

Curriculum Vitae
ROBERT E. TREHARNE

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PROFILE

A highly skilled and motivated experimental researcher with extensive experience in the field of thin-film photovoltaics (PV). A specialist knowledge of transparent conductors including their deposition, opto-electronic characterisation and technological applications. Current research focusses on investigating the effect of material band line-ups in CdTe/CdS solar cells and developing rapid screening approaches to new materials discovery for PV. A key member of the Photovoltaics Group within the Stephenson Institute for Renewable Energy, responsible for significant contributions to the lab infrastructure including the installation and development of precision characterisation equipment. An international collaborator with many links to research institutions that include NREL (USA), Mugla University (Turkey) and Eindhoven Univ. of Technology (Netherlands).

EDUCATION

- PhD in Physics from Durham University, awarded Jan 2012.

Thesis title: *“RF Magnetron Sputtering of Transparent Conducting Oxides and CdTe/CdS Solar Cells”*

- MPhys from Warwick University, *1st Class*, awarded June 2007.

CURRENT POSITION

Postdoctoral Research Associate, Photovoltaics Group, SIRE, University of Liverpool: (Jan 2012 - March 2015). Key responsibilities include:

- Performing fundamental research and managing multiple projects.
- Managing inter-departmental collaborations.
- Developing IP and patents.
- Procurement.
- Identifying new areas of experimental research.
- Organising training for postgraduate research.
- Supervision of PhD and Masters students.

Key contributions to date:

- Development of high precision thin-film optical characterisation tools.
- Patent with high potential for commercial impact regarding processing routes to CdTe/CdS solar cells.

SKILLS AND EXPERIENCE

A high proficiency in a wide range of thin-film deposition, opto-electronic and structural characterisation, and data analysis techniques has been gained during post-graduate and post-doctoral work. These include;

- Magnetron sputtering
- Device Processing
- Scanning and transmission electron microscopy
- X-ray diffraction
- Spectrophotometry
- Ellipsometry
- Electrical characterisation (van der Pauw, Hall, J-V, C-V, EQE)
- A proficiency in several programming languages (FORTRAN, Python, Visual Basic, LabView, javascript, PHP)
- Optical modelling of multi-layer stacks and solar cells
- Web development for public engagement projects

INTERACTION & ENGAGEMENT

Conferences: Highly active within the fields of photovoltaics and electrical engineering with consistent contributions to national and international conferences. Awards received for best paper (PVSAT conference, UK 2011) and poster presentations (E-MRS, Strasbourg, 2010). An assured and engaging presentation style allows research outputs to be communicated effectively and with high impact.

PV21 SUPERGEN: Collaborated extensively with research groups throughout the UK as a member of PV21 consortium. Responsible for leading researcher meetings, presenting research outputs to academic board and organising public engagement projects. Now a member, with similar roles, of successor consortium - SUPERSOLAR SUPERGEN.

Industrial Links: Close collaborations with Pilkington NSG in the development of dielectric coatings for float glass. Other links include Semimetrics Ltd, following projects to develop thin-film characterisation equipment, and Tata Steel.

Leader of the PV-link project: A researcher led initiative to promote interaction and collaboration between PV research centres across the UK. Roles include supervising development of web based content management system, organising researcher workshops, liaising with existing research networks and industrial R&D groups.

TEACHING AND OUTREACH

Highly involved in departmental teaching, current responsibilities include:

- Teaching undergraduate problem classes and demonstrating practical sessions.
- Mentoring undergraduate students
- STEMNET ambassador for Merseyside - involves regularly promotion of current research to school groups.
- Public and school outreach - recent examples include IOP events: "Lab in a lorry" and "Physics in the field" events.

JOURNAL PUBLICATIONS

R. E. Treharne, A. D. Weerakkody, I. Mitrovic, S. Hall and K. Durose, “*Non-parabolicity and band gap re-normalisation in Si doped ZnO*”, Submitted to J. Appl. Phys. (November 2013).

J. D. Major, Leon Bowen, **R. E. Treharne** and K. Durose, “*Assessment of photovoltaic junction position using combined FIB and EBIC analysis of CSS deposited CdTe solar cells*”, Submitted to Prog. PV: Res. Appl (October 2013).

R. E. Treharne, B. L. Williams, J. D. Major, M. Alturkestani, K. Durose, L. Bowen, B. G. Mendis, H. Bayhan, M. Bayhan, G. Zoppi, I. Forbes, “*Electrical characterisation of fully sputtered CdTe/CdS thin-film solar cells*”, Submitted to Sol. Energy Mater. Sol. Cells (September 2013).

I. P. Soshnikov, V. A. Petrov, Y. Y. Proskuryakov, D. A. Kudryashov, A. V. Nanshchekin, G. E. Cirlin, **R. E. Treharne** and K. Durose, “*Formation of structures with noncatalytic CdTe nanowires*”, Semiconductors, **47**, (2013), 875-878.

***R. E. Treharne**, K. Hutchings, D. A. Lamb, S. J. C. Irvine, D. Lane and K. Durose, “*Combinatorial optimization of Al-doped ZnO films for thin-film photovoltaics*”, J. Phys. D: Appl. Phys. **45**, (2012), 335102.

R. E. Treharne, B. L. Williams, L. Bowen, B. G. Mendis, K. Durose, “*Investigation of post deposition CdCl₂ treatment for fully sputtered CdTe/CdS thin film solar cells*”, Proc. 38th IEEE PVSC, (2012), 001983-001987.

J. D. Major, L. Bowen, **R. E. Treharne** and K. Durose, “*Assessment of photovoltaic junction position in CdTe solar cells using a combined FIB-EBIC technique*”, MRS Proc. (2012), 1432.

***R. E. Treharne** and K. Durose, “*Fluorine doped ZnO thin films by RF magnetron Sputtering*”, Thin Solid Films, **519**, (2011), 7579.

R. E. Treharne and K. Durose, “*Optical modelling of fluorine doped ZnO*”, Thin Solid Films, **520**, (2011), 1313.

***R. E. Treharne**, A. Seymour-Pierce, K. Durose, K. Hutchings, S. Roncallo, D. Lane, “*Optical design and fabrication of fully sputtered CdTe/CdS solar cells*”, J. Phys: Con. Ser., **286**, (2011), 012038.

CONFERENCES ATTENDED

TCM2012, Crete, Greece (2012), Oral presentation: “*Combinatorial optimization of Al doped ZnO thin-films for thin-film photovoltaics*”.

IEEE PVSC, Austin, USA (2012). Poster presentation: *“Investigation of post deposition CdCl₂ treatment for fully sputtered CdTe/CdS solar cells”*.

PVSAT-8, Northumbria University, Newcastle, UK. (2012). Oral presentation: *“A combinatorial approach to transparent conducting oxide design for thin-film photovoltaics”*.

PVSAT-7, Heriot-Watt University, Edinburgh, UK. (2011). Poster presentation: *“Optical design and fabrication of fully sputtered CdTe/CdS solar cells”*. *Award for best conference paper.

CMMP10, Warwick University, Coventry, UK. (2010). Oral presentation: *“A fully sputtered, 12.5% efficient CdTe/CdS solar cell”*.

PVSAT-6, Southampton, UK. (2010). Poster presentation: *“Fully sputtered CdTe/CdS thin-film solar cells”*, (2010).

E-MRS, Strasbourg, Fra. (2010). Poster presentation: *“Fluorine doped ZnO thin films by RF magnetron sputtering”*. *Awarded symposium poster prize.

TCM2010, Crete, Greece, (2010). Poster presentation: *“Optical modelling of ZnO thin films”*.

IOP Advances in Photovoltaics, London, UK (2010). Poster presentation: *“Recent progress in development of CdTe/CdS solar cells”*.

PVSAT-5, Glyndŵr University, Wrexham, UK. (2009). Oral presentation: *“Alternative doping routes to SnO₂:F via RF magnetron sputtering”*.