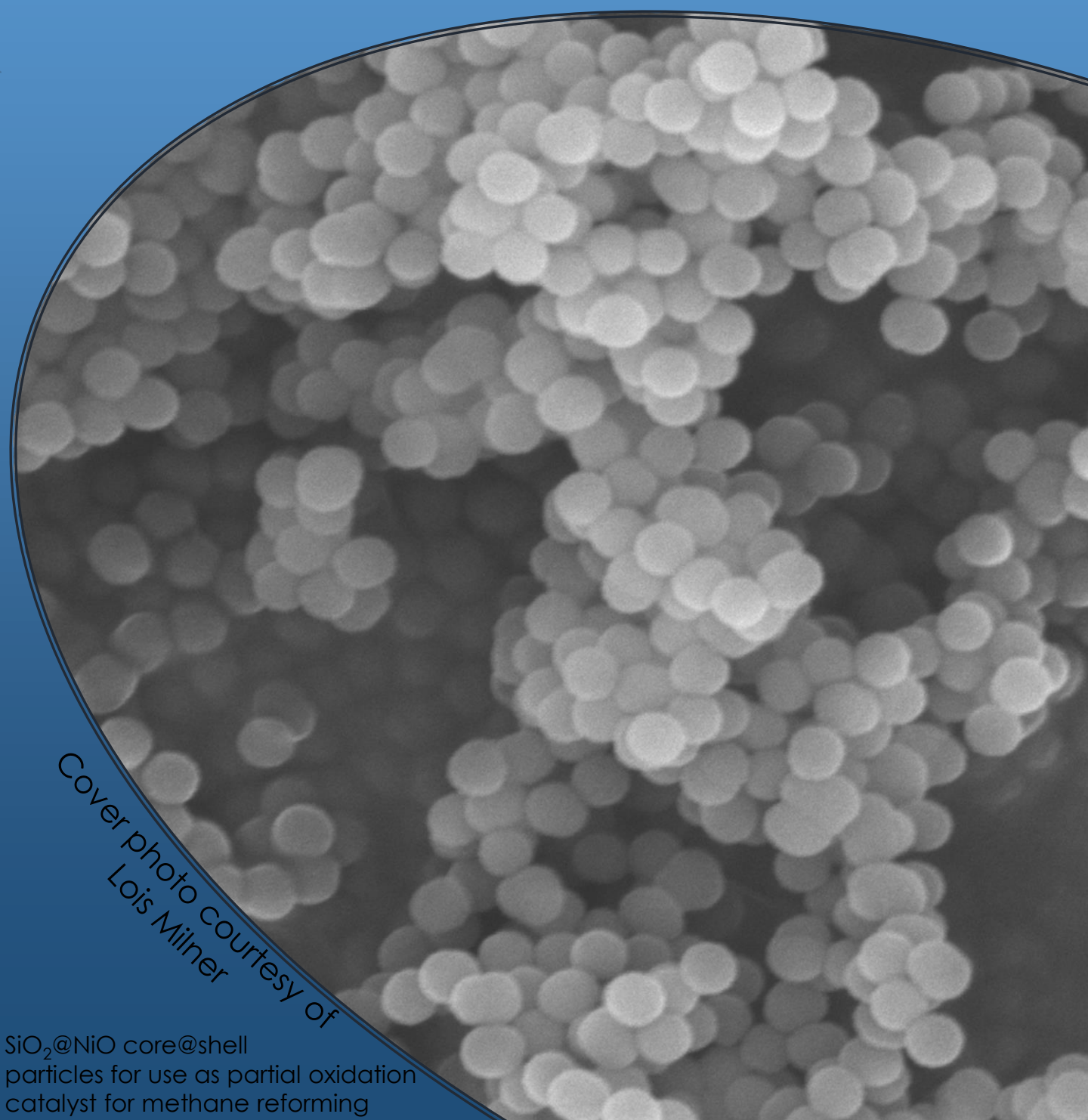


Centre for Doctoral Training in Fuel Cells & Their Fuels

Volume 3 - Issue 1 - JAN 2017



Cover photo courtesy of
Lois Milner

SiO₂@NiO core@shell
particles for use as partial oxidation
catalyst for methane reforming

Welcome to the Winter Newsletter

Welcome to the January 2017 edition of the quarterly newsletter for Centre for Doctoral Training in Fuel Cells and their Fuels.

The Centre for Doctoral Training in Fuel Cells and Their Fuels is a research partnership spanning the University of Birmingham, Imperial College London, University of Loughborough, University of Nottingham and University College London.

The Centre is funded by the Engineering and Physical Sciences Research Council (EPSRC).

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Newsletter Editors

This newsletter was compiled by site editors:

- Rhi Dixon (*University of Birmingham*)
- Graham Stevenson (*Imperial College London*)
- Sharleigh Talbot (*University of Loughborough*)
- Daniel Smith (*University of Nottingham*)
- Tom Heenan (*University College London*)

The editors are grateful to researchers across our partner universities for their contributions and Project Officer John Hooper for his assistance in collating this issue.

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CDT Fuel Cells
and their Fuels



@FuelCellsCDT

New Researchers

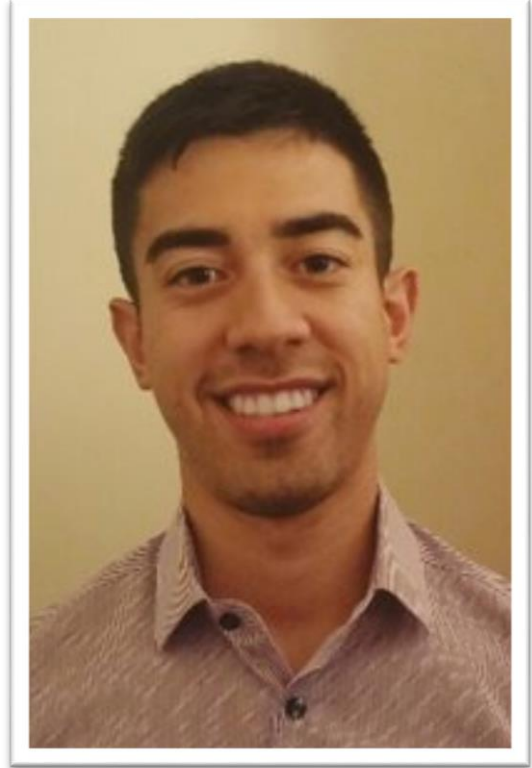
The Centre for Doctoral Training in Fuel Cells and Their Fuels welcomed a new cohort of postgraduate researchers.

Within the last quarter, seven new researchers have joined the Centre. Four of these researchers are based at the University of Birmingham, two are working at the University of Loughborough and one is completing his PhD in the University of Nottingham.

The editors would like to formally introduce them to the Centre and wish them the best of luck with their work.

Marcus Adams

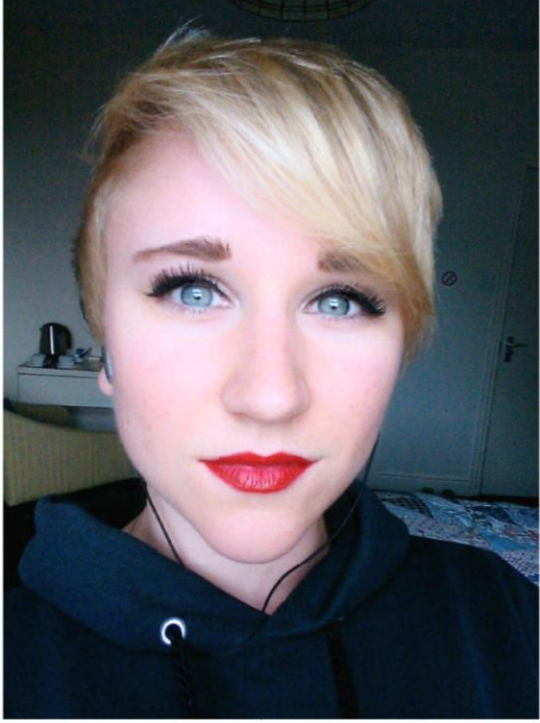
Marcus grew up in Chelmsford, Essex and completed a MEng in Chemical Engineering at the University of Surrey. During his undergraduate studies, Marcus completed a 1 year placement at Technip as an Assistant Process Engineer designing ethylene plants and oil refineries.



His current work, at the University of Nottingham is in metal hydride solid state hydrogen technology for stationary energy storage applications.

Outside of his work Marcus enjoys a number of activities including football and swimming.

Rhi Dixon



Rhi was born in Kent and moved to Birmingham to complete her BSc in Physics. She then moved to Pontypridd to study an MSc in Renewable Energy and Resource Management, with a focus on investigating the effect of the ratio of hydrogen to methane in the fuel mixture on

the performance of anode-supported SOFCs.

On returning to Birmingham, Rhi will be researching the use of novel dopants on the anode of biogas-fuelled SOFCs in order to minimize the effects of carbon and sulfur.

Outside of the office, Rhi is a qualified HCA who has recently taken up learning BSL. She also enjoys PC gaming, drawing and cooking.

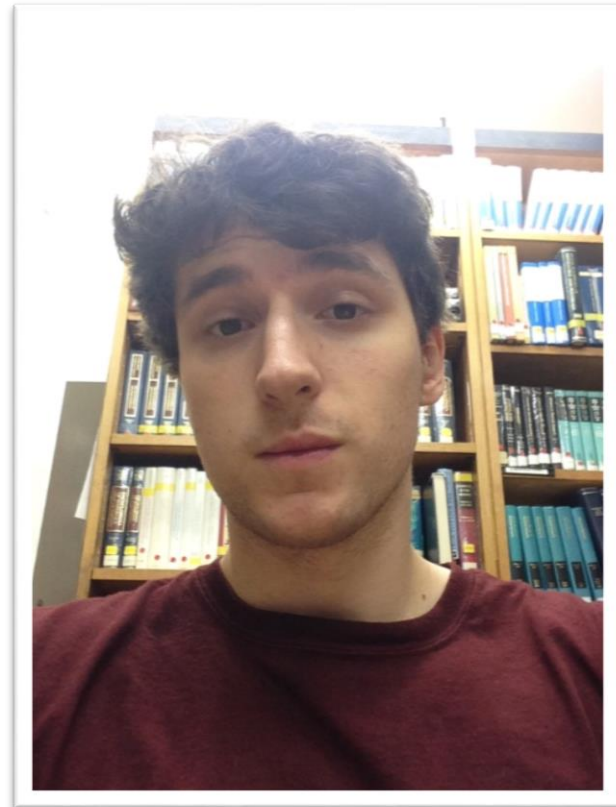
Sam Eardley

Sam is from Rosehill, North Shropshire. He graduated from the University of Oxford with a MSc in Material Science.

His work at the University of Birmingham will focus on optimizing the ion exchange rate across the membrane of PEM fuel cells. This will enable

Sam to produce a comparison data sheet whilst improving the current technology.

Outside of the office Sam plays wheelchair basketball and wheelchair tennis at competitive county level. He also hopes to pick up playing pool and snooker for the university during his time here.



Oliver Fernihough



Oliver is originally from Birmingham and moved to Swansea to study BSc Chemical Engineering in 2011. In 2015 Oliver returned to his hometown to take an MSc in Advanced Chemical Engineering at the University of Birmingham. During his time here he worked on the fabrication and testing of functionalised reduced Graphene Oxide with Platinum-Palladium nanowires.

Oliver's PhD studies, at Birmingham, involve nanopatterning proton exchange membranes in order to increase the power density for use in PEM fuel cells.

Oliver is a keen instrumentalist and enjoys a variety of sports including swimming, cycling and running.

Beatrice Sampson

Beatrice was born in Gloucester but grew up in France. In 2016 Beatrice graduated from the University of Birmingham with a MEng in Chemical and Energy Engineering.

Her current work at the University of Birmingham is looking at the added value of fuel cells in a variety of applications. Beatrice hopes to decrease the perceived cost of fuel cells and therefore increase their marketability.

Beatrice enjoys a range of arts and crafts including sewing and knitting as well as baking. She also holds a blackbelt in Ninjutsu.



Alexandros Symillidis



Alexandros was born in Nicosia, Cyprus but grew up in Athens, Greece.

At the University of Patras, Alexandros completed his BSc in Chemical Engineering with a focus on triode operation of PEM fuel cells. Alexandros was

also awarded his MSc in Patras for his work on CO₂ hydrogenation over Ru- and Co-supported catalysts.

At the University of Loughborough, Alexandros is developing direct liquid-fuel fuel cell systems for building and automotive applications.

During his free time Alexandros enjoys cycling and escape-room games.

Alex Thirkell

Alex is originally from Ipswich but moved to Chesterfield at age five.

At the University of Loughborough Alex studied MEng Aeronautical

Engineering, spending his placement year working with evaporatively-cooled PEM fuel cells at Intelligent Energy.

In Loughborough, Alex aims to develop a model for use by aircraft manufacturers to quickly find the optimal fuel cell system for their new aircraft. He also hopes to integrate a lightweight low-temperature fuel cell system into a 4m wingspan model aircraft to demonstrate fuel cell-powered flight.

Alex is an ex-national swimmer, having held the county record for 1500m freestyle. Alex is a qualified swimming teacher and has spent time teaching disabled children.



Annual JESS Trip

Throughout the middle of September, several of our new PhD students attended the Joint European Summer School programme in Athens, Greece. The Joint European Summer School is a programme for new PhD students designed to introduce the students to the field and Hydrogen Fuel Cells, Electrolysers and Batteries in a more exciting environment, whilst also acting as a natural ice breaker for the students to get to know each other, as well as students from other European universities. Although primarily organised by the University of Birmingham, it was also held in collaboration with Jülich University and the Technical University of Denmark (DTU). Although heavily concentrated on providing a scientific crash course, there was plenty of free time for the students to socialise, including a mid-week trip to the Corinth Canal.

Following the introductory week, a newly established second week which included more specialisation classes took place, where current students of the University of Birmingham CDT Group attended along with a few of the new PhD students. Similar to the first week, there again was a mid-week trip to the Acropolis.



Marcus Adams, Oliver Fernihough and Sam Eardley
enjoying the Greek climate and culture

Rushlight's Energy Briefing

On 20th October, University of Loughborough student Diana Mehta attended Rushlight's energy briefing on the hydrogen economy and its real potential. This event was hosted at Smith and Williamson, London.

Diana found the talk given by Ben Madden on the hydrogen economy particularly interesting as it expanded on the plans for the Leeds's H21 project. There event also hosted a panel regarding fuel cells and hydrogen production.

CasaXPS User Workshop

In November, Birmingham group PhD students Aimee Jackson, Laura Allerston and James Walker attended a workshop on CasaXPS in Newton Abbot, Devon.

The workshop was hosted by Neal Fairley, the developer behind CasaXPS software, which is used to interpret X-ray photoelectron spectroscopy data. Neal was joined by a number of eminent XPS experts including Drs Emily Smith, University of Nottingham and David Morgan, University of Cardiff.

The hosts kindly shared their wealth of knowledge and experience in the various applications of XPS, with particular focus on ionic liquids with Emily Smith and catalysis with David Morgan, and the workshop saw attendees process a range of model spectra to explore in greater depth the applications of the software.

Aimee and James will be running a seminar in the coming months, open to researchers from across the centre, to share their findings and learnings from the workshop. The workshop is also due to be repeated, and readers can find details of upcoming dates here: <http://www.casaxps.com/casaxps-training/training-events.htm>



Students engaging in the CasaXPS workshop

SUPERGEN Hub Conference

The SUPERGEN Hub fuel cells conference was held in Belfast, Ulster from the 12th – 14th December. The conference covered a range of topics including hydrogen production, storage and safety, materials and testing for PEM and solid oxide fuel cells and systems, energy policy and social science.

Dr Paul Shearing's talk on 4D imaging work on SOFC materials was considered insightful and encouraged Birmingham student James Walker to re-visit his work on beamline techniques. Joshua Bailey's and Tom Heenan's talks featured the current 3D imaging work being undertaken at UCL and the future of imaging. Furthermore, Southampton academic Dr Denis Kramer provided a thorough overview of the theoretical underpinning for much of the work underway in PEFC catalysis.

Dan Sadler from the Northern Gas Networks gave a summary of their feasibility report regarding the H21 Leeds City Gate project. The full report can be found at <http://www.northerngasnetworks.co.uk/document/h21-leeds-city-gate/> and a short film about the project can be accessed here:

<http://www.northerngasnetworks.co.uk/2016/07/watch-our-h21-leeds-city-gate-film/>.

The summary of the Catalysis Research for Polymer Electrolyte Fuel Cell (CaRPE-FC) project, as given by Dr Steven Holdcroft from the Simon Fraser University has been highlighted as research that may be of interest to our researchers unable to attend. Dr Holdcroft also spoke of the membranes, for use in alkaline fuel cells, he is researching with hopes of competing with Nafion.

Outside of conference hours, the dinner was held in the beautiful Belfast City Hall and researchers were welcomed by the Lord Mayor Brian Kingston who delivered a speech on the economic redevelopment underway in the city, with particular reference to the work they are doing to improve Belfast's sustainability.



From left: Vikrant Venkataraman, Ashkan Kavei, Oliver Fernihough, James Walker, Laura Allerston, Daniel Escalera Lopez, Pete Mardle, Graham Stevenson, Lois Milner, Kun Zhang

UCell & RI Christmas Lecture

In the run-up to Christmas the UCell team at UCL aided in the design and application of the demonstration equipment used for the 2016 Royal Institute Christmas lecture 'Supercharged: Fuelling the Future' which was delivered by Professor Saiful Islam from the University of Bath¹. This year's lecture was created with the goal of educating in the field of energy: where can we source it, how can we use it and how can we store it. The team aided in the design of a demonstration battery pack that would power a mobile phone for a year, as well as providing a demo kit to show the electrolysis of water into hydrogen, which can then be used in a polymer electrolyte fuel cell.

The lectures can be found on the BBC iPlayer here:

<http://www.bbc.co.uk/iplayer/episode/b086yr10/royal-institution-christmas-lectures-2016-supercharged-fuelling-the-future-3-fully-charged>



New UCell'er Jen Hack enjoying her visit to the Royal
Institute

Keele CNN Meeting

At the end of January, Birmingham PhD student James attended the relaunch meeting for the Royal Society of Chemistry's Chemical Nanoscience and Nanotechnology Special Interest Group (SIG). Held at the impressive Keele Hall on the Keele University campus in Staffordshire, the event brought together around 100 chemists working on various aspects of nanochemistry. The meeting was spread over two days, with invited talks from eminent academics alongside a poster session for PhD students and early career researchers. James particularly enjoyed Professor Andrea Ferrari's plenary talk on graphene materials, in which he provided a broad overview of the work that his group and researchers working across the wider Cambridge Graphene Centre are doing to forge the future for this wonder material.

We look forward to keeping an eye on and engaging in the work of the Chemical Nanoscience and Nanotechnology SIG.



Keele Hall hosted the Chemical Nanoscience and Nanotechnology meeting

Christmas Celebrations



Publications

McInnes, A., Plant, S., Ornelas, I., Palmer, R., Upul Wijayantha, K., *Enhanced Photoelectrochemical Water Splitting Using Oxidized Mass-Selected Ti Nanoclusters on Metal Oxide Photoelectrodes*. Royal Society of Chemistry, Sustainable Energy & Fuels 2017. Available online at :

<http://pubs.rsc.org/en/content/articlelanding/2017/se/c6se00050a#!divAbstract>

A Note about Future Publications

All students who get publications accepted should let John Hooper know. Ideally send an EndNote link, but if this isn't possible, then the usual title, authors, journal and dates information will be enough to add details manually.

Closing Remarks

Don't forget to let John Hooper know of any conferences you attend alongside details of your talk or poster title.

That's all for this January 2017 issue of the Centre for Doctoral Training newsletter. Any comments or contributions for the next edition can be sent to the editors at hfc-cdt-editors@contacts.bham.ac.uk.

Don't forget to keep up to date with all the latest CDT news on Twitter and Facebook.



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