Imperial College London  
Department of Materials  

In operando analysis of the electrochemical processes governing solid oxide fuel cell electrode degradation  

Duration: 48 months  
Supervisors: Professor Stephen Skinner (Department of Materials)

We are inviting applications for a fully funded 4-year PhD project in the Department of Materials at Imperial College London.

This funding stream is available for UK citizens and EU nationals who have spent the last five years in the UK. The studentship will cover tuition fees plus the standard maintenance stipend of £16,296 per year (this year's rate).

Oxide based electrochemical cells, such as fuel cells, used for clean energy conversion consist of multiple components, all of which operate at elevated temperatures (>500 oC). Each cell in a stack is expected to operate for periods in excess of 40,000hrs. Electrochemical cells unfortunately suffer from degradation processes that limit both performance and lifetime, and include interfacial reactions, electrical polarisation, and sintering. To fully understand these processes we will use environmental Scanning Electron Microscopy (e-SEM) to investigate the behaviour of the electrodes under operating conditions, developing capability in applying electrical load, and temperature and gas atmosphere to cells. In addition we will use our unique plasma FIB-SIMS instrument to probe diffusion at the microstructural scale, and correlate these measurements with the operando e-SEM data. We will investigate both fresh and aged samples, in partnership with our industry colleagues, and this will provide detailed models of the mechanisms driving degradation, allowing improved devices to be developed.

You will join the Centre for Doctoral Training in the Advanced Characterisation of Materials, where you will receive structured training in a number of key characterisation techniques, as part of a cohort of students. This project is joined with an industry partner.

We seek candidates for an October 2017 start. You will hold, or be expected to achieve, a Master's degree in addition to a Bachelor's degree (or equivalent) at 2:1 level (or above) in a relevant subject (e.g. Physics, Chemistry, Materials, or Engineering).

How to apply:

Applications will be handled in two stages:

Stage 1: Send a full CV, including the marks (%) for all (undergraduate) modules completed to date and including a clear description of previous research project experience, as well as a covering letter and contact details of two academic referees, to Professor Skinner (s.skinner@imperial.ac.uk) Applications that do not provide this information cannot be considered.

Stage 2: Suitable applicants will be interviewed, and if successful invited to make a formal application.

Closing date: 31st July 2017

Imperial Managers lead by example. Committed to equality and valuing diversity. We are also an Athena SWAN Silver Award winner, a Stonewall Diversity Champion, a Two Ticks Employer, and are working in partnership with GIRES to promote respect for trans people.