session 9 – PV equipment manufacturers***Chaired by Bryan Ekus, SOLARUNITED (confirmed)**Panelists/Speakers: Richard Moreth, Vitronic (confirmed) – Peter Wohlfart, Singulus (confirmed) – Elke Beune, J&R (invited) – Gunter Erfurt, Meyer Burger (invited) – Markus Nicht, Innolas (invited) – Peter Fath, RCT (confirmed) – Dongmei Li Betz, Jinchen (invited)*

Equipment manufacturers play a central role in technology evolution and price decrease. This session will highlight the key challenges for this segment of this industry, how they see the technology changes and how they can contribute to shape the cost structure.

12:10 **Lunch Break**

13:45

**Session 10 – Supply chain including recycling***Chaired by Jan Grimberg, DSM (invited)**Panelists/Speakers: Fabrice Stassin, Umicore (confirmed) – Michele Vannini, COVEME (confirmed) – Fernando Nuno, Copper Alliance (invited)*

The key to the next stage of solar market development is to improve efficiency and lower costs across the solar supply chain in order to create sustainable revenue streams. How to streamline the supply chain with state-of-the-art technologies? What are the Risks, Due to Tax & Legal Aspects in the Value Chain? Make or Buy Strategies? How to become a global player within the Solar Market?

14:45

**Coffee Break**

15:00

**Session 11 – Quality & Reliability***Chaired by Laura Azpilicueta, SOLARUNITED (confirmed)**Panelists/Speakers: David Moser, EURAC (confirmed) – Ulrike Jahn, TÜV Reihnland (confirmed) – Christoph Mayr, AIT (confirmed) – Hélène Grandjean, Engie Laborelec (confirmed) – Bill Gambogi, Dupont (confirmed)*

Reliability remains the key word for PV development these days. But what does it mean for the PV industry? How to learn from defects in the field and improve products, processes, and procedures?

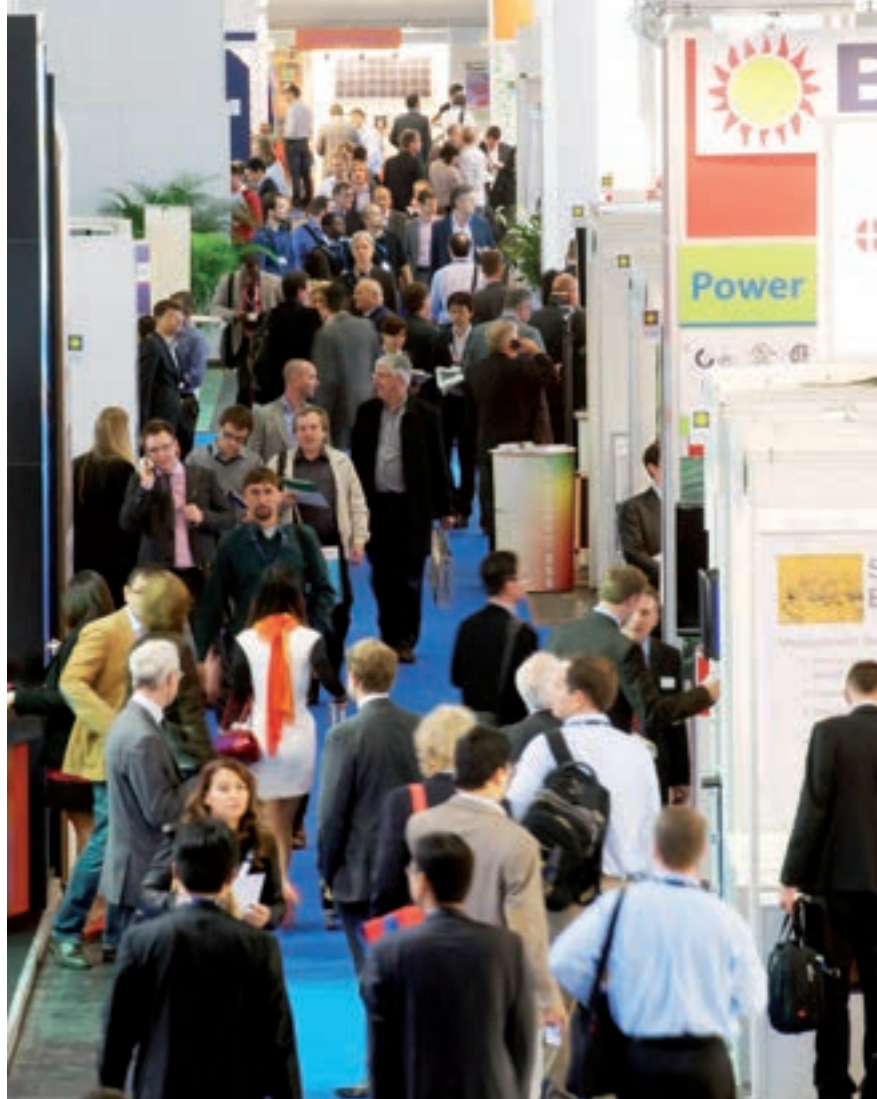
16:15

**Session 12 – Thin-Film: options for future development & industrialization***Chaired by Wim Sinke, ECN (invited)**Panelists/Speakers: Marko Topic, University Ljubljana (invited) – Thomas Bocke, VON ARDENNE (confirmed) – Andreas Wade, First Solar (Confirmed) – Katsumi Kushiya, SolarFrontier (invited) – Bernhard Dimmler, Manz (confirmed) – Dirk Beisenherz, Singulus (confirmed)*

Thin film progresses in efficiency and cost, to the extent that its situation has significantly changed in the last years. Will Thin Film offer finally a real alternative to crystalline silicon?

18:00

**End of the Solar Industry Forum**



## EXHIBITION

For more information please visit  
[www.photovoltaic-conference.com/programme/exhibition](http://www.photovoltaic-conference.com/programme/exhibition)



List of Exhibitors · alphabetical

**3D-Micromac AG****C10**

Technologie-Campus 8  
09126 Chemnitz  
Germany



phone: +49-371 400 430  
fax: +49-371 400 4340  
e-mail: sales@3d-micromac.com  
web: www.3d-micromac.com

3D-Micromac AG is the industry leader in laser micromachining. We develop processes, machines and turnkey solutions the highest technical and technological level in order to satisfy PV cell manufacturers' requirements for high productivity and efficiency. By combining process know-how, equipment and service, our system solutions for Laser Contact Opening or half cell cutting of solar wafers are fulfilling the requirements of efficient cell manufacturing in every possible way.

**Abet Technologies, Inc.****B13**

168 Old Gate Lane  
Milford, Connecticut 06460  
USA



phone: +1-203 540 99 90  
fax: +1-203 540 99 90  
e-mail: sales@abet-technologies.com  
web: www.abet-technologies.com

Abet Technologies manufactures standard and custom solar cell PV-IV measurement systems and IPCE measurement systems. PV-IV metrology tools include standards compliant steady state solar simulators, vacuum chuck temperature controlled test stations, comprehensive software, calibrated reference cells and a range of electronic loads. QE Measurement Systems with LED based light engines for spectral response measurements from 300 to 1800 nm.

**Advanced Silicon Group****C9**

173 Bedford Road  
Lincoln, MA 017773-1512  
USA



phone: +1-301 502 37 75  
e-mail: bill.rever@advancedsilicongroup.com  
web: www.advancedsilicongroup.com

Advanced Silicon Group (ASG), a leading innovator in black silicon and its applications, offers silicon nanotechnology solutions via consulting, licensing, and custom fabrication services with applications in photovoltaics, biosensors, Li-ion batteries, MEMS, and more. In solar, ASG is Bringing Black Silicon to Light (TM).

ASG works with companies to improve performance and reduce costs by helping them to incorporate silicon nanowire arrays into their products.

**ASYS GmbH****B10**

Benzstrasse 10  
89160 Dornstadt  
Germany



phone: +49-7348 9855 0  
e-mail: info@asys-group.com  
web: www.asys-group.com

The ASYS Group based in Germany is an established manufacturer of machines and production lines for the electronics, life-science and solar industries. The ASYS SOLAR brand features Metallization Lines and next-generation technologies for the implementation of advanced cell concepts. Since its entry into the solar market in 2002, ASYS has delivered cell manufacturing equipment to its worldwide customer base with a production capacity in excess of 30GW. Offering both scalable production solutions and high-speed technologies, ASYS is thus the ideal partner for cost-efficient Metallization Lines.

**Bentham Instruments Limited****A13**

2 Boulton Road, Reading  
Berkshire RG2 0NH  
United Kingdom



phone: +44-118 975 13 55  
e-mail: sales@bentham.co.uk  
web: www.bentham.co.uk

Bentham are UK-based, market leaders in the design and manufacture of high-performance monochromator-based light measurement solutions, spanning applications in the optical characterisation of sources, detectors, materials and in-vivo diagnostics.

We will showcase our PVE300 EQE tool, utilised by research and industry worldwide in the measurement of spectral response, reflectance and transmission of all types of PV devices and architectures.

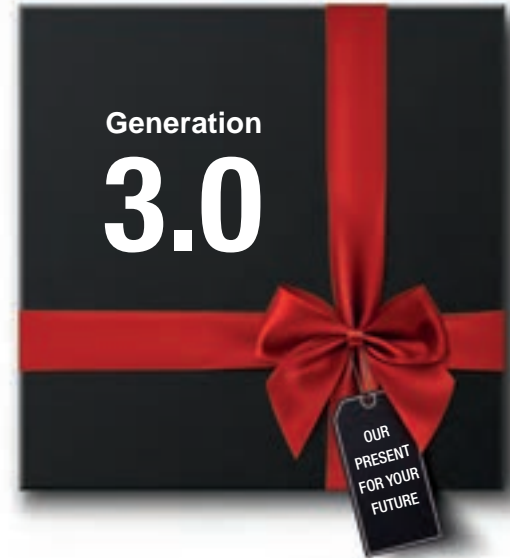
**BERGER Lichttechnik GmbH & Co. KG****B6**

Wolfratshauer Str. 150  
82049 Pullach  
Germany



phone: +49-89 793 55 266  
fax: +49-89 793 55 265  
e-mail: info@bergerlichttechnik.de  
web: www.bergerlichttechnik.de

BERGER Lichttechnik is providing class A+A+A+ Pulsed Solar Simulators and measuring systems for terrestrial and space applications. Turning our well known High Efficiency testing method into new generation 3.0 test equipment for mass production. Now offering total integration into sorter and handling machines by reduced form factor, smart controls and easier solutions for operation and maintenance, also including higher throughput and lower total costs of ownership.

**BERGER**  
Lichttechnik**Introducing:****Featuring:**

- › **Higher throughput**
- › **Low cost of ownership**
- › **Smart system easy to maintain**
- › **Small form factor fully integrated**
- › **Latest high efficiency technology**

**BERGER Lichttechnik GmbH & Co. KG**  
Wolfratshauer Str. 150 · D-82049 Pullach · Germany  
Phone +49 (0)89 793 55 266 · Fax +49 (0)89 793 55 265  
[www.bergerlichttechnik.de](http://www.bergerlichttechnik.de)

Offices in Germany, the US, China and Taiwan

Please visit us:  
**Booth B6**

**Berlin-Brandenburg Energy Network e.V. B14**

c/o DWR eco  
Albrechtstr. 22  
10117 Berlin  
Germany



phone: +49-30 555 70 816  
e-mail: [info@bbenergynetwork.de](mailto:info@bbenergynetwork.de)  
web: [www.bbenergynetwork.de](http://www.bbenergynetwork.de)

The Berlin-Brandenburg Energy Network e.V. (BEN) is the network and the central representative of the renewable energy industry in Berlin-Brandenburg. We are committed to solutions for the effective implementation of the Energiewende in the region, in Europe and internationally and support entrepreneurial activities (Start-Up Acceleration) in the sector worldwide.

**CSEM SA C7**

Rue Jaquet-Droz 1  
2002 Neuchâtel  
Switzerland



e-mail: [info@csem.ch](mailto:info@csem.ch)  
web: [www.csem.ch](http://www.csem.ch)

CSEM – technologies that make the difference CSEM, founded in 1984, is a research and development center (public-private partnership) specializing in microtechnology, nanotechnology, microelectronics, system engineering, photovoltaics and communications technologies. 450 highly qualified and specialized employees from various scientific and technical disciplines work for CSEM in Neuchâtel, Zurich, Muttenz, Alpnach and Landquart.

Further information is available at [www.csem.ch](http://www.csem.ch)

**Delft University of Technology B11**

Mekelweg 4  
2628 CD Delft  
The Netherlands



phone: +31-152 788 730  
fax: +31-152 782 968  
e-mail: [A.H.M.Smets@tudelft.nl](mailto:A.H.M.Smets@tudelft.nl)  
[M.Zeman@tudelft.nl](mailto:M.Zeman@tudelft.nl)  
web: <https://www.tudelft.nl/en/eemcs/thefaculty/departments/electrical-sustainable-e>

The vision of the Photovoltaics Materials and Devices Group at the TUDelft is to contribute to the energy transition with performing world class research and offering on-campus and on-line education on photovoltaics. We reach out to the world by offering education Massive Open Online Course 'Solar Energy' and MicroMasters 'Solar Energy Engineering' on edX, photovoltaic system summer school on campus, and the text book "Solar Energy , the physics and engineering of photovoltaic conversion technology and systems".

**Dutch Energetics Management (DEM) (Affiliated to Dutch Innovative Management and Services BV (DIMS)) B11**

Basstrat 156  
5702SL Helmond  
The Netherlands



phone: +31-641 34 18811  
e-mail: [bdilmen@dutchenergetics.nl](mailto:bdilmen@dutchenergetics.nl)  
[info@dutchenergetics.nl](mailto:info@dutchenergetics.nl)  
web: [www.dutchenergetics.nl](http://www.dutchenergetics.nl)

We are from the third Planet. We are the Masters of Cycles; established in 2009, as a hightech company dedicated to integrate advanced technology with Solar Energy Technologies for our customers around the world. We have a dedicated R&D team with many professional engineers. Our company devotes to providing innovative products, perfect service, and solution to meet the customers' requirements. Products with excellent performance and human services have gained reputation from our business partners.

ECN

B8

P.O. Box 1  
1755 ZG Petten  
The Netherlands



phone: +31-885 154 893  
web: www.ecn.nl

Energy research Centre of the Netherlands (ECN) is the largest energy research institute in the Netherlands. ECN develops new technology and conducts pioneering research in various ways into innovative solutions to facilitate the transition to sustainable energy management. With around 500 members of staff, we are active in projects both at domestically and abroad, in joint efforts with the industry, government authorities and research institutes.

Engineered Materials Systems, Inc.

C6

100 Innovation Court  
Delaware, Ohio 43015  
USA



phone: +1-740 362 44 44  
e-mail: mfrancis@emsadhesives.com  
web: www.emsadhesives.com

Engineered Materials Systems, Inc. (EMS) a subsidiary of Nagase Co., LTD is technology focused on electronic materials for photovoltaic, semiconductor and microelectronic and assembly products. EMS is a leading supplier of Electrically Conductive Adhesives for Shingling, Stringing and Back Contact applications in solar module manufacturing.

# Welcome Reception

on Monday,

**25 September 2017**

**18:30 to 20:00**



We thank Berger Lichttechnik and LONGi Solar for supporting the Welcome Reception

**BERGER**  
Lichttechnik

**LONGi** Solar

**ETA Florence Renewable Energies****A4**

Via Antonio Giacomini, 28  
50132 Florence  
Italy



phone: +39-055 500 2280 (223)  
fax: +39-055 573 425  
e-mail: sara.momi@etaflorence.it  
web: www.etaflorence.it

ETA-Florence is a consultancy and engineering firm active in the field of renewable energy, with a multi-disciplinary, international team. Since 1994 it has participated in over 250 projects and organized more than 150 international events. From 2000 ETA-Florence is also the organizer of the annual European Biomass Conference and Exhibition-EUBCE, a leading event counting on the EU JRC technical support, attracting biomass experts of academic, industry and policy institutions from 70 countries.

**EUREC - The Association of European Renewable Energy Research Centres****B15**

Place du Champ de Mars 2  
1050 Brussels  
Belgium



phone: +32-231 840 50  
e-mail: info@eurec.be  
web: www.eurec.be

EUREC was founded in 1991 as European Economic Interest Grouping (E.E.I.G.) with the goal of improving the quality and scope of European research and development in renewable energy technologies. The purpose of the association is to promote and support the development of innovative technologies and human resources to enable a prompt transition to a sustainable energy system.

**etaflorence**  **renewableenergies**

Science • Communication • Knowledge • Innovation

# Letting knowledge flow

**HORIZON 2020**

ETA Florence is committed to partnering for scientific research projects within Research and Innovation programmes such as Horizon 2020. Through communication and dissemination strategies and the exploitation of research results, ETA Florence supports its partners to make a significant contribution to solving the current European challenges.

**WHO WE ARE**

With more than 20 years of experience, ETA Florence is a European leader in scientific knowledge management. We have established an interdisciplinary international team with diverse professional backgrounds from scientific research, communications, event organisation and industry. These specialists ensure that the knowledge resulting from EC-funded research is used effectively for the innovation cycle.

**WHAT WE DO**

ETA Florence works with more than 300 research institutions in over 30 countries to design projects with beneficial effects. Using our team's collective expertise, we facilitate knowledge transfer and provide dissemination plans that are specifically tailored to each new project. We have been partner in more than 250 EC-funded projects.

**OUR EXPERTISE**

- Market Analysis, Knowledge Management and Transfer.
- Stakeholder Engagement, Education and Training, Events, Workshops, Webinar, Social Media, Dissemination Material, Publications.
- Communication, Dissemination and Strategies, Project Management and IPR issues related to the Management of the Consortium.

[www.etaflorence.it](http://www.etaflorence.it) @etaflorence

## European Commission, DG Joint Research Centre

B1

TP 450  
via Enrico Fermi 2749  
21027 Ispra  
Italy



e-mail: [jrc-esti-services@ec.europa.eu](mailto:jrc-esti-services@ec.europa.eu)  
web: <https://ec.europa.eu/jrc/en/research-facility/european-solar-test-installation>

The Joint Research Centre (JRC) is the European Commission's science and knowledge service which employs scientists to carry out research in order to provide independent scientific advice and support to EU policy. As part of its activities the JRC operates the European Solar Test Installation (ESTI) for assessing PV device performance at its site in Ispra, Italy. It's online tool PV-GIS provides free data on solar energy resource and potential PV electricity output for Europe and beyond.

## FME

B11

Zilverstraat 69  
2718 RP Zoetermeer  
The Netherlands



phone: +31 793 531 100  
fax: +31 793 531 365  
e-mail: [internationaal@fme.nl](mailto:internationaal@fme.nl)  
web: [www.fme.nl](http://www.fme.nl)

Cleantech Holland is an export organisation and platform for Dutch clean tech businesses, universities, governments, and nonprofit organizations. Our aim is to promote the use of Dutch products, services, systems and innovations in the following fields; Green Energy; - Energy Infrastructure; - Energy Efficiency; - Energy Storage.

## greateyes GmbH

B14

Rudower Chaussee 29  
12489 Berlin  
Germany



phone: +49-30 639 262 37  
fax: +49-30 639 262 38  
e-mail: [info@greateyes.de](mailto:info@greateyes.de)  
web: [www.greateyes.de](http://www.greateyes.de)

greateyes is an innovative, German based enterprise that is dedicated to the field of optical inspection. For the solar industry, various electro- and photoluminescence systems for wafer, cell, and module examination are available.

## h.a.l.m. elektronik GmbH

C2

Burgstr. 106  
60389 Frankfurt am Main  
Germany



phone: +49-69 943 353 0  
fax: +49-69 943 353 141  
e-mail: [info@halm.de](mailto:info@halm.de)  
web: [www.halm.de](http://www.halm.de)

h.a.l.m. elektronik delivers high-end class A+A+A+ solar simulators for the IV-measurement of all types of solar cells and solar modules. In addition to visual inspection and other advanced analysis, our main focus is the exact measurement of the electrical characteristic of photovoltaic specimen. The three components xenon flasher, curve tracer, and a very flexible software are the key to our precision. Their combination makes the h.a.l.m. technologies high-end which is acknowledged worldwide.

## Heraeus Deutschland GmbH & Co. KG (Heraeus Photovoltaics)

A5

Heraeusstr. 12-14  
63450 Hanau  
Germany



phone: +49-6181 3550 51  
fax: +49-6181 3516 5051  
e-mail: joerg.schielke@heraeus.com  
web: www.heraeus-renewables.com

Heraeus Photovoltaics is a global supplier of metallization solutions for the PV industry. We develop materials for conventional to advanced cell designs, customizable to meet customer's requirements. Through acquisition, we combined R&D portfolios and develop new paste formulations unlike any currently commercially available. With a reputation for innovation, personalized service and worldwide resources with local presence. Make Heraeus your Innovation Partner!

## Holland Solar

B11

Korte Elisabethstraat 6  
3511 JG Utrecht  
The Netherlands



phone: +31-30 232 80 08  
e-mail: hollandsolar@hollandsolar.nl  
web: www.hollandsolar.nl

## HydroPV Technologies

B11

t Hoenstraat 27  
2596 HZ Den Haag  
The Netherlands

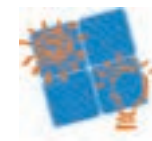


phone: +31-703 464 428  
e-mail: m.romijn@hydropv.eu  
web: www.hydropv.eu

HydroPV Technologies is a renewables company specialized in PV production of electricity on water surfaces and hydro storage of the electricity in reservoirs as batteries. Electricity is produced by optimally cooled PV modules on fully ventilated floating structures. Up to 1.5 Megawatt generation capacity can be enabled per hectare water surface, we expect that by 2025 we may enable up to 2 Mw per hectare water. Additionally up to 30 thousand cubic meters water may be saved per hectare per year by avoided evaporation.

## IEA PVPS International Energy Agency Photovoltaic Power Systems Programme B15

c/o NET Ltd.  
Waldweg 8  
1717 St. Ursen  
Switzerland



phone: +41-26 494 00 30  
fax: +41-26 494 00 34  
e-mail: mary.brunisholz@netenergy.ch  
web: www.iea-pvps.org

### INTERNATIONAL ENERGY AGENCY PHOTOVOLTAIC POWER SYSTEMS PROGRAMME (IEA PVPS)

- Global co-operation towards sustainable deployment of 31 members: 26 countries, EC, SolarPower Europe, Copper Alliance, SEPA & SEIA
- Activities are carried out collaboratively on a country basis along a number of technical and non-technical subjects related to photovoltaics.
- Currently, 7 projects (Tasks) are active.



**InnoLas Solutions GmbH****B9**

Pionierstr. 6  
82152 Planegg  
Germany



phone: +49-89 81059 168 1000  
fax: +49-89 81059 168 1900  
e-mail: info@innolas-solutions.com  
web: www.innolas-solutions.com

InnoLas Solutions looks back on over 20 years' experience in laser technology. A dynamic team develops and manufactures laser systems for micro material processing with various applications in the photovoltaic, electronics, and semiconductor industries. An InnoLas solution utilizes cutting-edge innovations in laser technology to develop highly efficient and reliable processing systems. Every InnoLas machine platform is optimized for best-in-class performance in 24/7 operation.

**Ionx Cleaning Facilities bv****A8**

Rudonk 12  
4824 AJ Breda  
The Netherlands



phone: +31-641 232 912  
e-mail: info@ionxcf.com  
web: www.ionxglobal.eu

Ionx cleaning facilities bv is a member of the Ionx Global Group. Ionx C.F. bv is a company that provides automated cleaning facilities with innovative robotic solutions for solar plants and other glass surfaces such as glass curtain walls of office buildings and high rises or other architectural glass design-roofs etc.

We facilitate these services with sustainable technology, we offer an affordable, safe and efficient cleaning procedures, from the first to the last square meter.

This has a direct impact on the ROI of renewable energy sources and also indirectly increases the value, appearance and proceeds of real-estate.

**ISC Konstanz e.V.****C1**

Rudolf-Diesel-Str. 15  
78467 Konstanz  
Germany



phone: +49-7531 36183 0  
fax: +49-7531 36183 11  
e-mail: info@isc-konstanz.de  
web: www.isc-konstanz.de

International Solar Energy Research Center (ISC) Konstanz e.V. is a non-profit international communication platform for R&D and industry, with the goal of making photovoltaics (PV) more powerful and cost effective. At ISC Konstanz, about fifty scientists from roughly twenty nations develop leading-edge technologies: crystalline silicon solar cells, powerful modules and future systems for the entire world. Our specialities are cost effective device technologies such as standard Al-BSF, PERC, PERT

**IZOVAC Technologies****B7**

M. Bogdanovicha Str. 155-907  
220040 Minsk  
Belarus



phone: +375-17 29 31 842  
fax: +375-17 29 31 845  
e-mail: info@izovac.com  
web: www.izovac.com

IZOVAC Group - the expert in thin-film technologies and coating equipment manufacturing. - Turnkey provider of photovoltaic solutions. HJT solar fabs.- R&D center, consulting for photovoltaic projects.

**Jonas & Redmann****B9**

Kaiserin-Augusta-Allee 113  
10553 Berlin  
Germany



phone: +49-30 230 86 60  
fax: +49-30 230 50 99  
e-mail: info@jonas-redmann-com  
web: www.jonas-redmann.com

Jonas & Redmann has been a leading international manufacturer of special purpose machinery and automated production systems for 28 years. Providing latest technology and highest quality in products and customized solutions, Jonas & Redmann focuses on four dedicated divisions: Photovoltaics, Energy Storage, Medical Engineering and Assembly Automation.

**JRT Photovoltaics GmbH****B9**

Riegeler Str. 4  
79364 Malterdingen  
Germany



phone: +49-764 492 79 70  
e-mail: info@jrt-pv.de  
web: www.jrt-pv.de

JRT Metallization Lines - For the solar industry JRT is offering an industry standard-setting flexible system for the partial coating of silicon wafers by screen printing which ensures a high print quality combined with minimum breakage rates and low set up and maintenance times.

**Kipp & Zonen BV****A10**

P.O.Box 507  
2600AM Delft  
The Netherlands



phone: +31-152 755 210  
e-mail: info@kippzonen.com  
web: www.kippzonen.com

Kipp & Zonen is a world-leading manufacturer of top quality instruments for the measurement solar irradiance. In solar energy, accurately monitoring the sun's radiation is key to finding optimal locations, making informed investment decisions, monitoring performance, maximizing operating efficiency and scheduling maintenance. Another important input to O&M monitoring is panel soiling. Our revolutionary DustIQ is a maintenance-free product to provide the soiling ratio in real-time.

**KOPEL / KYOSHIN ELECTRIC CO., LTD****B16**

18, Goshonouchi-Nishimachi,  
Shichijou, Shimogyo-ku,  
Kyoto 600-8865  
Japan



phone: +81-75 311 85 55  
fax: +81-75 312 41 80  
e-mail: kopel@kyoshin-electric.co.jp  
web: www.kopel.jp

Kyoshin Electric Co., Ltd. is a Japanese company founded for about 70 years.

Our KOPEL Method can measure IV measurements around 400 ms in the measurement of Hetero-Junction solar cells (HJT) and other highly efficient solar cells (PERC, IBC). Throughput of up to 3,000 sheets / hour is realized using this and a high-speed conveyance device.

**Luvata Pori Oy****C5**

Kuparitie 2  
P.O.Box 60  
28101 Pori  
Finland



phone: +358-262 266 111  
fax: +358-262 653 09  
e-mail: info@luvata.com  
web: www.luvata.com

Luvata Special Products is a world leader in metal solutions manufacturing and related engineering services to industries such as renewable energy, automotive, healthcare, and power generation and distribution. The company's continued success is attributed to its longevity, technological excellence and strategy of building partnerships beyond metals. Luvata Special Products is a group company of Mitsubishi Materials Corporation.

**pv magazine group GmbH & Co KG****A7**

Kurfürstendamm 64  
10707 Berlin  
Germany



phone: +49-302 130 050 18  
e-mail: info@pv-magazine.com  
web: www.pv-magazine.com

Since its initial publication in 2008, pv magazine has evolved into the top international magazine for solar decision makers and is now leading the global solar media market. pv magazine is expanding its position as the number one global knowledge platform. The media portfolio from pv magazine rounds off its comprehensive digital range with the daily newsletter and the most current news on www.pv-magazine.com.

**Newport Spectra-Physics****A3**

Guerickeweg 7  
64291 Darmstadt  
Germany



phone: +49-615 170 89 09  
fax: +49-615 170 82 17  
e-mail: jens.voigtaender@newport.com  
web: www.newport.com

Newport, a subsidiary of MKS Instruments, Inc., is a leading global supplier of optomechanical, optoelectronic and optics products and systems that enable innovators around the world to make, manage and measure light. Newport offers expertise in precision motion, vibration control, light measurement and optomechanics with one of the largest standard product catalogs in the industry and unmatched custom capabilities.

**pv-tools GmbH****A15**

Hefehof 31  
31785 Hameln  
Germany



phone: +49-515 140 356 57  
fax: +49-515 140 356 57 8  
e-mail: b.fischer@pv-tools.de  
web: www.pv-tools.de

pv-tools manufactures highly automated off-line characterisation tools for silicon solar cells. The LOANA system displayed at this exhibition combines IV, IQE, LBIC, CV, EL, LIT and more in one machine. Also on display is the contact resistance mapping tool TLM-SCAN.

## Quantum Zurich

C4

Ifangstrasse 68  
8153 Rümlang  
Switzerland



phone: +41-768 282 120  
e-mail: info@quantumzurich.com  
web: www.quantumzurich.com

Quantum Zurich fabricates and develops FAST Quantum Efficiency measurement systems for solar cells.

## Semilab Co. Ltd

A11

Prielle Kornélia Str. 2  
1117 Budapest  
Hungary



phone: +36-150 546 90  
fax: +36-150 546 95  
e-mail: sales.support@semilab.hu  
web: www.semilab.hu

Semilab designs, produces and sells metrology equipment for the characterization of semiconductor and photovoltaic materials, for monitoring the manufacturing process of semiconductor devices, flat panel displays, solar cells and for R&D purposes in these areas. Most of our measurement techniques are non-contact and non-destructive, and can be flexibly integrated in different platforms. We also offer in-line measurements for solar cell production lines.

## RENA Technologies GmbH

B2

Höhenweg 1  
78148 Gütenbach  
Germany



phone: +49-772 393 130  
fax: +49-772 393 13 50  
e-mail: info@rena.com  
web: www.rena.com

“THE WET PROCESSING COMPANY” RENA Technologies is one of the world's leading suppliers of production equipment for wet chemical surface treatment. RENA equipment is used to treat the surfaces of solar cells, semiconductor wafers, cannulas, optical substrates, dental implants and other high-tech products using wet chemicals or ultra-pure water with standardised machines and guaranteed processes or entirely customised equipment.



We thank our Sponsor RENA



Your enabler to cost effective,  
high volume alkaline texturing!

## RENA BatchTex N400

High Throughput Texturing on a Compact Footprint

- Throughput up to 6000 wafers/h
- Tool length <13 m
- RENA monoTEX®
  - Shortest process time
  - Highest bath lifetime
  - Excellent homogeneity

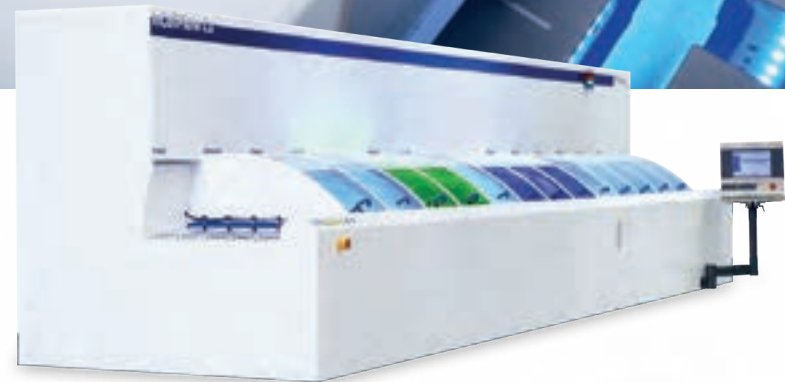


Looking for cost down?

## RENA InCellPlate Cu

Replace Front Side Printed Silver by Plated Electrodes

- Throughput up to 5000 wafers/h
- Savings up to 0.06 \$Ct/cell
- Deposition of Ni/Cu/Ag stack
- Compatible with conventional module assembly
- Based on RENA NIAK inline platform



## SINGULUS TECHNOLOGIES AG

B3

Hanauer Landstr. 103  
63796 Kahl am Main  
Germany



phone: +49-6188 440 0  
fax: +49-6188 440 110  
e-mail: bernhard.krause@singulus.de  
web: www.singulus.de

SINGULUS TECHNOLOGIES builds machines for economical and resource-efficient production processes. SINGULUS' strategy is based on the expansion of its existing core competencies. The application areas include coating, surface processing, wet-chemical as well as the related chemical and physical processing steps. The company's target is to reach a technologically leading position in the Solar division. For all machines, processes and applications SINGULUS draws upon its know-how in the areas of automation and process technology.

## Sinton Instruments

B5

4720 Walnut St, Suite 102  
Boulder, CO 80301  
USA



phone: +1-303 945 21 13  
fax: +1-303 945 21 99  
e-mail: quotes@sintoninstruments.com  
web: www.sintoninstruments.com

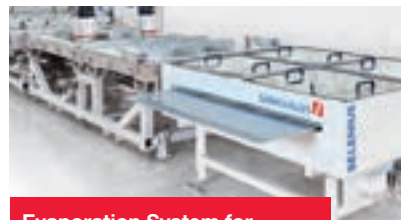
Sinton Instruments provides state-of-the-art test and measurement instruments for use in Silicon PV manufacturing and R&D for each stage of the solar cell production process from bricks and ingots through module test. We have revolutionized industrial cell and module testing by incorporating patented methodology and analysis techniques to provide unprecedented accuracy and process-control information.



Evaporation,  
Sputtering,  
Selenization &  
Wet Processing



Sputtering System for  
CIGS & CdTe



Evaporation System for  
CIGS

SINGULUS

**Sisecam Flat Glass****C8**

Icmeler Mah. D-100 Karayolu,  
Cad. No:44A Tuzla  
34947 Istanbul  
Turkey



phone: +90-850 206 32 55  
e-mail: [ibikmaz@sisecam.com](mailto:ibikmaz@sisecam.com)  
web: [www.sisecamflatglass.com](http://www.sisecamflatglass.com)

SISECAM is one of the largest and leading glass manufacturer and processor based in Turkey which supply high performance tempered solar glass in various sizes to Photovoltaics & Thermal Systems manufacturers worldwide.

**Solar Swiss Connect****C7**

c/o FSRM  
CP 2353  
2001 Neuchatel  
Switzerland



phone: +41-327 200 900  
e-mail: [info@solarswissconnect.ch](mailto:info@solarswissconnect.ch)  
web: [www.solarswissconnect.ch](http://www.solarswissconnect.ch)

Solar Swiss Connect is a non-profit association aiming to promote the swiss solar energy know-how and technologies. It creates national and international networks to stimulate knowledge transfer among all stakeholders in the field of solar energy.

**SOLARC Innovative Solarprodukte GmbH A16**

Glogauer Str. 21  
10999 Berlin  
Germany



phone: +49-30 319 8554 10  
fax: +49-30 319 8554 99  
e-mail: [werner@solarc.de](mailto:werner@solarc.de)  
web: [www.solarc.de](http://www.solarc.de)

SOLARC is your industrial partner for the development and manufacturing of innovative solar power systems, customised solar modules, GPS Tracking systems, solar charge controllers, DC/DC converters as well as motor and lighting controls systems. We are the right address for companies seeking for an experienced and a reliable partner to develop and manufacture customised components for a solar power-supply. SOLARC's particular strength lies in the development of customised-specific solutions.

**SOLARUNITED****B9**

P.O. Box 1610  
63406 Hanau  
Germany



phone: +49-618 198 280 42  
e-mail: [ekus@ipvea.com](mailto:ekus@ipvea.com)  
web: [www.solar-united.org](http://www.solar-united.org)

**SOLARUNITED -THE GLOBAL SOLAR BUSINESS & TECHNOLOGY ASSOCIATION**

Focusing on Quality, Reliability, Innovation, and PV Technology.

Formally known as IPVEA - today, we are known as SOLARUNITED, and we serve the interests of PV equipment manufacturers, module producers, project developers, financiers, consultants, service providers – the complete value chain and more!

As an SOLARUNITED member, you enjoy the considerable benefits of access to key decision makers, exposure to timely and critical issues, and expert analysis to help your business or organization succeeds in the international solar industry.

**Solaxess SA****C7**

Rue de la Maladière 71 C  
2001 Neuchâtel  
Switzerland



phone: +41-329 302 828  
e-mail: info@solaxess.ch  
web: www.solaxess.ch

Solaxess is a Swiss company specialized in the high-tech solar sector and works closely with the CSEM (Swiss Center for Electronics and Microtechnology).

Solaxess develops, manufactures and markets nanotechnological films which are embedded during the PV panel manufacturing. These films allow a perfect integration of PV panels in the architecture and into the building. The PV module manufacturers are now able to produce aesthetic white or light-colored panels.

**Solliance****B11**

High Tech Campus 21  
5656 AE Eindhoven  
The Netherlands



phone: +31-88 515 4646  
e-mail: info@solliance.eu  
web: www.solliance.eu

The research organization Solliance is focused on development and integration of thin film PV technology through public-private partnerships. It is a joint venture of ECN, TNO, Holst Centre and imec, together with academic partners TU Eindhoven, University of Hasselt, TU Delft and ForschungsZentrum Jülich. At the booth specific attention is given to the BIPV project "PV CustomFit", supported by the cross border collaboration program Interreg V Flanders-Netherlands with financial support of the European Funds for Regional Development.

**Solibro GmbH****B12**

OT Thalheim  
Sonnentallee 32-36  
06766 Bitterfeld-Wolfen  
Germany



phone: +49-3494 3840 93000  
fax: +49-3494 3840 93100  
e-mail: info@solibro-solar.com  
web: www.solibro-solar.com

Solibro GmbH is one of the world's leading manufacturers of CIGS thin-film modules, with a production capacity of 145 MW. Solibro has Headquarters in Thalheim, Germany and a research site in Uppsala, Sweden, both of which work to develop trailblazing solutions for the company's CIGS products. Solibro supplies products that are sustainable and cost-effective, with extraordinary aesthetics and top quality "Made in Germany".

**Stäubli Electrical Connectors****B9**

Stockbrunnenrain 8  
4123 Allschwil  
Switzerland



phone: +41-603 065 555  
e-mail: ec.ch@staubli.com  
web: www.staubli-alternative-energies.com

The first industrial photovoltaic connector (MC3) was introduced by Multi-Contact (Stäubli) in 1996 followed by the original MC4 in 2004 setting the industry standard ever since. The exclusive MULTILAM advanced contact technology raised the bar in terms of consistent quality and outstanding reliability, which leads to a positive impact on the bankability, the efficiency and the ROI of photovoltaic projects. Today, we have connected almost 50% (170GW) of the cumulative installed PV capacity.



**Sunprojects****B11**

Marathonlaan 17  
1183 VC Amstelveen  
The Netherlands



phone: +31-061 514 70 59  
e-mail: info@sun-projects.nl  
web: www.sun-projects.nl

**SVCS s.r.o.****A12**

Optatova 37  
63700 Brno  
Czech Republic



phone: +420-541 423 214  
fax: +420-541 423 219  
e-mail: info@svcs.cz  
web: www.svcs.cz

Equipment for solar cell production and research - horizontal and vertical furnaces for diffusion, batch PE CVD for passivation/ARC, LPCVD for polysilicon. Gas source systems for ammonia, silane, nitrogen, oxygen and other ultra high purity (UHP) gases used in solar cell production. Liquid source systems for delivery of precursors like TMA, TCS, TEOS DMZ, POCl<sub>3</sub> and BBr<sub>3</sub> and many others. ALD, PEALD and PECVD systems for R&D. Partner of EU-funded R&D programs for higher PV cell efficiency.

**SUPSI ISAAC****C7**

Campus Trevano  
6952 Canobbio  
Switzerland



phone: +41-586 666 351  
e-mail: pv-services.isaac@supsi.ch  
web: www.supsi.ch/isaac

SUPSI with its PVLab operates the only PV testing laboratory with ISO 17025 accreditation present in Switzerland: the PV group has been active since 1982 and supports the national and international industry with specialized competences in modules and system characterization, quality and safety, long term and accelerated testing, failure mode effect analysis.

**Tempress Systems****B4**

Radeweg 31  
8171 MD Vaassen  
The Netherlands



phone: +31-578 699 200  
fax: +31-578 693 693  
e-mail: rdejong@tempress.nl  
web: www.tempress.nl

We at Tempress share the vision to be successful as high-end technology and equipment supplier for the Solar industry. We want to offer our customers the best and innovative products. We believe that clean affordable and sustainable solar electricity is an essential part of the worldwide energy mix. We are proud that with our products and technology we enable affordable electricity with nearly zero carbon emission per kWh.

## TFSC-Instrument

A14

3 Rue Leon Blum  
91120 Palaiseau  
France



phone: +33-169 19 43 49  
e-mail: info@tfscinstrument.com  
web: www.tfscinstrument.com

TFSC-Instrument is offering new products dedicated to solar cell EQE and I-V measurements and also to thin film characterization such as minority carrier diffusion length (SSPG-230).

New generation of Spectral Response (EQE) system based on robust and reliable LED sources dedicated to small area <math><1 \text{ cm}^2</math>; QUESA-1200 to large area (300x300  $\text{cm}^2</math>); QUEMA-1200 for solar cell characterization with combination of high class solar simulator in the same system.$

## TKI Urban Energy

B11

Arthur van Schendelstraat 550  
3511 MH Utrecht  
The Netherlands



phone: +31-6 5155 3613  
web: www.tki-urbanenergy.nl

TKI Urban Energy supports energy innovations to accelerate the transition to a sustainable, affordable and reliable energy system in the built environment. More than 250 open innovation projects have been started in the past four years. More information on these innovation projects can be found on [www.tki-urbanenergy.nl/projecten](http://www.tki-urbanenergy.nl/projecten). By promoting collaboration between companies and research organizations, TKI Urban Energy also strives to strengthen economic development of Dutch companies active in the field of renewable energy solutions for the built environment (Urban Energy).

## University of Ljubljana, LPVO

A2

Trzaska 25  
1000 Ljubljana  
Slovenia



phone: +386-147 684 70  
fax: +386-147 681 30  
e-mail: marko.topic@fe.uni-lj.si  
web: www.pvo.fe.uni-lj.si/en/

The University of Ljubljana is the largest and the oldest in Slovenia. The Laboratory of Photovoltaics and Optoelectronics (LPVO) within its Faculty of Electrical Engineering within is the central R&D&I group for photovoltaics in Slovenia. In the fields of photovoltaics, optoelectronics and electronics we offer

- Turn key monitoring solutions for solar cells and PV modules
- Prototype development
- Characterisation
- Modelling and simulations
- PV system planning
- PV system components testing

## Valentin Software GmbH

B14

Stralauer Platz 34  
10243 Berlin  
Germany



phone: +49-30 588 439 0  
fax: +49-30 588 439 11  
e-mail: info@valentin-software.com  
web: www.valentin-software.com

Valentin Software has successfully developed intelligent software solutions for the design, simulation and yield calculation of energy supply for over 25 years. Our simulation programs PV\*SOL premium and PV\*SOL help system designers, engineers and installers to professionally design and dimension photovoltaic systems, and are also used in educational institutions for teaching and research purposes. In the Benelux countries we work together with our distribution partner Switch2Solar.

**Van der Valk Solar Systems****B11**

Zwartendijk 73  
2681 LP Monster  
The Netherlands



phone: +31-174 212 223  
e-mail: [verkoop@valksolarsystems.nl](mailto:verkoop@valksolarsystems.nl)  
web: [www.valksolarsystems.nl](http://www.valksolarsystems.nl)

Van der Valk Solar Systems is a specialist company that is fully focused on developing and producing solar mounting systems for pitched roofs, flat roofs and open fields.

- Innovative systems developed in compliance with applicable worldwide standards
- Fast and reliable deliveries thanks to modern machinery and large stocks
- System supplier since 1963
- Free to use software, ValkPVplanner, for project design and project calculation
- Quick assembly thanks to premounting of essential components
- All systems available in portrait as well as landscape configuration
- Various systems also available as ready-to-use kits

**Vela Solaris AG****C7**

Stadthausstr. 125  
8400 Winterthur  
Switzerland



phone: +41-552 207 100  
e-mail: [info@velasolaris.com](mailto:info@velasolaris.com)  
web: [www.velasolaris.com](http://www.velasolaris.com)

The Swiss company Vela Solaris develops and sells the Polysun software products, available since 1992. Polysun software is being used in the planning of photovoltaic, heatpump and solar thermal systems and cogeneration units as well as for combination of these systems. The dynamic simulation enables the user to give accurate yield forecasts and to optimize the entire system. The comprehensive calculation of profitability includes a far-reaching analysis of the economic aspects.

**VITRONIC Dr.-Ing. Stein  
Bildverarbeitungssysteme GmbH****B9**

Hasengartenstr. 14  
65189 Wiesbaden  
Germany



phone: +49-611 7152 0  
fax: +49-611 7152 133  
e-mail: [sales@vitronic.com](mailto:sales@vitronic.com)  
web: [www.vitronic.com](http://www.vitronic.com)

VITRONIC is a global leader for high performance machine vision solutions for industrial and logistics automation and traffic technology. In photovoltaics VITRONIC looks back to more than 10 years of experience. Manufacturers of solar cells and modules around the world look to VITRONIC for automated optical inspection systems (AOI) that give them a competitive edge. And with more than 2,000 successful PV installations for over 80 customers worldwide, the track record speaks for itself.

**VON ARDENNE GmbH****A6**

Am Hahnweg 8  
01328 Dresden  
Germany



phone: +49-351 2637 300  
e-mail: [office@vonardenne.biz](mailto:office@vonardenne.biz)  
web: [www.vonardenne.biz](http://www.vonardenne.biz)

VON ARDENNE develops and manufactures industrial equipment for vacuum coatings on materials such as glass, wafers, metal, and polymer films. We are the leading provider of thin-film and crystalline photovoltaics tools, from laboratory scale to best-in-class production equipment. Furthermore, our customers can rely on technical and technology support by our worldwide service organization and German engineering with a track record of providing coating equipment for more than 60 years.

**Wiley****A9**

John Wiley & Sons, Inc.  
111 River  
Street Hoboken,  
NJ 07030-5774  
USA

**WILEY**

web: [www.wiley.com](http://www.wiley.com)

Wiley, a global company, helps people and organizations develop the skills and knowledge they need to succeed. Our online scientific, technical, medical, and scholarly journals, combined with our digital learning, assessment and certification solutions help universities, societies, businesses, governments, and individuals increase the academic and professional impact of their work.

**WIP Renewable Energies****B15**

Sylvensteinstr. 2  
81369 Munich  
Germany



phone: +49-89 720 12 735  
fax: +49-89 720 12 791  
e-mail: [wip@wip-munich.de](mailto:wip@wip-munich.de)  
web: [www.wip-munich.de](http://www.wip-munich.de)

WIP Renewable Energies is an interdisciplinary team of professionals focussing on the successful implementation of Renewable Energy Projects. We provide expert and consultancy services to improve the performance of sustainable energy systems and optimize energy consumption. We bridge the gap between the research and the implementation into the markets.

**ZSW Zentrum für Sonnenenergie- und  
Wasserstoff-Forschung Baden-Württemberg C3**

Meitnerstr. 1  
70565 Stuttgart  
Germany



phone: +49-711 787 00  
fax: +49-711 7870 100  
e-mail: [info@zsw-bw.de](mailto:info@zsw-bw.de)  
web: [www.zsw-bw.de](http://www.zsw-bw.de)

ZSW is a leading institute for applied research: photovoltaics, regenerative fuels, battery and fuel cell technology as well as energy systems analysis. In PV, we present materials research in CIGS on glass, flexible CIGS technology and new materials like kesterites and perovskites. ZSW holds the current record for the CIGS thin-film technology with 22.6 percent for a laboratory cell. We also provide indoor and outdoor testing services, storage as well as solar and wind power output forecasts.



**We thank our Sponsor Singulus**

Exhibition Layout with Exhibitors by stand number

## Exhibition Area

ground floor (Diamond Lounge / Europa Foyer)

EXHIBITION

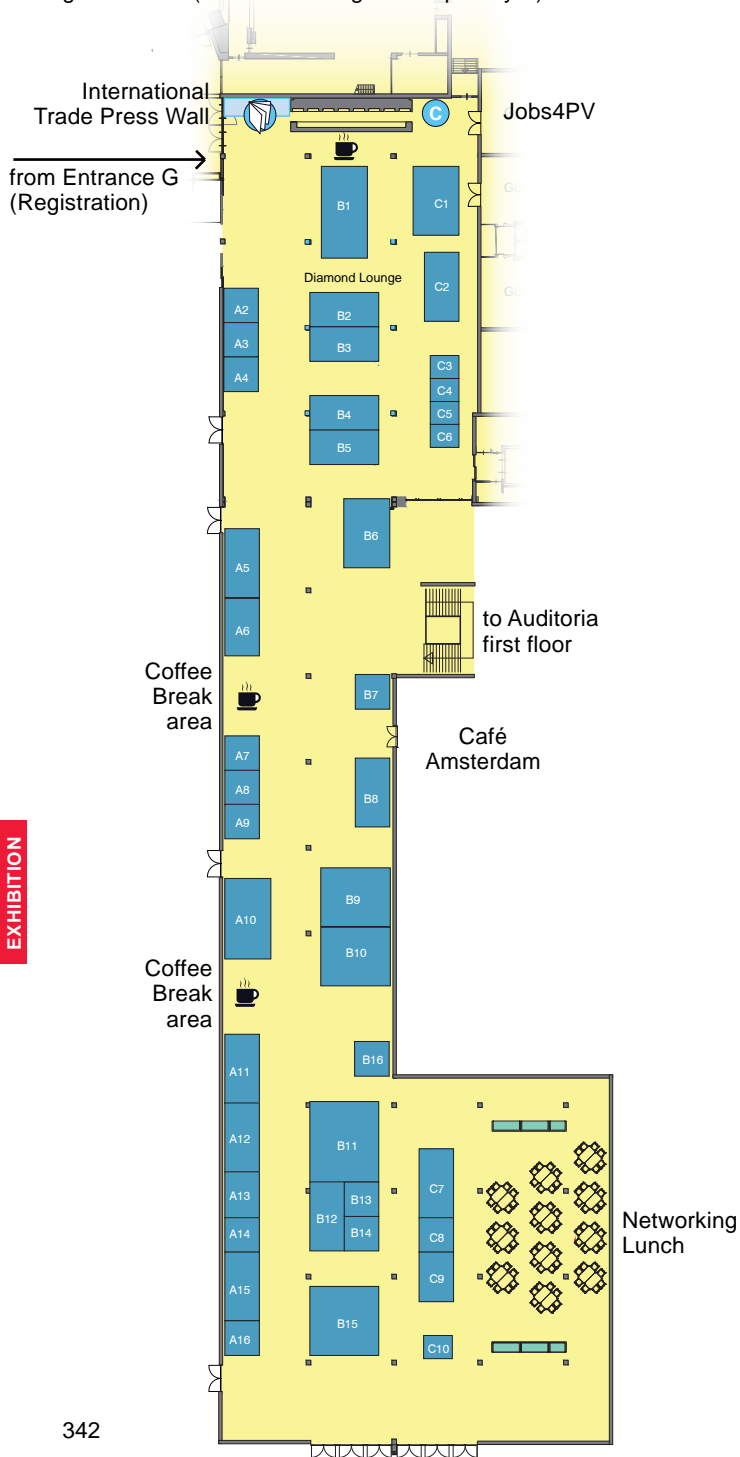


- A2 University of Ljubljana, LPVO
- A3 Newport Spectra-Physics
- A4 ETA Florence Renewable Energies
- A5 Heraeus Deutschland GmbH & Co. KG (Heraeus Photovoltaics)
- A6 VON ARDENNE GmbH
- A7 pv magazine group GmbH & Co KG
- A8 Ionx Cleaning Facilities bv
- A9 Wiley
- A10 Kipp & Zonen BV
- A11 Semilab Co. Ltd
- A12 SVCS s.r.o.
- A13 Bentham Instruments Limited
- A14 TFSC-Instrument
- A15 pv-tools GmbH
- A16 SOLARC Innovative Solarprodukte GmbH
- B1 European Commission, Joint Research Centre
- B2 RENA Technologies GmbH
- B3 SINGULUS TECHNOLOGIES AG
- B4 Tempres Systems
- B5 Sinton Instruments
- B6 BERGER Lichttechnik GmbH & Co. KG
- B7 IZOVAC Technologies
- B8 ECN
- B9 InnoLas Solutions GmbH
- B9 Jonas & Redmann
- B9 JRT Photovoltaics Lines
- B9 SOLARUNITED
- B9 Stäubli Electrical Connectors
- B9 VITRONIC Dr.-Ing. Stein Bildverarbeitungssysteme GmbH
- B10 ASYS GmbH

## Exhibition Area

ground floor (Diamond Lounge / Europa Foyer)

## EXHIBITION



- B11 Delft University of Technology
- B11 Dutch Energetics Management (DEM)  
(Affiliated to Dutch Innovative Management  
and Services BV (DIMS))
- B11 FME
- B11 Holland Solar
- B11 HydroPV Technologies
- B11 Solliance
- B11 Sunprojects
- B11 TKI Urban Energy
- B11 Van der Valk Solar Systems
- B12 Solibro GmbH
- B13 Abet Technologies, Inc.
- B14 Berlin-Brandenburg Energy Network e.V.
- B14 greateyes GmbH
- B14 Valentin Software GmbH
- B15 EUREC - The Association of European  
Renewable Energy Research Centres
- B15 IEA PVPS International Energy Agency  
Photovoltaic Power Systems Programme
- B15 WIP Renewable Energies
- B16 KOPEL / KYOSHIN ELECTRIC CO., LTD
- C1 ISC Konstanz e.V.
- C2 h.a.l.m. elektronik GmbH
- C3 ZSW Zentrum für Sonnenenergie- und  
Wasserstoff-Forschung Baden-Württemberg
- C4 Quantum Zurich
- C5 Luvata Pori Oy
- C6 Engineered Materials Systems, Inc.
- C7 CSEM SA
- C7 Solar Swiss Connect
- C7 Solaxess SA
- C7 SUPSI ISAAC
- C7 Vela Solaris AG
- C8 Sisecam Flat Glass
- C9 Advanced Silicon Group
- C10 3D-Micromac AG





NOTES

.....

NOTES

.....



## GENERAL INFORMATION

For more information please refer to  
[www.photovoltic-conference.com/participation](http://www.photovoltic-conference.com/participation)

**VENUE OF EU PVSEC 2017**

RAI Amsterdam Convention Centre  
Europaplein  
NL 1078 GZ  
Amsterdam  
The Netherlands

Telephone : +31-(0)-20-549 12 1  
[www.rai.nl/en](http://www.rai.nl/en)

*For detailed Travel and Transport Information please visit  
[www.photovoltaic-conference.com/participation](http://www.photovoltaic-conference.com/participation)*



**ACCESS**

**EU PVSEC Conference**

Upon arrival at RAI Amsterdam, Conference participants should proceed to the Conference Registration Desk at the main entrance G to check in and pick up their badge.

**Opening hours of the Conference Registration Desk:**

Sun	24 Sept 2017	16:00 – 18:00
Mon	25 Sept 2017	07:30 – 19:00
Tue – Thu	26 - 28 Sept 2017	08:00 – 19:00
Fri	29 Sept 2017	08:00 – 09:30

**Conference Badge**

Your personalised Conference badge authorises you to visit:

- all EU PVSEC Conference sessions on day/s registered
- all EU PVSEC Parallel Events on day/s registered
- the Solar Industry Forum on day/s registered
- the Exhibition (25-28 September 2017)

*Kindly note, that your badge is not transferable to another person. We ask for your understanding that your personalised admission might be controlled by our staff. In case of loss or find a badge, please inform our staff immediately. Kindly note that lost badges cannot be replaced.*

**EU PVSEC Industry Exhibition**

The Exhibition is open to all Conference Delegates.

Opening hours are from:

Mon	25 Sept 2017	13:00 – 18:00
Tue – Wed	26 - 27 Sept 2017	09:00 – 18:00
Thu	28 Sept 2017	09:00 – 16:00

**EU PVSEC Parallel Events**

All EU PVSEC Parallel Events are open to Conference Delegates on day/s registered.

For further information about the EU PVSEC Parallel Events see page 277)

Find here a general overview of the EU PVSEC 2017 ticketing categories and registration benefits:

**EU PVSEC 2017 Registration Benefits**

Registration Category	Conference Sessions	Exhibition	Parallel Events	Solar Industry Forum	Information Material	Proceedings	EU PVSEC Dinner	Networking Lunch	Welcome Reception
Full Conference Week	✓	✓	✓	✓	✓	✓			✓
One Day Admission*	✓*	✓	✓*	✓*	✓	✓			✓
Two Days Admission*	✓*	✓	✓*	✓*	✓	✓			✓
Students	✓	✓	✓	✓	✓	✓			✓
Networking Lunch (from Mon - Thu)								✓	
EU PVSEC Dinner (Wednesday)							✓		
Special Full Conference Week Registration for Exhibitors	✓	✓	✓*	✓*	✓	✓			
Exhibition Visitors		✓							

\* on registered day/s only

## CONFERENCE PROCEEDINGS

The EU PVSEC 2017 Proceedings contain all scientific papers presented at the EU PVSEC 2017 and submitted for publication.

They constitute a comprehensive source of state-of-the-art information and vital point of reference for researchers, technologists, decision-makers, entrepreneurs and all involved in the global PV sector.

The EU PVSEC 2017 Proceedings include full presented papers, slides presentations and poster presentations (if available).

A digital identifier (DOI code) has been assigned to each paper to ensure unequivocal and permanent identification and citation capability of the online publication. This identification system is administered by the German National Library of Science and Technology.

Conference participants will have immediate and free access to the EU PVSEC 2017 Proceedings right after publication.

The EU PVSEC Proceedings are available on [www.eupvsec-proceedings.com](http://www.eupvsec-proceedings.com).

Authors are requested to submit their manuscript for publication in the Conference Proceedings (see page 360)

## COOPERATION WITH 'PROGRESS IN PHOTOVOLTAICS'

After a peer review process, a selected number of the highest ranked papers from every Conference subject will be published - in addition to the EU PVSEC Proceedings 2017 - on the website and in a digital special issue of the renowned scientific journal '*Progress in Photovoltaics*'.



## PRIZES & AWARDS

### European Becquerel Prize for Outstanding Merits in Photovoltaics

The European Becquerel Prize for Outstanding Merits in Photovoltaics will be awarded during the Conference. This prize was established by the European Commission in 1989 to mark the 150th anniversary of Alexandre-Edmond Becquerel's discovery of the photovoltaic effect in 1839, which laid the foundation of both, photovoltaics and photography. The Becquerel Prize will be awarded on Monday, 25 September 2017 during the Opening Ceremony in the Main Auditorium.

#### Dr. Stefan Nowak receives the Becquerel Prize 2017

He receives the award in honour of his merits in the field of integration of photovoltaic electricity into the future global sustainable energy system. The decision of the Becquerel Prize Committee is based in particular on his outstanding work in the development and management of international PV research, innovation and implementation programmes.



Dr. Nowak is one of the leading strategists and promoters of targeted European and global cooperation on PV research, market assessment and deployment. Of particular importance are his long-lasting activities as chairman of the International Energy Agency's "Photovoltaic Power Systems Programme" and as coordinator of the "Solar European Research Area Network".

His leadership, comprehensive and precise analyses and inspiring argumentation in strategic and institutional discussions have strongly contributed to the global credibility of photovoltaics as a basis of future energy systems.

#### Award Ceremony

The prize will be awarded at the Opening of this years' European Photovoltaic Solar Energy Conference and Exhibition, on 25 September 2017, in the Opening, following the Moderated Panel Discussion.

On the occasion of this ceremony Dr. Nowak will deliver a key note speech "**PV and beyond - from technology to the energy system**".

## Awards for Outstanding Visual Presentations

This award is one of the highlights of the Closing Session: The most outstanding Visual Presentations of each topic (Topic 1 to 7) will be awarded.

A jury of experts judges the quality of the contents reported and the quality of the presentation. The awards will be announced and delivered as part of the Conference Closing on Friday, 29 September 2017. The winners will be invited on stage and the winning posters will be projected in the Auditorium.

## EU PVSEC Student Awards

Following the success of previous years and to encourage high-quality work among young researchers, the EU PVSEC Student Awards will be delivered in recognition of the most remarkable and outstanding research work in the field of PV on the occasion of the EU PVSEC 2017.

66 applications for the EU PVSEC Student Awards have been received. They have been reviewed and scored by the international Scientific Committee, made up of more than 200 leading research and industry experts from the global PV community.

The prizes will be awarded during the Conference Closing Session on Friday, 29 September 2017.

Take the chance to attend the presentation of their outstanding work in the following Oral sessions:

### Monday, 25 September 2017

#### M. Rienäcker

ISFH, Emmerthal, Germany

1AP.1.2 Maximum Power Extraction Enabled by Monolithic Tandems Using Interdigitated Back Contact Bottom Cells with Three Terminals

#### R. Kimovec

University of Ljubljana, Slovenia

1AO.1.3 Multi-Segment Photovoltaic Laser Power Converters and Their Electrical Losses

#### A.R. Paduthol

UNSW Australia, Sydney, Australia

2AO.4.2 Efficient Carrier Injection from Amorphous Silicon into Crystalline Silicon Determined from Photoluminescence

### Tuesday, 26 September 2017

#### G. Nogay

EPFL, Neuchâtel, Switzerland

2BO.4.3 Locally Conductive Transport Channel Formation in High Temperature Stable Hole-Selective Silicon-Rich Silicon Carbide Passivating Contact

### Wednesday, 27 September 2017

#### F.T. Si

Delft University of Technology, The Netherlands

2CO.12.1 Quadruple-Junction Thin-Film Silicon Solar Cells Using Four Different Absorber Materials

### Thursday, 28 September 2017

#### Z.J. Yu

Arizona State University, Tempe, United States

3DO.7.6 23.6%-Efficient Monolithic Perovskite/Silicon Tandem Cell

#### A. Onno

University College London, United Kingdom

4DO.4.2 MBE Growth of 1.7eV AlGaAs Solar Cells on Si Using Dislocation Filters: An Alternative Pathway Toward III-V/Si Multijunction Architectures

Above programme may be subject to adaptation.



## NETWORKING

### Coffee Breaks (for Conference Delegates)

Coffee Breaks are included in the Conference fee. They will be served during the Conference breaks in the Exhibition Area, Europe Foyer.

### Catering / Restaurants

A special dedicated Networking Lunch could be booked prior to the event. Tickets are not available on-site. The Networking Lunch will be served in a dedicated networking area in exclusive ambiance, directly in the RAI Amsterdam. For those who did not include Networking Lunch tickets in their registration, there is a wide range of cafés and restaurants around RAI Amsterdam.

### Welcome Reception

On Monday, 25 September, there will be a Welcome Reception for all Conference participants and Exhibitors, from 18:30 in the Exhibition Area, Europe Foyer. Come and meet your colleagues of the PV community and celebrate the EU PVSEC 2017 as a major networking platform for the global PV Solar sector.

### EU PVSEC Dinner

The EU PVSEC 2017 Conference Dinner takes place on Wednesday evening, 27 September 2017 in the **Restaurant De Kroon** which is located in one of Amsterdam's most picturesque Squares: The Rembrandtplein (Rembrandt Square). The square has been named after the famous painter Rembrandt van Rijn who owned a house nearby from 1639 to 1656. By the early twentieth century, the square developed into a centre for nightlife drawing artists, young people and laborers. To serve these visitors, several hotels, cafés and entertainment venues opened in the adjoining streets. The area continues to be popular with residents and tourists.

The EU PVSEC Dinner will be a most captivating social event of the EU PVSEC week:

- Meet professionals from the PV world
- Enjoy excellent Cuisine
- Relax and network in pleasant ambiance

### Wednesday 27 September from 19:30 - 23:00 at Restaurant De Kroon

Free Bus Shuttle starting at around 18:45 - 19:00 at the RAI Amsterdam and going back at 23:00.

## Networking Lunch

A networking lunch will be available for interested delegates from Monday to Thursday, 25 – 28 September in a dedicated networking area in exclusive ambiance, directly in the RAI Convention & Exhibition Centre.

This avoids queueing up in lunch periods and provides a networking environment. The networking lunch will be served in buffet style, and is convenient for both meat lovers and vegetarians. Tickets can be bought online prior to the event, may become subject to availability and need to be paid in advance. Tickets will not be sold on-site. Access to the networking lunch will be granted upon presentation of a lunch voucher which you will receive at the registration desk on-site along with your registration documents. Lost tickets will not be replaced.

## SERVICES

### EU PVSEC Personal Programme Planner

We recommend using the EU PVSEC Personal Programme Planner in order to most successfully schedule your EU PVSEC week.

The EU PVSEC Personal Programme Planner provides a quick and detailed general synopsis of all events, sessions and presentations of the EU PVSEC 2017. It provides targeted search e.g. by speakers, organisations, topics, product categories, keywords, time and location.

Create your personal, clearly laid out agenda. See at a glance where and when your chosen presentations / sessions take place and get detailed information about the respective topics. You may save and modify your agenda at any time.

Please use the online version at [www.eupvsec-planner.com](http://www.eupvsec-planner.com), or the mobile version at [mobile.eupvsec-planner.com](http://mobile.eupvsec-planner.com).

The mobile version is web-based and can be used by all kinds of smartphones. All you need is your smartphone's browser and internet connection.

## INSTRUCTIONS FOR AUTHORS AND PRESENTERS

## Plenary / Oral Presentations

Speakers of Plenary and Oral presentations **hand in their presentation/s at the Presenters' Desk** (room G001, ground floor). A technician will control the correct functionality and transfer the presentation to the respective auditorium. Further details regarding Plenary/Oral Presentations can be found in the *Notes for Authors* available on the EU PVSEC website.

Opening hours of Presenters' Desk (room G001, ground floor):

Sun	24 Sept 2017	16:00 – 18:00
Mon	25 Sept 2017	07:30 – 19:00
Tue – Thu	26 - 28 Sept 2017	08:00 – 19:00
Fri	29 Sept 2017	08:00 – 12:00

Speakers and Chairpersons of Plenary and Oral sessions **meet 15 minutes prior to the start of their session** in the respective auditorium in order to be briefed and to become acquainted with audio-visual aids.

## Visual Presentations

Authors of Visual presentations are requested to **set up their posters** on the allotted boards as early as possible on **Monday morning, 25 September** and to **take them down on Thursday, 28 September, after the last session at 18:30**. All Visual presentations should be presented through the full 4 days from Monday to Thursday in the Poster Area. Please find all detailed guidelines in the *Notes for Authors of Visual Presentations*.

Authors of posters are requested to **be in situ at their posters at the session time** indicated in the Programme Brochure, in order to present their paper to the audience and to create a Q&A session.

In order to be **published in the EU PVSEC 2017 Proceedings**, authors need to **deliver their manuscript at the Delivery of Manuscripts Desk (room G002)**. If the manuscript is not delivered during the Conference, your paper cannot be published in the Proceedings. The *Instructions for Preparation of Papers* are available for download on the EU PVSEC website.

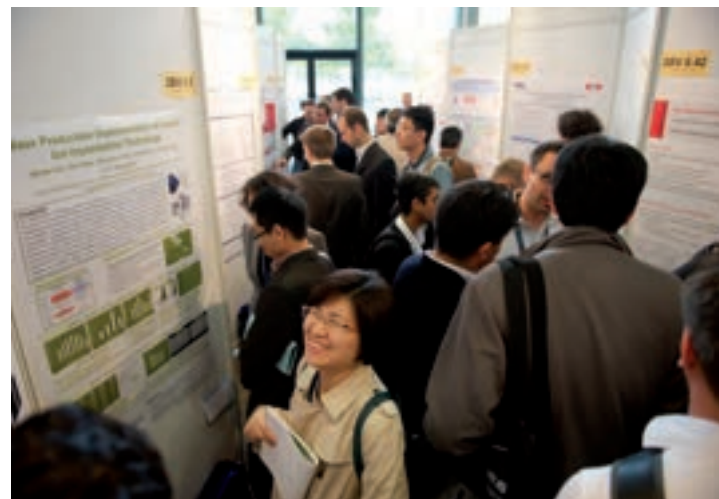
Opening hours of the Delivery of Manuscripts Desk (room G002, ground floor):

Sun	24 Sept 2017	16:00 – 18:00
Mon	25 Sept 2017	07:30 – 19:00
Tue - Thu	26 – 28 Sept 2017	08:00 – 19:00

## INSURANCE

The organiser cannot be held responsible for injury to Conference attendees or for damage to or loss of their personal belongings, regardless of cause.

Attendees are advised to make their own insurance arrangements.







## ACKNOWLEDGEMENTS

Committees, Supporters, Sponsors & Media Partners

## INTERNATIONAL SCIENTIFIC ADVISORY COMMITTEE

### Chair

Piotr Szymanski  
European Commission Joint Research Centre, Director of Energy,  
Transport and Climate

### Secretary

Nigel Taylor, European Commission Joint Research Centre, Institute  
for Energy and Transport, Ispra, Italy

### Committee Members

Paolo Frankl, Head of the Renewable Energy Division, International  
Energy Agency, France

Maria Getsiou, European Commission DG RTD, Brussels, Belgium

Stefan W. Glunz, Head of Division "Solar Cells – Development and  
Characterization", Fraunhofer ISE, Freiburg, Germany

Dirk Habermann, Chief Innovation Officer, Meyer Burger Technology  
AG, Gwatt (Thun), Switzerland

Philippe Malbranche, General Director, CEA INES, France

Pietro Menna, European Commission DG ENER, Brussels, Belgium

Stefan Nowak, Managing Director of NET Nowak Energy &  
Technology, Switzerland

Wim Sinke, Program Development Manager, ECN Solar Energy, The  
Netherlands

Arno Smets  
Professor Solar Energy at Delft University of Technology, Delft, The  
Netherlands

Marko Topič  
Chairman ETIP PV - European Technology & Innovation  
Platform Photovoltaics, Head of Laboratory of Photovoltaics and  
Optoelectronics of the University of Ljubljana, Slovenia

Pierre Verlinden, Chief scientist and vice chair, State Key Lab. TRINA  
Solar, China

Peter Helm, EU PVSEC Executive Director, WIP Renewable  
Energies, Munich, Germany

Angela Grassi, ETA-Florence Renewable Energies, Florence, Italy

## EXECUTIVE COMMITTEE

### Conference General Chairman

Arno Smets  
Professor Solar Energy at Delft University of Technology, Delft, The  
Netherlands

### Technical Programme Chairman

Nigel Taylor, European Commission Joint Research Centre, Institute  
for Energy and Transport, Ispra, Italy

### Committee Members

Heinz Ossenbrink, former with European Commission, JRC, Institute  
for Energy and Transport, Ispra, Italy

Stefan Nowak, Managing Director of NET Nowak Energy &  
Technology, Switzerland

Wim Sinke, Program Development Manager, ECN Solar Energy, The  
Netherlands

Nigel Taylor, European Commission Joint Research Centre, Institute  
for Energy and Transport, Ispra, Italy

Peter Helm, EU PVSEC Executive Director, WIP Renewable  
Energies, Munich, Germany

Angela Grassi, ETA-Florence Renewable Energies, Florence, Italy

## SCIENTIFIC COMMITTEE

### Topic Organisers

Oliver Anspach, PV Crystalox Solar, Erfurt, Germany

Derk Bätzner, Meyer BurgerTechnology, Hauterive, Switzerland

Franz P. Baumgartner, Zurich University of Applied Sciences, Winterthur, Switzerland

Fabrizio Bonemazzi, ENEL, Rome, Italy

Christoph Brabec, University of Erlangen-Nuremberg, Germany

Rolf Brendel, ISFH, Emmerthal, Germany

Christian Breyer, Lappeenranta University of Technology, Finland

Julio Cárabe, CIEMAT, Madrid, Spain

Mariska de Wild-Scholten, SmartGreenScans, Groet, The Netherlands

Nicholas J. Ekins-Daukes, Imperial College London, United Kingdom

Francesca Ferrazza, Eni, San Donato Milanese, Italy

Giovanni Flamand, imec, Leuven, Belgium

Francesco Frontini, SUPSI, Canobbio, Switzerland

Maria Getsiou, European Commission DG RTD, Brussels, Belgium

Stefan W. Glunz, Fraunhofer ISE, Freiburg, Germany

Ralph Gottschalg, Loughborough University, United Kingdom

Giso Hahn, University of Konstanz, Germany

Peter Lechner, ZSW, Stuttgart, Germany

Antonio Martí Vega, UPM, Madrid, Spain

Gaetan Masson, Becquerel Institute, Brussels, Belgium

Oliver Mayer, GE Global Research, Garching, Germany

Delfina Muñoz, CEA, Le Bourget du Lac, France

Thomas Nordmann, TNC Consulting, Feldmeilen, Switzerland

Stefan Nowak, NET Nowak Energy & Technology, St. Ursen, Switzerland

Nicola Pearsall, Northumbria University, Newcastle upon Tyne, United Kingdom

Emiliano Perezagua, Consultores de Energía Fotovoltaica, Madrid, Spain

Marion Perrin, CEA, Le Bourget du Lac, France

Jozef (Jef) Poortmans, imec, Leuven, Belgium

Christos Protogeropoulos, Athens, Greece

Stephan Riepe, Fraunhofer ISE, Freiburg, Germany

Tony Sample, European Commission DG JRC, Ispra, Italy

Alessandra Scognamiglio, ENEA, Portici, Italy

Carla Signorini, ESA-ESTEC, Noordwijk, The Netherlands

Ayodhya Nath Tiwari, EMPA, Dübendorf, Switzerland

Marko Topic, University of Ljubljana, Slovenia

John Van Roosmalen, ECN, Petten, The Netherlands

Wilfried van Sark, Utrecht University, The Netherlands

Sjoerd Veenstra, ECN, Eindhoven, The Netherlands

Karsten Wambach, Wambach-Consulting, Aindling, Germany

Arthur W. Weeber, ECN, Petten, The Netherlands

Ingrid Weiss, WIP - Renewable Energies, Munich, Germany

Wiltraud Wischmann, ZSW, Stuttgart, Germany

Peter Wohlfart, SINGULUS TECHNOLOGIES, Kahl am Main, Germany

**Paper Review Experts**

Armin Gerhard Aberle, SERIS, Singapore  
Cristina Alonso-Tristán, UBU, Burgos, Spain  
Ignacio Anton Hernandez, UPM, Madrid, Spain  
Nekane Azkona, UPV/EHU, Zamudio, Spain  
Kris Baert, KU Leuven, Heverlee, Belgium  
Jörg Bagdahn, Fraunhofer CSP, Halle (Saale), Germany  
Giorgio Bardizza, European Commission DG JRC, Ispra, Italy  
Radim Barinka, Fill Factory, Rožnov pod Radhoštm, Czech Republic  
Paul A. Basore, PV Specialist Services, Solana Beach, USA  
Guy Beaucarne, Dow Corning, Seneffe, Belgium  
Andreas W. Bett, Fraunhofer ISE, Freiburg, Germany  
Jann Binder, ZSW, Stuttgart, Germany  
Robert Birkmire, University of Delaware, Newark, USA  
Philippe Blanc, MINES ParisTech, Paris, France  
Pierluigi Bonomo, SUPSI, Canobbio, Switzerland  
Franck Bourry, CEA, Le Bourget du Lac, France  
Stuart Bowden, Arizona State University, Tempe, USA  
Timothy Bruton, TMB Consulting, Woking, United Kingdom  
Virginijus Bukauskas, Center for Physical Sciences and Technology, Vilnius, Lithuania  
Roberta Campesato, CESI, Milan, Italy  
Silvia Caneva, WIP - Renewable Energies, Munich, Germany  
David Cheyns, imec, Leuven, Belgium  
Stéphane Cros, CEA, Le Bourget du Lac, France  
Izael Da Silva, Strathmore University, Nairobi, Kenya

Thomas Dalibor, Avancis, München, Germany  
Adrien Danel, CEA, Le Bourget du Lac, France  
Bill Dauksher, Arizona State University, Tempe, USA  
Maarten Debucquoy, imec, Leuven, Belgium  
Paola Delli Veneri, ENEA, Portici, Italy  
Thibaut Desrues, CEA, Le Bourget du Lac, France  
Bernhard Dimmler, Manz CIGS Technology, Schwäbisch Hall, Germany  
Doriana Dimova-Malinovska, Bulgarian Academy of Sciences, Sofia, Bulgaria  
Sébastien Dubois, CEA, Le Bourget du Lac, France  
Thorsten Dullweber, ISFH, Emmerthal, Germany  
Ken Durose, Stephenson Institute for Renewable Energy, Liverpool, United Kingdom  
Roland Einhaus, Apollon Solar, Lyon, France  
Peter Fath, RCT-Solutions, Konstanz, Germany  
Gabi Friesen, SUPSI, Canobbio, Switzerland  
Vasilis Fthenakis, Columbia University, New York, USA  
Bruno Gaiddon, Hespul, Lyon, France  
Stefan Gall, HZB, Berlin, Germany  
William J. Gambogi, DuPont, Wilmington, USA  
Luiz Carlos Gomes de Freitas, Federal University of Uberlândia, Brazil  
Ivan Gordon, imec, Leuven, Belgium  
Jonathan Govaerts, imec, Leuven, Belgium  
Giorgio Graditi, ENEA, Portici, Italy  
Matthias Grottko, WIP Renewable Energies, Munich, Germany  
Jean Francois Guillemoles, CNRS, Chatou Cedex, France

Ingo Hagemann, Architekturbüro Hagemann, Aachen, Germany

Jan Haschke, EPFL, Neuchâtel, Switzerland

Claas Helmke, Management Consultancy Research, Erfurt, Germany

M. Angeles Hernandez-Fenollosa, UPV, Valencia, Spain

Karl Hesse, Wacker Chemie, Burghausen, Germany

Yoshihiro Hishikawa, AIST, Tsukuba, Japan

Jörg Horzel, CSEM, Neuchâtel, Switzerland

Shujuan Huang, UNSW Australia, Sydney, Australia

Thomas Huld, European Commission DG JRC, Ispra, Italy

Kees Hummelen, University of Groningen, The Netherlands

Stuart J. C. Irvine, Swansea University, St. Asaph, United Kingdom

Ulrike Jahn, TÜV Rheinland Energy, Cologne, Germany

Joachim John, imec, Leuven, Belgium

Elizabeth Kaijuka-Okwenje, Makerere University, Kampala, Uganda

Izumi Kaizuka, RTS, Tokyo, Japan

Dong-Won Kang, Cheongju University, Republic of Korea

Victor Khorenko, AZUR SPACE, Heilbronn, Germany

Sung Dug Kim, Solar Material Consulting, San Jose, USA

Richard King, Arizona State University, Tempe, USA

Dirk König, UNSW Australia, Sydney, Australia

Igor Konovalov, University of Applied Science Jena, Germany

Stephen Koopman, CSIR, Pretoria, South Africa

Stefan Krauter, University of Paderborn, Germany

Ana Rosa Lagunas, CENER, Sarriguren, Spain

Philip Leicester, Loughborough University, United Kingdom

Claude Lévy-Clément, CNRS, Thiais, France

Mónica Lira-Cantú, CIN2, Barcelona, Spain

Ching-Fuh Lin, NTU, Taipei, Taiwan

Martha Ch. Lux-Steiner, HZB, Berlin, Germany

Philippe Malbranche, CEA, Le Bourget du Lac, France

Didier Mayer, MINES ParisTech, France

Paola Mazzucchelli, EUREC, Brussels, Belgium

Keith McIntosh, PV Lighthouse, Coledale, Australia

Alexander Meeder, Geo-En Energy Technologies, Berlin, Germany

Johannes Meier, PV Consultant, Berlingen, Switzerland

Axel Metz, h.a.l.m. elektronik, Frankfurt am Main, Germany

Marc Meuris, imec, Leuven, Belgium

Carlos Molpeceres, UPM, Madrid, Spain

Christos Monokroussos, TÜV Rheinland, Shanghai, China

Jörg Müller, Hanwha Q CELLS, Bitterfeld-Wolfen, Germany

Miguel Angel Muñoz-García, UPM, Madrid, Spain

Gerhard Mütter, Alternative Energy Solutions, Vienna, Austria

Henning Nagel, Fraunhofer ISE, Freiburg, Germany

Hartmut Nussbaumer, Zurich University of Applied Sciences, Winterthur, Switzerland

Christer Nyman, Soleco, Porvoo, Finland

Yoshio Ohshita, TTI, Nagoya, Japan

Yoshitaka Okada, University of Tokyo, Japan

Sener Oktik, Sisecam, Istanbul, Turkey

Gernot Oreski, PCCL, Loeben, Austria

Wolfram Palitzsch, Loser Chemie, Zwickau, Germany  
 Jürgen Parisi, University of Oldenburg, Germany  
 Kristian Peter, ISC Konstanz, Germany  
 Stefan Peters, Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
 Kai Petter, Hanwha Q CELLS, Bitterfeld-Wolfen, Germany  
 Riccardo Po, eni, Novara, Italy  
 Michael Powalla, ZSW, Stuttgart, Germany  
 Ralf Preu, Fraunhofer ISE, Freiburg, Germany  
 Bernd Rech, HZB, Berlin, Germany  
 Alex Redinger, University of Luxembourg, Belvaux, Luxembourg  
 Tjerk Reijenga, BEAR-iD, Gouda, The Netherlands  
 Jan Remund, Meteotest, Bern, Switzerland  
 Jochen Rentsch, Fraunhofer ISE, Freiburg, Germany  
 Francesco Roca, ENEA, Portici, Italy  
 Alessandro Romeo, University of Verona, Italy  
 Kittessa Roro, CSIR, Pretoria, South Africa  
 Jatin Roy, IIT Kharagpur, India  
 Francisca Rubio Berenguel, Freiburg, Germany  
 Marin Rusu, HZB, Berlin, Germany  
 Vladimir Saly, Slovak University of Technology, Bratislava, Slovakia  
 Erik Sauar, Brighterlite, Oslo, Norway  
 Hermann Schlemm, Meyer Burger, Hohenstein-Ernstthal, Germany  
 Jan Schmidt, ISFH, Emmerthal, Germany  
 Marion Schroedter-Homscheidt, German Aerospace Center, Wessling, Germany  
 Ruud Schropp, Eindhoven University of Technology / Utrecht University, The Netherlands

Martin C. Schubert, Fraunhofer ISE, Freiburg, Germany  
 Manajit Sengupta, NREL, Golden, USA  
 Hajime Shirai, Saitama University, Japan  
 Gerald Siefer, Fraunhofer ISE, Freiburg, Germany  
 Ronald Sinton, Sinton Instruments, Boulder, USA  
 Volker Sittinger, Fraunhofer IST, Braunschweig, Germany  
 Dirk Stellbogen, ZSW, Stuttgart, Germany  
 Juergen Sutterlueti, Gantner Instruments, Schruns, Austria  
 Sandor Szabó, European Commission DG JRC, Ispra, Italy  
 Barbara Terheiden, University of Konstanz, Germany  
 Gianluca Timò, RSE, Piacenza, Italy  
 Stathis Tselepis, CRES, Athens, Greece  
 Xavier Vallvé, Trama TecnoAmbiental, Barcelona, Spain  
 Mike Van Iseghem, EDF R&D, Moret-sur-Loing, France  
 Michael Vetter, IPHT, Jena, Germany  
 Alessandro Virtuani, SUPSI, Canobbio, Switzerland  
 Eszter Voroshazi, imec, Leuven, Belgium  
 Andreas Wade, First Solar, Berlin, Germany  
 Wilhelm Warta, Fraunhofer ISE, Freiburg, Germany  
 Gerhard Willeke, Fraunhofer ISE, Freiburg, Germany  
 Donald Wood, Hemlock Semiconductor, USA  
 Akira Yamada, Tokyo Institute of Technology, Japan  
 David Young, NREL, Golden, USA  
 Mike Zehner, Rosenheim University of Applied Science, Germany  
 Miro Zeman, Delft University of Technology, The Netherlands  
 Jun Zhao, Meyer Burger, Hohenstein-Ernstthal, Germany

## INSTITUTIONAL SUPPORT



With the support of UNESCO's  
Natural Sciences Sector



WCRE – World Council  
for Renewable Energy

## COORDINATION OF THE TECHNICAL PROGRAMME



## SUPPORTING ORGANISATIONS



## INSTITUTIONAL PV INDUSTRY COOPERATION



## SUPPORTING ASSOCIATIONS



WE THANK OUR EU PVSEC 2017 SPONSORS

**BERGER**  
Lichttechnik

**LONGI** Solar

R | E | N | A | ●

**SINGULUS** 



# BERGER Lichttechnik

## Climate Chamber

# BERGER Lichttechnik



- › Full spectrum according to IEC 60904 Ed. 3
- › Classification A+A+A+ for high precision measurement
- › Fully automatic temperature profile acquisition
- › Minimum floor space and power consumption
- › For R&D, lab and production monitoring

BERGER Lichttechnik GmbH & Co. KG  
Wolfratshauer Str. 150 · D-82049 Pullach · Germany  
Phone +49 (0)89 793 55 266 · Fax +49 (0)89 793 55 265

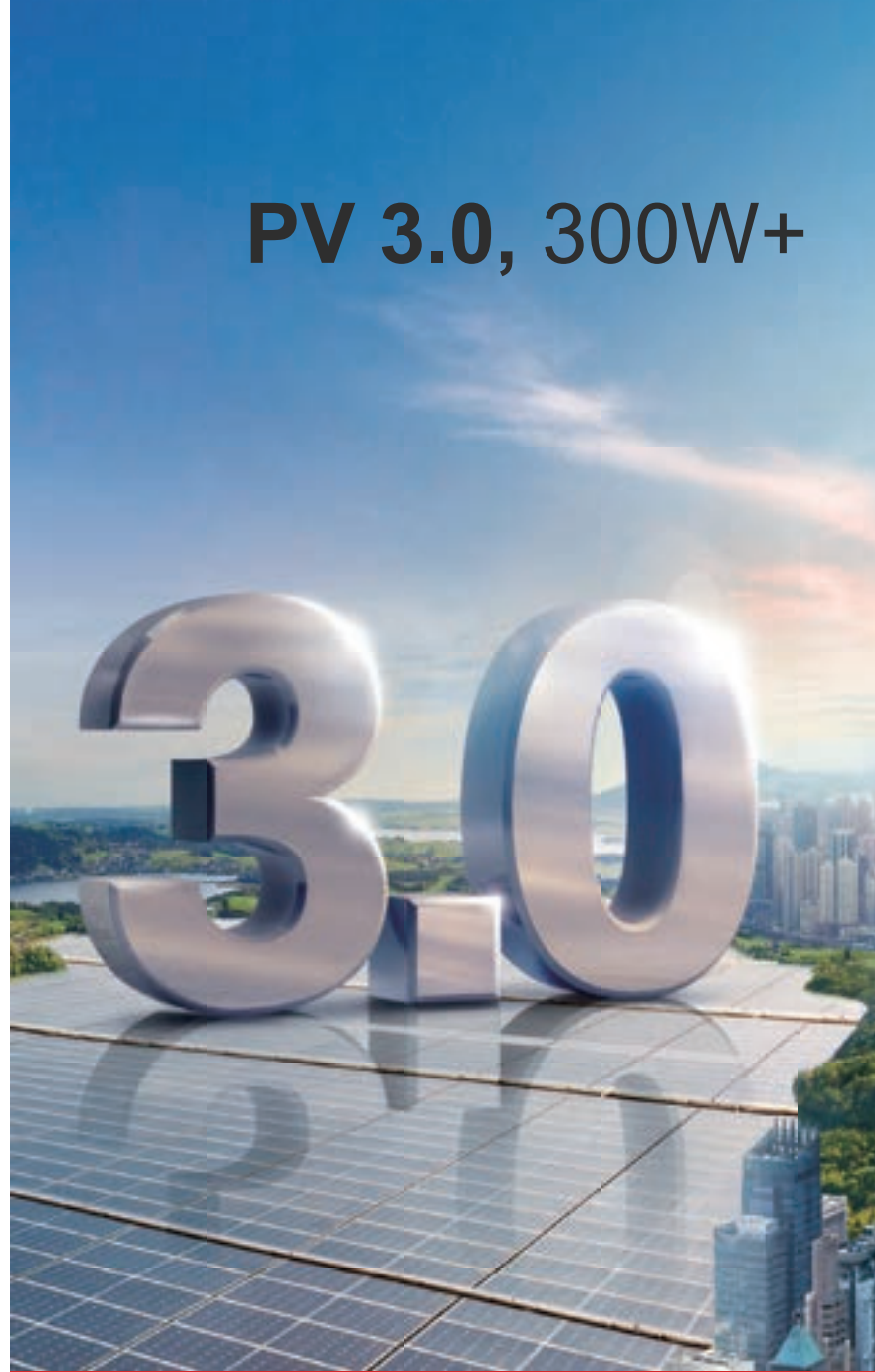
[www.bergerlichttechnik.de](http://www.bergerlichttechnik.de)

Offices in Germany, the US, China and Taiwan

Please visit us:  
**Booth B6**

**LONGI** Solar

**PV 3.0, 300W+**



**LONGI** Solar

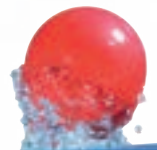
Looking for cost down?

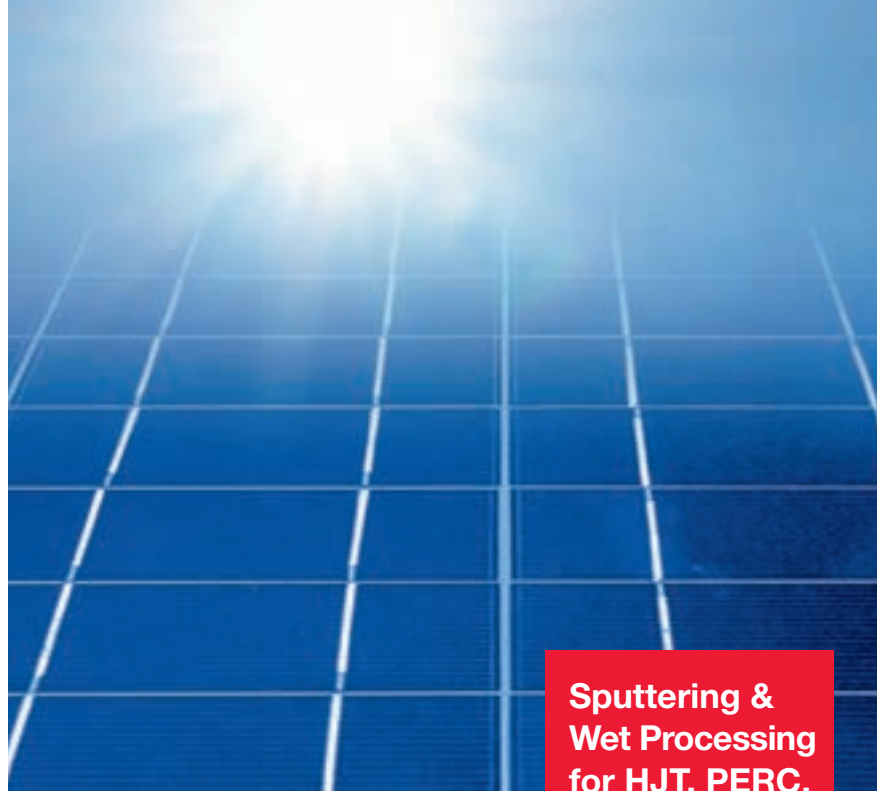
## RENA InCellPlate Cu

Replace Front Side Printed Silver by Plated Electrodes

- Throughput up to 5000 wafers/h
- Savings up to 0.06 \$Ct/cell
- Deposition of Ni/Cu/Ag stack
- Compatible with conventional module assembly
- Based on RENA NIAK inline platform

R | E | N | A | ●





**Sputtering &  
Wet Processing  
for HJT, PERC,  
IBC & more**



**Sputtering System**



**Wet Processing System**



Ask for Innovation. Call SINGULUS TECHNOLOGIES  
mail: [sales@singulus.de](mailto:sales@singulus.de) \_ tel: +49-6188-4400 \_ [www.singulus.de](http://www.singulus.de)

GOLD MEDIA PARTNERS



SILVER MEDIA PARTNERS



ONLINE MEDIA PARTNERS





PLENARY SESSIONS	Page
1AP.1 Stairway to High Efficiency	6
2BP.1 Silicon Photovoltaics	28
3CP.1 Thin Film PV: Pushing the Limits with Breakthroughs in Industry and Research	47
5DP.1 Performance, Reliability and Sustainability of Photovoltaic Modules and Balance of System Components	64
6DP.2 PV System Performance and Integration	65
7EP.1 Recent Developments in Competitive PV Markets	89

ORAL SESSIONS	Page
<b>1 New Materials and Concepts for Photovoltaic Devices</b>	
1AO.1 Devices & Characterisation	12
1AO.2 Optics and Materials	15
1AO.3 Advanced and Novel Concepts for Very High-Efficiency Solar Cells	18
1CO.1 Advanced Materials and Technologies for PV Modules	42
1CO.2 New Materials and Advanced Applications for Photovoltaics	48
<b>2 Silicon Photovoltaics</b>	
2AO.4 Characterisation of Contacts and Doped Layers	13
2AO.5 Characterisation of Cells and Modules	16
2AO.6 Industrial Production of Highly Efficient c-Si Solar Cells	19
2BO.1 Silicon Crystallisation	24
2BO.2 LID and Defect Engineering	29
2BO.3 New Wafering Technologies	33
2BO.4 Novel Approaches for c-Si Solar Cells	36
2CO.9 Production Technologies for Silicon Solar Cells	44
2CO.10 c-Si Solar Cell Process Technology	50
2CO.11 c-Si Homojunction Cells	55
2CO.12 Thin Film and Foli-Based Silicon Solar Cells	60
2DO.1 c-Si Heterojunction Solar Cells	65
2DO.2 c-Si Solar Cells with Poly-Si Based pn-Junction	70
2DO.3 Structures with Poly-Si based High / Low Junction	76

<b>3 Thin Film Photovoltaics</b>	
3AO.7 Optical Losses and TCO's	14
3AO.8 Module Stability and Characterisation	17
3AO.9 Device Characterisation	20
3BO.9 Manufacturing and Performance Improvements	26
3BO.10 Alkaline Treatments	31
3BO.11 Kesterites	35
3BO.12 Organic Based PV	39
3CO.3 Materials, Interfaces & Charge Dynamics in Perovskite Solar Cells	53
3CO.4 Processing and Upscaling of Perovskite Solar Cells and Modules	57
3DO.7 Perovskite-Based Hybrid Tandems	68
<b>4 Concentrator and Space Photovoltaics</b>	
4DO.4 III-V-Based Devices for Terrestrial and Space Applications	67
<b>5 Performance, Reliability and Sustainability of Photovoltaic Modules and Balance of System Components</b>	
5BO.5 Backsheet and Encapsulant Materials	25
5BO.6 Electrical Characterisation of PV Devices	30
5CO.5 Performance Enhancing Coatings and Outdoor Performance	43
5CO.6 Potential Induced Degradation, Light & Elevated Temperature Induced Degradation and Partial Shading Effects on PV Modules	49
5CO.7 Bifacial Characterisation, Energy Rating and Yield Prediction	54
5CO.8 Accelerated Testing and Imaging Techniques	59
5DO.5 Balance of System Components	72
5EO.1 Sustainability and Recycling	84
<b>6 PV System Performance and Integration</b>	
6BO.7 Advanced Field Performance Estimation	34
6BO.8 Failure Modes and Degradation	38
6CO.13 Bifacial and Shaded System Performance	45
6CO.14 Design of PV Plants & Hybrid Systems and Their Applications	51
6CO.15 Innovative O&M and Inspection Methods and Safety Aspects	56
6CO.16 PV Energy System Integration within the Building	61
6DO.6 Solar Resource and Forecasting	77
6DO.10 Photovoltaics and the Building Envelope: Main Issues and Challenges	69
6DO.11 Modelling and Optimisation Issues for BIPV	74
6DO.12 Photovoltaics and Infrastructure	80
6EO.2 PV Energy System Integration into the Grid	85

<b>7 PV Economics, Markets and Policies</b>	
7DO.8 Global PV Economics and Market Trends	73
7DO.9 Innovative National PV Market/Economics Business Cases	78
7EO.3 PV-Related Policies, Strategies and Societal Issues	87
<b>VISUAL SESSION</b>	<b>Page</b>
1CV.3 Fundamental Studies / New Materials and Concepts for Cells and Modules	164
2AV.1 Feedstock, Crystallisation, Wafering, Defect Engineering	93
2AV.2 Homojunction Solar Cells	99
2AV.3 Heterojunction Solar Cells	105
2CV.2 Thin Film and Foli-Based Solar Cells / Characterisation & Simulation Methods / Manufacturing & Production	153
3CV.1 CIGS, CdTe and Related Thin Film Solar Cells and Modules (I)	146
3DV.2 CIGS, CdTe and Related Thin Film Solar Cells and Modules (II) / Perovskite, Organic and Dye-Sensitised Devices	187
<b>4CV.4 III-V-Based Devices for Terrestrial and Space Applications</b>	<b>174</b>
5BV.4 PV Module Performance and Reliability (I)	135
5DV.3 PV Module Performance and Reliability (II) / Inverters and Balance of System Components / Sustainability and Recycling	200
6BV.1 Design and Operation of PV Systems (I)	111
6BV.2 Design and Operation of PV Systems (II)	117
6BV.3 Solar Resource and Forecasting / Building, Infrastructure and Landscape Applications / Grid and Energy System Integration	123
7DV.1 PV Economics and Markets / PV-Related Policies, Strategies and Societal Issues	179

# Conference Programme Outline

Monday, 25 September		Tuesday, 26 September		Wednesday, 27 September		Thursday, 28 September		Friday, 29 September	
08:30	Opening Scientific Opening 1AP.1 Main Auditorium	08:30	2BO.1 T2.1 Audit. G102-103	08:30	1CO.1 T1.2 Audit. Emerald G102-103	08:30	5DP.1 Main Auditorium	08:30	5EO.1 T5.3 Audit. G104-105
10:00	Opening Addresses	10:30	2BO.2 T2.1 Audit. G102-103	10:30	5CO.5 T5.1 Audit. Emerald G102-103	10:30	Break	10:30	Break
11:00	Moderated Panel Discussion	12:15	Lunch	12:00	Break	12:00	6DP.2 Main Auditorium	10:30	7EP.1 Main Auditorium
12:15	Becquerel Prize Ceremony	13:30	2BO.3 T2.1 Audit. G102-103	12:00	3CP.1 Main Auditorium	12:00	Lunch	11:30	Closing Session / Main Audit. Key note, Highlights of the Conference, Poster Awards, Student Awards, Farewell
13:30	1AO.1 T1.1 Audit. Emerald	13:30	2BO.4 T2.2/3 Audit. G102-103	12:00	1CO.2 T1.2 Audit. Emerald	12:00	2DO.1 T2.3 Main Audit.	12:30	
15:00	1AO.2 T1.1 Audit. Emerald	15:15	2BO.5 T2.1 Audit. G102-103	12:00	3CO.3 T3.2 Audit. Emerald	12:00	2DO.2 T2.3/2 Main Audit.		
16:45	1AO.3 T1.2 Audit. Emerald	17:00	2BO.6 T2.2 Audit. G102-103	12:00	3CO.4 T3.2 Audit. Emerald	12:00	2DO.3 T2.3 Main Audit.		
17:00				12:00	3CO.5 T3.2 Audit. Emerald	12:00	2DO.4 T2.3 Main Audit.		
18:30				12:00	3CO.6 T3.2 Audit. Emerald	12:00	2DO.5 T2.3 Main Audit.		
				12:00	3CO.7 T3.2 Audit. Emerald	12:00	2DO.6 T2.3 Main Audit.		
				12:00	3CO.8 T3.2 Audit. Emerald	12:00	2DO.7 T2.3 Main Audit.		
				12:00	3CO.9 T3.2 Audit. Emerald	12:00	2DO.8 T2.3 Main Audit.		
				12:00	3CO.10 T3.2 Audit. Emerald	12:00	2DO.9 T2.3 Main Audit.		
				12:00	3CO.11 T3.1 Audit. Emerald	12:00	2DO.10 T2.3 Main Audit.		
				12:00	3CO.12 T3.1 Audit. Emerald	12:00	2DO.11 T2.3 Main Audit.		
				12:00	3CO.13 T3.1 Audit. Emerald	12:00	2DO.12 T2.3 Main Audit.		
				12:00	3CO.14 T3.1 Audit. Emerald	12:00	2DO.13 T2.3 Main Audit.		
				12:00	3CO.15 T3.1 Audit. Emerald	12:00	2DO.14 T2.3 Main Audit.		
				12:00	3CO.16 T3.1 Audit. Emerald	12:00	2DO.15 T2.3 Main Audit.		
				12:00	3CO.17 T3.1 Audit. Emerald	12:00	2DO.16 T2.3 Main Audit.		
				12:00	3CO.18 T3.1 Audit. Emerald	12:00	2DO.17 T2.3 Main Audit.		
				12:00	3CO.19 T3.1 Audit. Emerald	12:00	2DO.18 T2.3 Main Audit.		
				12:00	3CO.20 T3.1 Audit. Emerald	12:00	2DO.19 T2.3 Main Audit.		
				12:00	3CO.21 T3.1 Audit. Emerald	12:00	2DO.20 T2.3 Main Audit.		
				12:00	3CO.22 T3.1 Audit. Emerald	12:00	2DO.21 T2.3 Main Audit.		
				12:00	3CO.23 T3.1 Audit. Emerald	12:00	2DO.22 T2.3 Main Audit.		
				12:00	3CO.24 T3.1 Audit. Emerald	12:00	2DO.23 T2.3 Main Audit.		
				12:00	3CO.25 T3.1 Audit. Emerald	12:00	2DO.24 T2.3 Main Audit.		
				12:00	3CO.26 T3.1 Audit. Emerald	12:00	2DO.25 T2.3 Main Audit.		
				12:00	3CO.27 T3.1 Audit. Emerald	12:00	2DO.26 T2.3 Main Audit.		
				12:00	3CO.28 T3.1 Audit. Emerald	12:00	2DO.27 T2.3 Main Audit.		
				12:00	3CO.29 T3.1 Audit. Emerald	12:00	2DO.28 T2.3 Main Audit.		
				12:00	3CO.30 T3.1 Audit. Emerald	12:00	2DO.29 T2.3 Main Audit.		
				12:00	3CO.31 T3.1 Audit. Emerald	12:00	2DO.30 T2.3 Main Audit.		
				12:00	3CO.32 T3.1 Audit. Emerald	12:00	2DO.31 T2.3 Main Audit.		
				12:00	3CO.33 T3.1 Audit. Emerald	12:00	2DO.32 T2.3 Main Audit.		
				12:00	3CO.34 T3.1 Audit. Emerald	12:00	2DO.33 T2.3 Main Audit.		
				12:00	3CO.35 T3.1 Audit. Emerald	12:00	2DO.34 T2.3 Main Audit.		
				12:00	3CO.36 T3.1 Audit. Emerald	12:00	2DO.35 T2.3 Main Audit.		
				12:00	3CO.37 T3.1 Audit. Emerald	12:00	2DO.36 T2.3 Main Audit.		
				12:00	3CO.38 T3.1 Audit. Emerald	12:00	2DO.37 T2.3 Main Audit.		
				12:00	3CO.39 T3.1 Audit. Emerald	12:00	2DO.38 T2.3 Main Audit.		
				12:00	3CO.40 T3.1 Audit. Emerald	12:00	2DO.39 T2.3 Main Audit.		
				12:00	3CO.41 T3.1 Audit. Emerald	12:00	2DO.40 T2.3 Main Audit.		
				12:00	3CO.42 T3.1 Audit. Emerald	12:00	2DO.41 T2.3 Main Audit.		
				12:00	3CO.43 T3.1 Audit. Emerald	12:00	2DO.42 T2.3 Main Audit.		
				12:00	3CO.44 T3.1 Audit. Emerald	12:00	2DO.43 T2.3 Main Audit.		
				12:00	3CO.45 T3.1 Audit. Emerald	12:00	2DO.44 T2.3 Main Audit.		
				12:00	3CO.46 T3.1 Audit. Emerald	12:00	2DO.45 T2.3 Main Audit.		
				12:00	3CO.47 T3.1 Audit. Emerald	12:00	2DO.46 T2.3 Main Audit.		
				12:00	3CO.48 T3.1 Audit. Emerald	12:00	2DO.47 T2.3 Main Audit.		
				12:00	3CO.49 T3.1 Audit. Emerald	12:00	2DO.48 T2.3 Main Audit.		
				12:00	3CO.50 T3.1 Audit. Emerald	12:00	2DO.49 T2.3 Main Audit.		
				12:00	3CO.51 T3.1 Audit. Emerald	12:00	2DO.50 T2.3 Main Audit.		
				12:00	3CO.52 T3.1 Audit. Emerald	12:00	2DO.51 T2.3 Main Audit.		
				12:00	3CO.53 T3.1 Audit. Emerald	12:00	2DO.52 T2.3 Main Audit.		
				12:00	3CO.54 T3.1 Audit. Emerald	12:00	2DO.53 T2.3 Main Audit.		
				12:00	3CO.55 T3.1 Audit. Emerald	12:00	2DO.54 T2.3 Main Audit.		
				12:00	3CO.56 T3.1 Audit. Emerald	12:00	2DO.55 T2.3 Main Audit.		
				12:00	3CO.57 T3.1 Audit. Emerald	12:00	2DO.56 T2.3 Main Audit.		
				12:00	3CO.58 T3.1 Audit. Emerald	12:00	2DO.57 T2.3 Main Audit.		
				12:00	3CO.59 T3.1 Audit. Emerald	12:00	2DO.58 T2.3 Main Audit.		
				12:00	3CO.60 T3.1 Audit. Emerald	12:00	2DO.59 T2.3 Main Audit.		
				12:00	3CO.61 T3.1 Audit. Emerald	12:00	2DO.60 T2.3 Main Audit.		
				12:00	3CO.62 T3.1 Audit. Emerald	12:00	2DO.61 T2.3 Main Audit.		
				12:00	3CO.63 T3.1 Audit. Emerald	12:00	2DO.62 T2.3 Main Audit.		
				12:00	3CO.64 T3.1 Audit. Emerald	12:00	2DO.63 T2.3 Main Audit.		
				12:00	3CO.65 T3.1 Audit. Emerald	12:00	2DO.64 T2.3 Main Audit.		
				12:00	3CO.66 T3.1 Audit. Emerald	12:00	2DO.65 T2.3 Main Audit.		
				12:00	3CO.67 T3.1 Audit. Emerald	12:00	2DO.66 T2.3 Main Audit.		
				12:00	3CO.68 T3.1 Audit. Emerald	12:00	2DO.67 T2.3 Main Audit.		
				12:00	3CO.69 T3.1 Audit. Emerald	12:00	2DO.68 T2.3 Main Audit.		
				12:00	3CO.70 T3.1 Audit. Emerald	12:00	2DO.69 T2.3 Main Audit.		
				12:00	3CO.71 T3.1 Audit. Emerald	12:00	2DO.70 T2.3 Main Audit.		
				12:00	3CO.72 T3.1 Audit. Emerald	12:00	2DO.71 T2.3 Main Audit.		
				12:00	3CO.73 T3.1 Audit. Emerald	12:00	2DO.72 T2.3 Main Audit.		
				12:00	3CO.74 T3.1 Audit. Emerald	12:00	2DO.73 T2.3 Main Audit.		
				12:00	3CO.75 T3.1 Audit. Emerald	12:00	2DO.74 T2.3 Main Audit.		
				12:00	3CO.76 T3.1 Audit. Emerald	12:00	2DO.75 T2.3 Main Audit.		
				12:00	3CO.77 T3.1 Audit. Emerald	12:00	2DO.76 T2.3 Main Audit.		
				12:00	3CO.78 T3.1 Audit. Emerald	12:00	2DO.77 T2.3 Main Audit.		
				12:00	3CO.79 T3.1 Audit. Emerald	12:00	2DO.78 T2.3 Main Audit.		
				12:00	3CO.80 T3.1 Audit. Emerald	12:00	2DO.79 T2.3 Main Audit.		
				12:00	3CO.81 T3.1 Audit. Emerald	12:00	2DO.80 T2.3 Main Audit.		
				12:00	3CO.82 T3.1 Audit. Emerald	12:00	2DO.81 T2.3 Main Audit.		
				12:00	3CO.83 T3.1 Audit. Emerald	12:00	2DO.82 T2.3 Main Audit.		
				12:00	3CO.84 T3.1 Audit. Emerald	12:00	2DO.83 T2.3 Main Audit.		
				12:00	3CO.85 T3.1 Audit. Emerald	12:00	2DO.84 T2.3 Main Audit.		
				12:00	3CO.86 T3.1 Audit. Emerald	12:00	2DO.85 T2.3 Main Audit.		
				12:00	3CO.87 T3.1 Audit. Emerald	12:00	2DO.86 T2.3 Main Audit.		
				12:00	3CO.88 T3.1 Audit. Emerald	12:00	2DO.87 T2.3 Main Audit.		
				12:00	3CO.89 T3.1 Audit. Emerald	12:00	2DO.88 T2.3 Main Audit.		
				12:00	3CO.90 T3.1 Audit. Emerald	12:00	2DO.89 T2.3 Main Audit.		
				12:00	3CO.91 T3.1 Audit. Emerald	12:00	2DO.90 T2.3 Main Audit.		
				12:00	3CO.92 T3.1 Audit. Emerald	12:00	2DO.91 T2.3 Main Audit.		
				12:00	3CO.93 T3.1 Audit. Emerald	12:00	2DO.92 T2.3 Main Audit.		
				12:00	3CO.94 T3.1 Audit. Emerald	12:00	2DO.93 T2.3 Main Audit.		
				12:00	3CO.95 T3.1 Audit. Emerald	12:00	2DO.94 T2.3 Main Audit.		
				12:00	3CO.96 T3.1 Audit. Emerald	12:00	2DO.95 T2.3 Main Audit.		
				12:00	3CO.97 T3.1 Audit. Emerald	12:00	2DO.96 T2.3 Main Audit.		
				12:00	3CO.98 T3.1 Audit. Emerald	12:00	2DO.97 T2.3 Main Audit.		
				12:00	3CO.99 T3.1 Audit. Emerald	12:00	2DO.98 T2.3 Main Audit.		
				12:00	3CO.100 T3.1 Audit. Emerald	12:00	2DO.99 T2.3 Main Audit.		
				12:00	3CO.101 T3.1 Audit. Emerald	12:00	2DO.100 T2.3 Main Audit.		
				12:00	3CO.102 T3.1 Audit. Emerald	12:00	2DO.101 T2.3 Main Audit.		
				12:00	3CO.103 T3.1 Audit. Emerald	12:00	2DO.102 T2.3 Main Audit.		
				12:00	3CO.104 T3.1 Audit. Emerald	12:00	2DO.103 T2.3 Main Audit.		
				12:00	3CO.105 T3.1 Audit. Emerald	12:00	2DO.104 T2.3 Main Audit.		
				12:00	3CO.106 T3.1 Audit. Emerald	12:00	2DO.105 T2.3 Main Audit.		
				12:00	3CO.107 T3.1 Audit. Emerald	12:00	2DO.106 T2.3 Main Audit.		
				12:00	3CO.108 T3.1 Audit. Emerald	12:0			



# The most dynamic forum for the global PV Solar Sector

EU PVSEC Contact

WIP

Sylvensteinstr. 2

81369 München

Germany

Tel. +49-89-720 12 735

Fax +49-89-720 12 791

E-mail: [pv.conference@wip-munich.de](mailto:pv.conference@wip-munich.de)

[pv.exhibition@wip-munich.de](mailto:pv.exhibition@wip-munich.de)



Follow the EU PVSEC on:



[www.photovoltaic-conference.com](http://www.photovoltaic-conference.com)  
[www.photovoltaic-exhibition.com](http://www.photovoltaic-exhibition.com)