



The Solar Energy Society  
and  
PV-Net UK



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## PVSAT-6

6th Photovoltaic Science, Applications and Technology  
Conference C91

Chilworth Manor  
University of Southampton  
Wednesday 24 – Friday 26 March 2010

## PROVISIONAL PROGRAMME V1.1

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UNIVERSITY OF  
**Southampton**



Wednesday 24<sup>th</sup> March 2010

14:00 – 16:00	<b>OPENING SESSION</b> Chair: Tim Bruton	
14:00	Welcome from University of Southampton Welcome from Tim Bruton, Conference Chair Conference and Programme Announcements	
14:30	Invited: Hydrogenated silicon (Si:H) thin film materials and solar cells	Chris Wronski, Pennsylvania State University, USA
15:00	Intermediate band solar cells and two-photon up-conversion : theory and a molecular approach	N. Ekins-Daukes, R. Piper, M. Yoshida, Imperial College Y. Cheng, T. Khoury, R. Clady, M. Tayebjee, M. Crossley and T. Schmidt, University of Sydney
15:20	The morphology and growth of silicon nanowires by ECR chemical vapour deposition	J. Ball & H. Reehal, London South Bank University
15:40	Process and device modelling for enhancement of Si solar cell efficiency	Nick Cowerm & Chikak Ahn, University of Newcastle Laura Brown, Alex Cole, Keith Heasman & Kristine Drew, NaREC
16:00 – 16.30 COFFEE BREAK		
16:30 – 18:00	<b>SESSION 2</b> Chair : David Lane, Cranfield University	
16:30	Invited: Developments in CdTe solar cells on glass and polymer film substrates	Ayodhya Tiwari, EMPA, Switzerland
17:00	The benefit of CdTe platform devices by MOCVD for systematic improvements in PV performance	V.Barrioz, W. Brooks, S. Irvine, D. Lamb, A. Clayton & E. Jones, Glyndwr University
17:20	Polymer/Fullerene Solar Cell Interfaces Studied with Impedance Spectroscopy	Shawn Willis, Jonathan Moghal, Hazel Assender & Andrew Watt, University of Oxford
17:40	PV R&D Discussion facilitated by PV-NET - all welcome	
18.45 Welcome Reception and Laboratory Tours, University of Southampton		



**Thursday 25th March**

9.00 – 10.30	<b>SESSION 3:</b> Chair: Bryce Richards, Heriot-Watt University	
9:00	Invited: .CrystalClear: Next generation wafer-based silicon PV technology from lab to fab	Wim Sinke, ECN, The Netherlands
9:30	A feasibility study towards obtaining ultra-thin PV solar cell devices by MOCVD based on a p-i-n structure	A Clayton, S. Irvine, V. Barrioz, W. Brooks & D. Lamb, Glwyndwr University I. Forbes & G. Zoppi, Northumbria University
9:50	Advance inline deposition system and process development for high efficiency Cu(In,Ga)Se <sub>2</sub> solar cells	Zhengfei Wei, Jake Bowers & Hari Upadhyaya, Loughborough University Terry Shimmel, Scientific Vacuum Systems Ltd.
10:10	Optical properties of thin films of Cu <sub>2</sub> ZnSnSe <sub>4</sub> fabricated by sequential deposition and selenisation	F. Luckert, M. Yakushev & R. Martin, Strathclyde University A. Karotki & A. Mudryi, National Academy of Sciences of Belarus N. Beattie, G. Zoppi, M. Moynihan & I. Forbes, Northumbria University
10.30 – 11:00 COFFEE BREAK		
11:00-12.30	<b>SESSION 4</b> Chair: Steve Ransome, SRCL	
11:00	Invited: Solar glass for PV applications – requirements and trends	Thomas Hofmann, Centrosolar Glas GmbH, Germany
11.30	Process for wave-like surface microstructure in titanium with multiple reflections detected using angle-resolved reflectivity	M. Poullou, C. Malvi, D. Dixon-Hardy & R. Crook, University of Leeds
11.50	HgTe quantum dots for infrared luminescent solar concentrators	B. Rowan, N. Shiradkar & B. Richards, Heriot-Watt University
12:10	Characterization and enhancement of light scattering through TCOs for thin film silicon solar cell applications	David Payne, Owain Clark, Eu Meng Ang & Darren Bagnall, University of Southampton
12.30 – 13.30 LUNCH		
13.30-15.30	<b>POSTER SESSION</b> All delegates are invited to view and discuss the posters with the authors (see annex for details of poster papers) Chair: Alex Cole, NaREC	
15:30 – 16:00 COFFEE BREAK		



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16:00– 17:50	<b>SESSION 5:</b> Chair: Hari Reehal, London South Bank University	
16:00	Invited: Use of PV and BIPV today	Ray Noble, Renewable Energy Association, UK
16.30	Indoor measurement of G-T-E-matrix for energy rating	M. Bliss, J. Roy, T.R. Betts & R. Gottschalg, Loughborough University
16.50	Design and performance evaluation of a prototype dielectric photovoltaic concentrator	Nabin Sarmah, Sendhil K. Natarajan, Bryce S. Richards & Tapas K. Mallick, Heriot-Watt University
17.10	Deposition and characterisation of copper indium gallium sulphide thin films fabricated by chemical vapour deposition with metal chloride precursors	Kevin Huang, Kenton Knight & Daniel Hewak, University of Southampton
17:30	A detailed comparison of measured outdoor performance vs. simulation program predictions for different PV technologies	Steve Ransome, SRCL
19.15 Reception, Chilworth Manor		
20.00 CONFERENCE DINNER AND AWARDS PRESENTATION, Chilworth Manor		



## Friday 26th March

9.00 – 10.30	<b>SESSION 6</b> Chair: Ralph Gottschalg, Loughborough University	
9:00	Invited: Photonics and thin film silicon technologies	Darren Bagnall, University of Southampton, UK
9:30	Formation of $\text{Cu}(\text{In}_{1-x}\text{Al}_x)\text{Se}_2$ by selenising RF magnetron sputtered Cu/Al/In precursor layers	R. Aninat, I. Forbes, G. Zoppi & R. Miles, Northumbria University
9:50	Rear surface passivation of Si solar cells by plasma deposited dielectric films	A. Perau, G. Kocher, B. Richards & J.I.B. Wilson, Heriot-Watt University D. Morrison, NaREC
10:10	An analysis of the forthcoming feed-in tariffs for solar photovoltaic electricity generation in the UK	Christian Jardine, University of Oxford
10.30 – 11.00 COFFEE BREAK		
11.00-12.40	<b>CLOSING SESSION</b> Chair: Tim Bruton	
11:00	Solar Energy Society 36 <sup>th</sup> Annual General Meeting All members welcome	
11:40	Invited: PV manufacturing and markets in 2009	Alan Turner, Solarbuzz, UK
12:10	Conference Closing Remarks	Mary Archer, President, The Solar Energy Society (UK-ISES) Tim Bruton, Conference Chair
12.30 – 13.30 LUNCH		



## PVSAT-6 Provisional Programme



### POSTER PAPERS

Poster Ref. No	Paper Reference No	PaperTitle	Authors
P-01	PVSAT-6_044	Plasmonic Light-Trapping for Thin Film a-Si solar cells	R.S.A Sesuraj, T.L Temple and D.M. Bagnall, University of Southampton
P-02	PVSAT-6_001	High and Low Reflective Surfaces for Solar Cells Using Noble Metal Nanoparticles	Badar Ahmed, Anthony Centeno, Neil Alford and Hari Reehal, Imperial College London, London South Bank University
P-03	PVSAT-6_003	Effect of surface roughness on the recombination lifetime on hydrogen fluoride etched crystalline silicon	Nicholas Alderman, Lefteris Danos, Martin Grossel and Tom Markvart, University of Southampton
P-04	PVSAT-6_009	Aluminium doped zinc oxide film contacts for use in dye sensitized solar cells	J.W.Bowers, A.N. Tiwari and H.M.Upadhyaya, CREST, Loughborough University
P-05	PVSAT-6_014	Increased efficiencies on CdTe solar cells via luminescence down-shifting with efficient excitation energy transfer between dyes	L. Danos, N. Soleimani, F. T. Martins, T. Markvart, V. Barrioz and S. J. C. Irvine, University of Southampton, Optic Technium
P-06	PVSAT-6_015	Design of a broadband silver grating coupler for silicon solar cells	Farrah Djidjeli and Darren M. Bagnall, University of Southampton
P-07	PVSAT-6_025	A comparison of CdTe thin film growth methods by spectroscopic ellipsometry	David Lane, Robert Treharne, Ken Durose, Cranfield University, Durham University
P-08	PVSAT-6_026	Lattice Parameters and Grain size of $Gul_n, Ga_{1-x}Sa_2$ films	A A Al-Bassam, King Saud University
P-09	PVSAT-6_053	Excited States of the A and B Free Excitons in $CuInSe_2$	M.V. Yakushev, F.Luckert, R.W. Martin, A.V.Karotki and A.V. Mudryi, Strathclyde University
P-10	PVSAT-6_033	High throughput screening of ZnS based intermediate band gap semiconductors	Kyle Hutchings, David Lane, Scilla Roncallo, Keith Rogers, Cranfield University
P-11	PVSAT-6_037	Nanostructured Antireflectance coatings and their application to solar cells	Jonathan Moghal, Gareth Wakefield, Martin Gardener, Andrew AR Watt, University of Oxford
P-12	PVSAT-6_038	Diagnostics of Ar-H-SiH <sub>4</sub> Electron Cyclotron Resonance Plasma for Optimisation of Silicon Deposition	T. Quinn and H.S.Reehal, London South Bank University
P-13	PVSAT-6_045	Modeling the scattering inside a fluorescent collector by ray tracing	N.Soleimani, S. Knabe, T.Markvart, G.H. Bauer, University of Southampton
P-14	PVSAT-6_047	Fluorine Doped ZnO thin films deposited by RF sputtering	R. E. Treharne and K. Durose, Durham University
P-15	PVSAT-6_051	All-sputtered CdTe/CdS solar cells	B. L. Williams, R. E. Treharne and K. Durose, Durham University
P-16	PVSAT-6_018	Deposition of Indium Tin Oxide by APCVD for Photovoltaic Applications	Jeffrey M. Gaskell, David W. Sheel, Heather Yates, University of Salford



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P-17	PVSAT-6_036	Band gap engineering in TiO <sub>2</sub> by doping: a literature survey	Nianhua Peng and Chris Jeynes, Surrey University
P-18	PVSAT-6_022	Synthesis of high quality monodisperse Nickel oxide nanocrystals for applications in solar cells	P. Khagram, R. M. D. Brydson, and R. Crook, University of Leeds
P-19	PVSAT-6_024	Templated growth of cadmium sulphide/cadmium telluride solar cells using a large grained cadmium oxide transparent conducting oxide	D. Lamb, S.J.C. Irvine, V. Barrioz, A. J. Clayton and W. S. M. Brooks, Glyndwr University
P-20	PVSAT-6_023	Influence of the spectral measurements on accuracy of estimate irradiance for PV devices	M. Krawczynski, M. B. Strobel, R. Gottschalg, CREST, Loughborough University
P-21	PVSAT-6_054	A Modelling Approach for Long-term Degradation of Photovoltaic Modules	J.Zhu, K.Astawa, T.R.Betts, R.Gottschalg, CREST, Loughborough University
P-22	PVSAT-6_034	Simulating the energy yield from III-V multi-junction concentrator systems	N.Chan, T.Young, H.Brindley, B.Chaudhuri, N.J.Ekins-Daukes
P-23	PVSAT-6_004	Geometrical and Optical Characterisation of Ag Nanoparticles Deposited on Si and SiO <sub>2</sub>	E.M. Ang, T.L. Temple and D.M. Bagnall, University of Southampton
P-24	PVSAT-6_020	Characterization of 1-Decene Monolayers directly attached to Si (111) surface	Mohd Adib Ibrahim, Lefteris Danos and Tom Markvart, University of Southampton
P-25	PVSAT-6_028	Characterisation of Closed Field Magnetron Sputtered ITO and CdTe Thin Films for use in Solar Cells	P. S. Nasikkar, D.R. Gibson, A.R.Waugh, J.M. Walls and H. M.Upadhyaya, CREST, Loughborough University
P-26	PVSAT-6_031	Preparation and optical characterisation of silicon nitride and aluminium nitride films for silicon solar cell antireflective coating application	P.Kaminski, G.Claudio, K.Bass, J.M.Walls, CREST, Loughborough University
P-27	PVSAT-6_032	Characterisation of Thin Films in Solar Cells with Complimentary Spectroscopic Methods	R. Seitz, R. Geiger, E. Leroy, D. Sheppard, HORIBA Scientific
P-28	PVSAT-6_048	A new tool for measuring patterned and diffuse glass	Peter A van Nijnatten, Rupert Aries and Patrick Courtney, OMT Solutions BV, Perkin Elmer
P-29	PVSAT-6_049	Automated Reflectance / Transmittance Analyzer for Variable Angle Spectrometry	Peter A van Nijnatten, Jurgen de Wolf and Ivo Schoofs, OMT Solutions BV
P-30	PVSAT-6_016	Front Dicing Technique for Pre-isolation of Concentrator Silicon Solar Cells	K. Drew, A. Cole, L.M. Brown, K. Heasman, T. Bruton, Narec
P-31	PVSAT-6_041	Effect of I-V Translations of Irradiance, Temperature and Spectrum on uncertainty of energy rating	<a href="#">J.Roy, M. Bliss, T.R. Betts, R. Gottschalg, CREST, Loughborough University</a>
P-32	PVSAT-6_043	Optical performance modelling of an atypical 3-D Cross Compound Parabolic Photovoltaic Concentrator using ray trace technique	Nazmi Sellami, Tapas.K.Mallick, David.A.McNeil, Heriot-Watt University
P-33	PVSAT-6_046	A novel bio-inspired approach to isotropic diffraction	Petros I Stavroulakis, Stuart A. Boden, Asa Asadollahbaik, Darren M. Bagnall, University of Southampton



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### POSTER PAPERS

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P-34	PVSAT-6_057	LGBC silicon concentrator solar cell with modified bus bar suitable for high volume wire bonding	K.C. Heasman, L.M. Brown, A. Cole, S. Devenport P Gibbard and T.M. Bruton, Narec
P-35	PVSAT-6_058		M. Krawczynski, M. B. Strobel, B.Goss, M.Bliss, N. Bristow, K.Cradden, R.Gwillim, T.R.Betts,R. Gottschalg, CREST, Loughborough University
P-36	PVSAT-6_059	Large scale PV system monitoring- modules technology intercomparison Toward thin film technologies cost reductions: modelling module's component materials availability and cost trends	Chiara Candelise, Mark Winskel, Rob Gross, Imperial College London
P-37	PVSAT-6_055	A Review of the PV system design	B.Goss, K.Cradden, R.Gwillim, R.Gottschalg, M. Strobel, CREST, Loughborough University
P-38	PVSAT-6_011	Modelling the efficiency of photovoltaic systems	I.R. Cole, R. Gottschalg, CREST, Loughborough University





## **PVSAT-6 Exhibitor Registration**



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### **PVSAT-6 EXHIBITORS**

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## PVSAT-6 DELEGATE REGISTRATION FORM

**Solar Energy Society Conference C91, Chilworth Manor, University of Southampton, 24-26 March 2010**

Please complete and detach the registration form and return to the Society's Secretariat together with your payment at the address below.

Early bird registration deadline: Wednesday 3 March 2010.

Your place will be confirmed in writing and venue details sent. Residential conference accommodation is available but must be applied for by completing the separate PVSAT-6 Accommodation Reservation form. Full Conference Rate includes all refreshments, lunches, Welcome Reception, University tour 24<sup>th</sup> March, Conference Dinner 25<sup>th</sup> March. One-Day Rates do not include Conference Dinner - tickets may be purchased at £50.00 each. All registration categories include a copy of the Conference Proceedings C91. Non-member registration includes standard Society national membership until end 2010. All prices inclusive of VAT.

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<b>Registration Category</b>	<b>Early registration (On or before 3 March 2010)</b>	<b>Registration (4 March 2010 onwards)</b>
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One-Day Rate Conference Dinner	£50.00	£50.00

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**6th Photovoltaic Science, Applications and Technology (PVSAT-6)  
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**24 - 26 March 2010, Chilworth Manor, University of Southampton, Southampton SO16 7PT, UK**

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