

31st International Photovoltaic Science and Engineering Conference (PVSEC-31)
MONDAY 13 December 2021 - WEDNESDAY 15 December 2021

As at 13 December 2021

Monday, 13 December 2021

AEDT				
	Chairs: Renate Egan & Bram Hoex			
	<i>Welcome</i>			
11:00	Photovoltaics: Where have we come from and where are we heading? Martin Green			
	Malcolm Turnbull			
	Chairs: Brett Hallam & Xiaojing Hao			
12:00	263: High efficiency perovskite/silicon tandems for electricity and hydrogen Kylie Catchpole			
12:30	236: The Future of Inorganic Thin Film PV Gang Xiong			
	Chair: Renate Egan			
13:00-13:15	ACEX Sponsored Industry Session Key materials for the production of solution-processed perovskite solar cells at scale Anthony Chesman			
13:00-13:05	Photoluminescence Imaging Basics - Sponsored Industry Session			
13:00	Lunch Break			
	Chairs : Hieu Nguyen & Stephen Bremner			
14:00	248: Integrated Molecular and Process Engineering for Highly Efficient Organic Photovoltaics with Suppressed Recombination Loss Alex Jen			
14:30	246: Efforts to expand the applications of III-V ultra-high efficiency solar cells from space to the ground Tatsuya Takamoto			
15:00	A1 Silicon: Passivated contacts (1) 14:00 16:00	A2 Inorganic thin-film 15:00 16:00	A2 CIGS Solar cells 15:00 15:50	A5 Perovskite materials & solar cells 15:00 16:00
	Chairs: Lachlan Black & Jingnan Tong	Chairs: Chang Yan & Tao Chen	Chairs: Yukiko Kamikawa and Ning Song	Chairs: Jueming Bing and Dechan Angmo
15:00	238: Cell design to minimise disruption of technology and investments on the way beyond PERC Pietro Altermatt	241: Wide bandgap sulphide chalcopyrite Chang Yan	242: Present status of molecular ink-based solution processing routes for Cu(In,Ga)(S,Se) ₂ solar cell absorbers Sunil Suresh	256: Efficient, stable and scalable all-perovskite tandem solar cells Hairen Tan
15:20	184: How to understand and improve the gettering effectiveness of polysilicon/oxide passivating contact structures Anyao Liu	26: Vacuum-deposited Cu ₂ BaGe _{1-x} Sn _x Se ₄ films and solar cells Yongshin Kim	164: Optimization of Absorber/Back-contact Interface in Flexible and Bifacial Cu(In,Ga)Se ₂ Thin-film Solar Cells Abdurashid Mavlonov	39: Tuning perovskite composition for high-performance, stable semi-transparent perovskite solar cells Jacek Jasieniak
15:35	103: Detailed electrical and optical loss-analyses of a 24.8% n-type silicon large-area screen-printed solar cell with phosphorus doped passivating contact. Er-Chien Wang	165: Facile synthesis of CuO-NiO-MAX nanocomposite for enhanced photocatalytic hydrogen evolution Karthik Kannan	Afternoon Break	48: Perovskite/Graphene Solar Cells without a Hole-Transport Layer Ryousuke Ishikawa
15:50	94: Spin-on doping for poly-Si passivating contacts Josua Stuckelberger	74: Mechanism of atomic hydrogen passivation for optical properties improvement of As-doped BaSi ₂ films Sho Aonuki		49: Homologous bromides treatment for improving the open-circuit voltage of perovskite solar cells Yong Li
16:05	Afternoon Break			Afternoon Break
16:30	A1 Silicon : Defect engineering for passivating contact and heterojunction solar cells 16:30 18:20	A2 CIGS solar cells: 16:30 17:50	A3 III-V, Space & Concentrator PV 16:30 18:10	A5 Perovskite cells & modules 16:30 17:45
	Chairs: Brett Hallam and Josua Stuckelberger	Chairs: Pablo-Reyes-Figueroa and Robert Patterson	Chairs: Stephen Bremner and Mitsuru Imaizumi	Chairs: Anthony Chesman and Adam Surmiak
16:30	29: New insights into the Gettering and Passivation observed in doped Poly-Silicon/Oxide Passivating contacts in Silicon-Photovoltaics via Atom Probe Tomography Apurv Yadav	255: Passivation and Light management, the needed boost in ultrathin Cu(In,Ga)Se ₂ technology Salome Pedro	253: III-V Compound Semiconductor Nanowire Solar Cells Ziyuan Li	70: Contactless and spatially-resolved determination of current-voltage curves in perovskite solar cells Anh Bui
16:45				110: Correlative imaging of optical properties for perovskite materials in single-junction and tandem solar cells Khoa Dang Nhat Nguyen
16:50	67: Fluorine and hydrogen passivation of p- and n- type polysilicon passivating contacts Hang Cheong Sio	46: Printed Metallization Increases Power Output of CIGS Modules Katharina Gensowski	171: Thermal study of voids under packaged concentrator solar cells Anastasia Soeriyadi	111: Benefits of Photo-thermal Deflection Spectroscopy (PDS) for Characterisation of Photovoltaic Materials Henner Kampwerth
17:00				152: Accurate quantification of photon recycling in highly luminescent perovskite thin films reveals the internal luminescence quantum efficiency and establishes a new benchmark at 78% Paul Fassi
17:05	71: Firing response of phosphorus doped polysilicon passivating contacts for high efficiency silicon solar cells Di Kang	109: Analysis of grain boundary and CdS/Cu(In,Ga)Se ₂ interface by using EBIC measurements Ryotaro Fukuda	20: Effectively transparent contacts for elimination of shading losses in concentrator solar cells Stefan Tabernig	156: Bichromatic light source for advanced subcell-dependent analysis in tandem solar cells Marko Topic
17:15				
17:20	168: Gallium and Boron Doped Silicon Heterojunction Solar Cells Bruno Vicari Stefani	116: Investigation of the CdS/RISe/CIGSe Interface Structure by Hard X-ray Photoelectron Spectroscopy Jakob Bombsch	27: High Efficiency InP solar cells: Revisiting Hydrogen plasma treatment Bikesh Gupta	
17:30				
17:35	31: Effect of hydrogenation process on passivation performance of silicon nanocrystal/silicon oxide compound layer Masashi Matsumi	120: Development of alkali fluoride-treatment strategies for Cu(In,Ga)(S,Se) ₂ thin-films grown under atmospheric pressure Pablo Reyes-Figueroa	105: Outdoor evaluation of plastic-integrated concentrating photovoltaic module with 1-eV-bottom subcell triple-junction solar cell Taichi Uno	
17:45				
17:50	210: High-intensity illuminated annealing for silicon heterojunction solar cells Matthew Wright		245: Nanophotonics for ultra-thin III-V photovoltaics Louise Hirst	
18:05				
18:10	93: Bulk Defects and Hydrogenation Kinetics in Fired Passivating Contacts (FPC) Mario Lehmann			

Kesterite Workshop 15:00 22:00

View the detailed program at <https://pvsec-31.com/program/>

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Tuesday, 14 December 2021

AEDT				
10:15				
10:45				
Early Bird Quiz				
Break				
Chairs: Anita Ho-Baille and Murad Tayebjee				
11:00				
234: X-factors that might determine how perovskite solar cells are deployed Michael McGehee				
11:30				
237: Taking Charge of Upconversion: Mechanistic Insights into Perovskite-Sensitized Triplet-Triplet Annihilation Lea Nienhaus				
Chair: Muriel Watt				
12:00				
100% Renewable Energy Session Andrew Blakers, Thomas Reindl, Pierre Verlinden, Marta Victoria				
13:00				
Lunch Break				
14:00				
A1 Silicon Tandems: 14:00 15:30	A2 Inorganic thin-film 14:00 15:55	A6 New Materials & Discovery: 14:00 15:50	A7 Module Characterisation: 14:00 16:05	A8 PV modules & systems: 14:00 15:20 & A10 PV development, industry, market & policy 15:20 16:10
Chairs: Heping Shen and Gregory J. Wilson	Chairs: Arthur Onno and Hao Xin	Chair: Robert Patterson	Chairs: Prof. Hishikawa and Benjamin Duck	Chairs: Henner Kampwerth, Ivan Perez-Wurfi
18: 27% efficient monolithic perovskite/c-Si tandem featuring commercial TOPCon bottom cell Klaus Weber	244: Parsing voltage losses in polycrystalline CdSeTe solar cells Arthur Onno	257: Autonomous and Fully Automated High-throughput Materials Discovery Platform Adam Surmiak	278: Precise and Reliable Performance Characterization of Novel Photovoltaic Devices Masahiro Yoshita	259: Building Integrated PV: Application Status and Pathways in Australia Rebecca Yang
14:15	138: Improving the performance of the silicon bottom cell in epitaxial III-V/Si tandem solar cells Stephen Bremner	47: Bayesian optimization of hydrogen plasma treatment for reducing defects in silicon quantum dot multilayers Fuga Komagata	35: Recent Advances in Outdoor PL Imaging at UNSW Oliver Kunz	30: Optimization Method of Installation Distance of Bifacial PV Modules Considering Cost, Shadow and Cluster Yuki Sado
14:20	224: The Pathway for Solution-less Photovoltaics Optimisation: combining PERC and Perovskites for an industrially relevant tandem cell Gregory Wilson	34: Sputtering Zn-1-xGe-xO thin films towards n+-AZO/p-BaSi2 heterojunction solar cells Yudai Yamashita	129: PV string fault detection by using density of module operation points for Large-scale PV power plant Kaori Tanina	130: Reducing greenhouse gas emissions by recycling end-of-life photovoltaic panels Rong Deng
14:30	216: Techno-economic analysis of 2-junction and 3-junction Silicon Perovskite tandem cells Nathan Chang	209: Defect Energy Levels of Doped ZnO: A Hybrid DFT Study Md. Anower Hossain	190: A Study on Continuous Monitoring and Fault Detection of Photovoltaic Modules Yuta Okamura	153: Impact of Bifacial PV Module Shading and Mismatch on Yearly Energy Yield Simulations Javier Guerrero
14:35	89: Investigation of the contaminants from molecular beam epitaxy growth chamber for III-V/Si tandem solar cells Chuji Yi, Zhuangyi Zhou	135: Development of modulated surface texturing for high-efficiency, thin-film, flexible, silicon-based tandem solar cells Gianluca Limodio	146: Spray Technology for Flash and Controlled Infiltration of Active Materials in Solar Cells Tulja Bhavani Korukonda	231: Anti-reflection coating on solar glass Ning Song
14:40	133: Energy Yield Modelling of Perovskite/Si Tandem Photovoltaics Ulrich Paetzold	213: Effect of H2S concentration for Cu2SnS3 thin films Yoji Akaki	139: Impact of substrate temperature on bandgap in ZnSnP2 thin films by MBE Taro Kuwano	56: An Australian DER Bill of Rights Niraj Lal
14:45	80: Amorphous Mg-doped ZnO Films to Enhance Electronic Properties and Efficiency of CZTS Solar Cells: A First-principles Modelling and Experimental Study Md. Anower Hossain	169: Comparative study on effect of shell materials like TiO2, NiO and ZnS coated on CdS core for superior photocatalytic H2 efficiency under visible light irradiation V. Navakoteswara Rao	131: Estimation of Individual Solar Cell Electrical Performance Parameters using Statistical Analysis of Electroluminescence Images for Silicon Photovoltaic Modules Amit Singh Rajput, Li Wan, Mauro Pravettoni	14: Solar Building Envelope Potentials in Urban Environment Hongying Zhao
14:50	144: Quasi-1D (Sb,Bi)2Se3 thin films for band-gap tuning in photovoltaic applications Ivan Caño Prades	118: Analysis of spectral effects on the performance of various coloured BIPV modules at different locations Min Hsian Saw	55: A Novel Indoor Approach for the Measure of the Incident Angle Modifier at the Module Level Muhd Nabil Abdul Aziz, Mauro Pravettoni	187: Distributed PV and power system security during disturbance events in the Australian NEM Naomi Stringer
14:55	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break
15:00	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break
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15:10	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break
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16:05	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break
16:10	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break
16:30	A1 Silicon Sustainability, reliability and characterisation: 16:30 17:45 Chairs: Alison Lennon	A2 Kesterite solar cells 16:30 18:15 Chairs: Bart Vermang and Pedro Salome	A4 Organic & hybrid solar cells : 16:30 18:15 Chair: Gavin Conibeer	A5 Perovskite materials development: 16:30 18:15 Chair: Jianghui Zheng
16:30	21: Expected global silver consumption for PV based on future energy roadmaps Moonyong Kim	243: DMSO solution route to 13% efficient kesterite solar cell Hao Xin	247: Development of Novel π -Conjugated Polymers for High-Efficiency Organic Solar Cells Itaru Osaka	163: Efficiency enhancement of tin and alloyed tin/lead perovskite solar cells by surface passivation with ethylenediamine Shuzi Hayase
16:45	13: Sequential LeTID test to separate the two types of degradations in Si PERC solar cells Yuji Ino	84: Illumination-dependent Temperature Coefficient of Voc in CZTS Photovoltaic Cells Simon Meng Fei Zhang	12: Inverted Organic Solar Cell using Zinc-Oxide with Low Temperature Process Junyoung Kim	191: Microfluidic Processing and Ligand-Engineering of NiO Nanoparticle Thin-Films for Low-Temperature Perovskite Solar Cells Monika Michalska
16:50	113: Quantitative analysis of sub-band-gap luminescence in silicon using a constant injection level Rabin Basnet	141: Potential beneficial effects of I-III-H4 decomposition during the reactive annealing in CZTSe solar cells Alex Jimenez	66: High-Quality Passivating Oxide Layer for Silicon-Organic Hybrid Solar Cell Applications Aditya Saha	200: Complementary bulk and surface passivations for highly efficient perovskite solar cells by gas quenching Shi Tang
17:00	179: Fluorine passivation of ring defects in Czochralski-grown silicon Rabin Basnet	186: Performance improvement in Cd-free CZTS solar cells enabled by wide bandgap window layers via ALD Xin Cui	176: Zn-Porphyrins are low cost and more efficient sensitizer in dye sensitized solar cells (DSSC) Kotteswaran Shanmugam	218: Thermally regulated strain-induced reverse halide segregation Nursultan Mussakhanuly
17:05	33: Efficiency Prediction of Solar Cells using Photoluminescence Images and Deep Learning Yoann Buratti	38: Light soaking effect in solution processed Cu2ZnSn(S,Se)4 thin film solar cells Michael Jones	121: The Role of Excimer in Singlet Fission Parisa Hosseiniabadi	219: Flexible Inorganic CsPbI3 quantum dot solar cell Long Hu
17:10	179: Fluorine passivation of ring defects in Czochralski-grown silicon Rabin Basnet	186: Performance improvement in Cd-free CZTS solar cells enabled by wide bandgap window layers via ALD Xin Cui	176: Zn-Porphyrins are low cost and more efficient sensitizer in dye sensitized solar cells (DSSC) Kotteswaran Shanmugam	134: Triple-Cation Narrow Bandgap Perovskite Thin-films for High-Efficiency All-Perovskite Tandem Solar Cells Somayeh Moghadamzadeh
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18:00	Quick Break	254: Status of emerging kesterite photovoltaic technology Edgardo Saucedo	86: Effects of halogen composition controlled by ligand concentration on near IR luminescence of inorganic lead halide perovskite nanocrystals for quantum cutting application Tomoya Yamada	107: Seasonal Variation of the Car-Mounted Photovoltaic Module Performance under Driving Conditions Yasuyuki Ota
18:15	Quick Break			
19:00	Poster Presentations			
21:00	Poster Presentations			

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Wednesday, 15 December 2021

AEDT					
	Chairs: Chris Fell, Anastasia Soeriyadi, Iain Macgill, Anna Bruce				
11:00	279: Current trends and future prospects of PV performance analysis Yuzuru Ueda				
11:30	280: Dispatchable Solar Power - a Hybrid Approach John Lasich				
12:00	251: The road to power system operation with 100% renewable energy Chris Davies				
12:30	271: Trends of global PV market and industry Izumi Kaizuka				
13:00	Lunch Break				
	Chair: Siva Karuturi				
14:00	Hamakawa & PVSEC Awards, including PVSEC Lecture				
14:00					
14:45	<i>A1 Silicon : Alternative processes for passivating contacts: 14:00 16:05</i>	<i>A2 CdTe Solar cells: 14:45 16:05</i>	<i>A5 Perovskite PV Performance: 14:45 16:15</i>	<i>A6 Novel PV devices: 14:45 16:00</i>	<i>A7 Module performance: 14:45 16:05</i>
	Chair: Anyao Liu	Chairs: Feng Yan and Kaiwen Sun	Chair: Md. Arafat Mahmud	Chairs: Fiona Beck and Stephen Bremner	Chairs: Chris Fell and Mauro Pravettoni
14:45	160: Self Assembled Monolayers for Passivated Contacts William Nemeth	265: MgZnO Emitter Layer for CdTe Solar Cells James Sites	75: The transparent conductive oxide layer impacts recombination and resistance losses within a perovskite solar cell Daniel Walter	222: Hot carrier solar cells: Phonon bottlenecks to slow carrier cooling in bulk materials, perovskites and MQWs Gavin Conibeer	258: Module Reliability In Tropical Asia: Three Case Studies Mauro Pravettoni
15:00			77: Effect of Edge States for Optical and Electrical Properties in Two-Dimensional Bromide Halide Perovskite Eunyoung Choi	145: Demonstration of power generation from a thermoradiative diode Muhammad Hasnan Sazzad	28: Impact of Glass Textures on the Energy Yield in Field-Installed Solar Modules Marco Ernst
15:05	44: Alumina-Titania Alloy Affords Low Contact Resistivity and Excellent Surface Passivation with J0 below 2 fA/cm2 Mohamed Ismael	266: The Path to Bifacial CdTe PV Randy Ellingson	100: Investigating reverse bias stability and recovery of perovskite solar cells Viqar Ahmad	114: Heat flows and non-equilibrium in non-ideal Hot Carrier Solar Cells Abhinav Sharma	37: Modelling extreme module degradation risks and fat tails: the impact of compounding and mismatch. Fiacre Rougieux
15:15			159: Reliable Power Rating of Perovskite PV Modules Nikos Kopidakis	192: Mini Photovoltaic Cells Enabling Less Invasive Medical Implants with Longer Operating Life Daniel Londono	154: Towards the Development of Digital Twins for Industrial Screen-Printed Metallization Sebastian Tegner
15:20	211: Remarkably high carrier injection from MoOx passivating contacts with an amorphous silicon interlayer on silicon Borong Sang	272: Low-temperature ex-situ Group V doping for polycrystalline CdTe Solar cells Feng Yan	112: Developments within and Collaboration Opportunities with ACAP on Advanced Material and Device Characterisation Henner Kampwerth	232: A Spectrum of Ideal Flowline Concentrators Alex Lehmann	228: A cost-effective PV module passive cooling using vortex generator Zibo Zhou
15:25			143: All-evaporated perovskites: challenges and opportunities for tandem photovoltaic devices Thomas Feeney		
15:30					
15:35	95: Development of Inkjet-Printed Doping for Poly-Si Based Silicon Solar Cells Jiali Wang	268: High efficient CdTe solar cells with ZnMg1-xO/CdS/CdSe complex window layers Lili Wu			
15:45					
15:50					
16:00	Afternoon Break				
16:05					
16:15					
16:30	<i>A1 Silicon : Passivating contacts (2): 16:30 17:30</i>	<i>A2 New Material & Tandems: 16:30 17:50</i>	<i>IEA PVPS Task 17 16:30 17:50</i>	<i>A9 PV system integration: 16:30 17:30</i>	<i>A10 Large Scale PV: 16:30 17:50</i>
	Chairs: Christophe Ballif and Delfina Munoz	Chairs: Tobias Bertram and Edgardo Saucedo	Chairs: Jessica Jiang & Ivan Perex-Wurfl	Chair: Niraj Lal	Chair: Pablo Ribeiro Dias
16:30	41: Laser Doped & Polysilicon Contact Bifacial Solar Cells over 24% Efficiency and 95% Bifacial Factor Kean Chern Fong	240: Antimony Selenosulfide Solar Cells Tao Chen	260: PV and Transport – Expected Benefits of PV-Powered Vehicles Keiichi Komoto	282: The History of Solar PV in Regional Australia Lyndon Frearson, Peter Renehan	178: Terawatt PV and the Aluminium Challenge Alison Lennon
16:45	52: Large-area monoPoly cells on 110 μm c-Si wafers with efficiency approaching 24% Naomi Nandakumar	269: More Se Vacancies in Sb2Se3 under Se-rich Conditions: an Abnormal Behavior induced by Defect-Correlation in Compensated Compound Semiconductors Shiyu Chen	273: VIPV demonstration for light commercial vehicles: Test drives and energy flow analysis Robby Peibst	43: Renewable energy supply system intended to improve resilience after disasters Youichi Hirata	181: Material challenges for terawatt scale silicon PV production and technology choices for improved sustainability at the cell and module level Brett Hallam
16:50					
17:00	92: Passivating polysilicon recombination junctions for crystalline silicon solar cells Franz-Josef Haug	270: Monolithic Perovskite/CIGSe tandem solar cells in two terminal configuration Tobias Bertram	261: Multidisciplinary study for PV-Powered Electric Vehicle Charging Stations: first approach and preliminary results Manuela Sechilariu	193: THE INVESTIGATION OF IMPACTS AND POWER VALUES FROM PV GRID CONNECTION Sorraphat Bubpharam	119: European Member State Targets for Photovoltaics: Is it enough for the European Green Deal Arnulf Jäger-Waldau
17:10					
17:15	188: TOPCon structure fabricated by using sputtered a-Si:H layers Takumi Miyamoto	267: Road to 27% Perovskite-on-CI(G)S tandem solar cells Ulrich Wilhelm Paetzold	262: Photovoltaic optimized charging of Electric Vehicles Urs Muntwyler		264: Analysis of Indium Availability: Not a Critical Issue for Large Scale Development of CIGS Technology Daniel Lincot
17:30					
17:30	Quick Break				
17:50					
18:00	Chairs: Bram Hoex and Ned Ekins-Daukes				
	Closing Ceremony & Best paper Awards				