



The
University
Of
Sheffield.

3.5 years PhD studentship, starting October 2021

Non-precious catalysts and porous media for polymer electrolyte fuel cells

Project description

Polymer electrolyte fuel cell (PEFC) is a clean technology that directly converts hydrogen fuel into electricity and produces only clean water. PEFCs are characterised by their high efficiency ($> 50\%$), rapid start-up (~ 1 s) and low operating temperatures ($< 100^\circ\text{C}$). They have been therefore the fuel cell of choice for some giant auto manufacturers to demonstrate/sell their hydrogen-powered vehicles: Toyota Mirai, Honda Clarity or Hyundai Nexa. The widespread deployment of polymer electrolyte fuel cell powered systems is however hindered by the use of costly platinum-based catalysts.

The goal of this project is thus to develop substantially cheaper but high performing materials to replace precious platinum based catalysts and other porous media. To that end, carbon foam based materials were found to be promising. To pursue this goal, you will synthesise various carbon foam based materials, characterise them and perform ex-situ and in-situ tests on them including advanced electrochemistry and laser spectroscopy. The central element of the study is to correlate the intrinsic electronic properties of the carbon foam materials (to be obtained using the latest time-resolved ultrafast spectroscopy equipment available in the Lord Porter Laser Laboratory) to the performance indicators of the fuel cell in order to continually refine the proposed materials and eventually realise more efficient PEFCs.

You will be part of an active, interdisciplinary research team at the University of Sheffield. This project will be jointly supervised by Dr Adrien Chauvet (an expert in spectroscopy), Dr Mohammed Ismail (an expert in fuel cell technology) and Prof Mohammed Pourkashanian (Head of the Energy Institute).



Eligibility

You are an enthusiastic student that has or expects to receive a 1st class or 2.1 MChem degree or equivalent in chemistry, engineering or a related subject. You are willing to work in a diverse environment, are self-motivated and have leadership abilities. This studentship is open to **home students** and **EU students** who have been residents in the UK for at least 3 years prior to the start of the studentship which will be most likely October 2021. Where possible, covering the international fees for outstanding students will be also considered.

How to apply

Deadline: 1st August 2021.

Apply by sending your CV, transcripts, a motivation letter and the contact details of at least two references to a.chauvet@sheffield.ac.uk.

For more information about the project, please contact Dr Adrien Chauvet (a.chauvet@sheffield.ac.uk) or Dr Mohammed Ismail (m.s.ismail@sheffield.ac.uk).

The University of Sheffield is a **world top 100 university** and **world top 50 most international**, situated at the edge of Sheffield's historical downtown, and only 6km away from the Peak District national park with direct train connections to London (2.5h), Manchester (1h) and Leeds (<1h).

We are looking forward to hearing from you.

Dr. Adrien Chauvet, Chemistry Department, Lord Porter Laser Laboratory
Dr Mohammed Ismail, Translational Energy Research Centre | Energy E2050
The University of Sheffield
<https://teamchauvet.com/>
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