

# Centre for Doctoral Training in Fuel Cells and their Fuels

Newsletter  
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CDT Fuel Cells  
and their Fuels

UNIVERSITY OF  
BIRMINGHAM

Loughborough  
University



The University of  
Nottingham

Imperial College  
London

UCL

## Welcome

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Welcome to the January edition of the new newsletter for the Engineering and Physical Sciences Research Council funded Centre for Doctoral Training in Fuel Cells and their Fuels which is a research partnership between the Universities of Birmingham, Nottingham, Loughborough, Imperial College London and University College London.

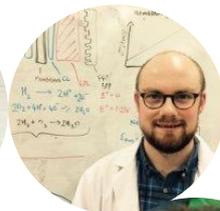
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This newsletter was compiled by University of Birmingham Editors James Walker and Aimee Jackson with contributions from Site Editors Tom Heenan (UCL), Daniel Smith (University of Nottingham), and Sharleigh Talbot (Loughborough University). The editors are grateful to Project Officer John Hooper for his assistance. Please do get in touch with comments, contributions and competition entries.

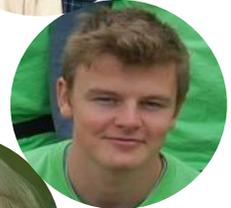
Aimee



James



Daniel



Tom



Sharleigh

Highlights in this addition include profiles of our newest recruits, a report of the highly successful SUPERGEN conference which was held at the University of Birmingham in December and a look ahead at upcoming events.

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## Our Researchers: The Newbies

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Nine new students started their PhDs within the CDT in September 2014. We're sure readers would love to hear all about them so we asked them to provide us with some tidbits.

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Five members of the new cohort will be based at the University of Birmingham:



Photograph courtesy of Scott Hardman.

The Birmingham students: Daniel, Lois, James, Laura & Aimee.

Daniel Escalera López comes from Barcelona. In his time at the Universitat de Barcelona he completed his bachelor's degree in chemistry and specialised in electrochemistry for his master's degree. Daniel's PhD project concerns the development of size-selected atomic clusters for electro-

and photocatalysis. Otherwise, he enjoys listening to music and playing football.

Lois Milner, native of Sheffield, completed her MSci in Chemistry at the University of Birmingham in 2014. Her project focusses on methane reforming catalysts for truck auxiliary power units. Outside of work Lois has recently been inspired to establish her own business.

James Walker was born in Montrose in the north east of Scotland and completed his MChem in Pure and Applied Chemistry at the University of Strathclyde in Glasgow. In his PhD project he aims to develop novel binary or ternary catalysts for polymer electrolyte membrane fuel cells. In his spare time James enjoys cooking and travelling.

Laura Allerston is from Hull, where she also studied for a Masters in Chemistry

with Nanotechnology. After working for a year as a research scientist in industry, she has now come back to university to obtain a PhD. Her research is aimed at applied and fundamental understanding of novel non-platinum PEM fuel cell catalysts. She really enjoys cooking for friends and family and has recently taken up Muay Thai boxing.

Aimee Jackson is from Stafford. She gained an MPhys at the University of Liverpool and is now working on graphene-oxide supported metal oxide catalysts for low temperature fuel cells. Aimee is an avid supporter of Stafford Rangers F.C..

One student from this year's intake will be based at University College London (UCL):



UCL student, Tom Heenan.

A keen engineer and proud Welshman, Tom Heenan lived in

Swansea until he was 18. After finishing his A-levels he then moved to London where he completed his undergraduate course at UCL. Tom's PhD will seek to increase understanding in the microstructural causes and effects of thermally driven degradation in Solid Oxide Fuel Cells. When he is not studying Tom spends the majority of his time surfing and training Crossfit.

Another of this year's intake is based at the University of Nottingham:



University of Nottingham student, Daniel Smith.

Daniel Smith was awarded a Bsc in Natural Sciences from the University of Lancaster before completing an MRes at the University of Birmingham in Materials for Sustainable Energy Technologies. Now based in the Department of Chemistry at the University of Nottingham, Daniel's project involves the use of ionic liquids for high temperature PEM fuel cell

applications. When not in the lab, Daniel is a keen musician and regularly performs at various concerts on the piano.

Two other students started their PhDs in Loughborough this year:



Loughborough Student, Jake Walls.

Jake, originally from Hertfordshire studied his bachelor's degree in Chemistry at Loughborough University. His PhD is based on developing an economic route for photoelectrochemical production of ammonia for possible applications in fuel cells.



Loughborough Student, Sharleigh Talbot.

Sharleigh is from Leicestershire. She completed her undergraduate degree in Chemistry at Loughborough University and is now working on developing a Photo-Fuel Cell for environmental remediation of contaminated water and production of renewable energy. In her spare time she enjoys Taekwondo and climbing.

## Events & Activities

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Students from the Centre for Doctoral Training have attended a variety of conferences and events over the last few months. Here is a round-up of some of the highlights and up-coming future events.

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### **JESS: The Joint European Summer School in Fuel Cells, Batteries and Electrolysers.**

One week prior to commencing PhD studies, 6 CDT students from Birmingham, Loughborough and UCL went to the JESS summer school in Crete. The summer school, which started on 22<sup>nd</sup> September, lasted five full days. The school was attended by students from across Europe, with particularly high numbers coming

Denmark's Danmarks Tekniske Universitet. While there, the students studied core material on fuel cell/battery technology and renewable energy more generally, before focussing on one of three specialisms: Low Temperature Fuel Cells and Electrolysers; High Temperature Fuel Cells; or Batteries. Outwith the conference suite the students worked in groups on an exercise to produce a roadmap for

the employment of one of the key technologies in a novel application on the island. The course was extremely useful, as it gave the students a chance to get to know each other, and to build their fuel cell knowledge before embarking on the 4 years of their PhD course.



### **SOFC Advances**

During October Lois Milner and Tom Heenan attended the Workshop on Industrial and Academic advances in Solid Oxide Fuel Cells at Imperial College London. The event combined industrial and academic speakers

from the UK and USA and talks included recent research in the US on the utilisation of coal in advanced SOFCs; updates on the LG Fuel Cell Systems programme to develop an SOFC system; High Temperature Fuel Cell Electrodes including new compositions & microstructures; and three dimensional imaging and modelling.

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### **Hydrogen: 'Fuelling' the Debate**

On Tuesday 25th November some students from Birmingham attended an evening of talks at Westminster on the theme 'Hydrogen and Fuel Cells: International Developments and Prospects for the UK'. The event was organised by the UK Hydrogen & Fuel Cell Association in collaboration with the All Parliamentary Group for Intelligent Energy and the All-Party Parliamentary Renewable and Sustainable Energy Group. The aim of the event was to showcase developments in hydrogen and fuel cell technology around the world in order to encourage discussion on how to best serve these growing industries in the UK.

There were three speakers. To start the event, Robin Hayles from Hyundai spoke of the introduction of the ix35 fuel cell car to the UK. Then, Chris White, from the California Fuel Cell Partnership delighted the audience with tales of hydrogen filling station developments in the 'Golden State' and suggested that perhaps greater academic involvement might help shape the debate surrounding the configuration of the growing refuelling network in the UK. Finally, Robert Kelly from AFC Energy provided insight into the use of fuel cells to generate stationary power in South Korea. The session closed with a panel debate, in which discussion focussed on the UK's hydrogen network requirements.



## **CARISMA**

2014 marked a special year for the CARISMA conference series. CARISMA was founded in Europe and this was the first time the event was held on a different continent. South Africa was chosen for a number of reasons, mainly because they have a large quantity of the world's reserves of platinum.

The conference, which was held in the spectacular '15th on Orange' Hotel, attracted attendees from Europe, North America, Asia and Australia. Of particular note were professors Frano Barbi and Masahiro Watannabe.

From Birmingham's Centre for Hydrogen and Fuel Cell Research, the conference was attended by Scott Hardman, Amrit Chandan, Ahmad El-Kharouf, Yaxiang Lu, Mariska Hattenberger, Shangfeng Du, Kannan Ramaiyn and Arvin Mossadegh Pour. Each presented their work in a range of themes which included catalyst development, gas diffusion layers and market entry strategies.



Photo courtesy of Yaxiang Lu.

(Back) Shangfeng, Scott, Amrit, Ahmad, Kannan, (front) Mariska and Yaxiang.

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## **H<sub>2</sub>FC Supergen**

The H<sub>2</sub>FC SUPERGEN conference brought one hundred and eighty three members of the UK's hydrogen and fuel cell research community together at the University of Birmingham between the 16<sup>th</sup> and 18<sup>th</sup> of December 2014. There was significant representation of researchers working at the centre's five partner universities. Presentations and posters covered a broad range of topics including fuel cell engineering, catalyst development and progress in hydrogen storage materials. The conference dinner, on Tuesday 17<sup>th</sup> December, was held at

Edgbaston Cricket Ground and was thoroughly enjoyed by those who attended.

On the opening evening there was a poster presentation and a demonstration from UCell. UCell are a team of PhD students, lecturers and industrial partners based in the Electrochemical Innovation Lab in UCL working on electricity production from hydrogen. UCL CDT student Tom Heenan is a member of UCell. Using a mobile 3 kW polymer electrolyte fuel cell the team provides off-grid power and education for a variety of events. When working with members of the public the team aim to showcase fuel cell technology and its benefits, limitations and dangers. However, UCell's aim at this conference was not to explain fuel cell technology to attending academics, but rather to explain the importance of public engagement in science and technology. That evening their fuel cell was put to good use heating mulled wine and drinks which were enjoyed by all. UCell would like to thank Dr Aman Dhir, Tony Meadowcroft and Dr Chloe Stockford for their assistance in making this outreach activity a success.



Photo courtesy of UCell.

UCell members Josh, Tom, Erik and James showcasing their very popular hydrogen powered mulled wine process line.

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### **Low Carbon 2014**

On Wednesday 15<sup>th</sup> October 2014, 5 of Birmingham's new CDT students attended the Science Capital Low Carbon 2014 event. This was hosted at Millennium Point in Birmingham, and was based around the theme 'From Partnership to Take -off'. There were 6 talks and 2 panel discussion sessions. All were focused on sustainable transport systems, and the delivery of them, including any associated challenges or issues. This was a great event to introduce the new students to wider issues in the sustainable energy sector.

## Upcoming Events

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Here are a few events that we hope to see readers attending in the coming months. Look out for a review of these in the next issue.

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### **STFC ERC**

In March several of the Centre's students will be attending the Science & Technology Facilities Council Early Career Researchers Conference on Electrochemical Energy in Abingdon. This should offer an excellent opportunity for the researchers to gain an insight into the STFC's work, and to meet colleagues working in similar fields.

**STFCBatteries.org** 

### **FCH2 2015**

Organised by a group of collaborators including the University of Birmingham, Innovation Birmingham, BlueVine Consultants and the H<sub>2</sub>FC SUPERGEN hub, FCH2 2015, which takes place between the 19<sup>th</sup> and 21<sup>st</sup> May at Millenium Point in Birmingham. The conference represents the UK platform for fuel cell and hydrogen researchers and industry partners to meet and discuss new trends, developments and deployment issues. The conference themes encompass fuel cells, materials and processes, hydrogen production and storage, socio-economics and public outreach. Check [www.fch2.co.uk](http://www.fch2.co.uk) for more details or follow the conference organisers @FCH2conference.

**FCH2** 2015  
TECHNICAL CONFERENCE