PhD studentship in ceramic anode materials for solid oxide fuel cells

**Department/Faculty:** Department of Materials, Faculty of Engineering  
**Duration:** 42 months from October 2019  
**Supervisors:** Dr Sivaprakash Sengodan

Applications are invited for a three and half year PhD studentship on ceramic anode materials for solid oxide fuel cells, available at Imperial College London starting in October 2019.

Solid oxide fuel cells (SOFCs) offer very high efficiency in the conversion of chemical energy in a fuel to electrical energy, and can potentially run with a variety of readily available hydrocarbon fuels. SOFCs operate at high temperature (>750 °C), though there is considerable interest in decreasing the working temperature of SOFCs to reduce costs and aging. Unfortunately, SOFC performance decreases rapidly as the operating temperature is reduced. The issue that limits the current SOFC anode performance is the use of multi-component composite systems to meet the anode requirements. Conventional SOFC anode material suffer from serious drawbacks, such as carbon build-up (coking), sulfur poisoning and low tolerance to redox cycling.

The proposed PhD project will focus on developing highly electronically conducting perovskite electrode materials that provide high performance with hydrocarbon and sulfur containing fuels in intermediate temperature (500-700 °C) solid oxide fuel cells (IT-SOFCs). The role of the PhD candidate will be to design new mixed ionic electronic conducting materials with high electrocatalytic activity for fuel oxidation. Within this area of research, you will master wet chemical methods, SOFC fabrication and measuring techniques. To gain insights into these materials advanced characterizations methods (i.e., XRD, SEM, TEM, XPS, etc.) will be applied for structural characterization of these anode materials.

Motivated prospective candidates with a Master’s degree or First degree or (equivalent) with a First Class or Upper Second in Chemistry, Materials Science, Chemical Engineering or in related disciplines are invited to apply. Prior experience in the synthesis and characterization of metal oxides, solid state chemistry and in electrochemistry are highly valued, albeit not required. Applicants should also be able to demonstrate excellent written and oral communication skills, which will be essential for collaborations in particular with theorists, disseminating the results via journal publications and attendance at international conferences.

This PhD studentship is funded by the UK’s Engineering and Physical Sciences Research Council and is open to UK home students or European students who have spent the last three years in the UK. The studentship will cover tuition fees plus the standard maintenance stipend of £16,777 (this year’s rate) per annum. **We will welcome applications from students who are not eligible for this funding but can self-fund.** Please send a full CV, including your grades, a motivation letter highlighting your background/research interests and the contact details of at least one referee to Dr. Sivaprakash Sengodan (s.sengodan@imperial.ac.uk).

The project will be jointly supervised by Dr Sivaprakash Sengodan (main contact) Professor Stephen Skinner (co-supervisor) (s.skinner@imperial.ac.uk).

Applications will be processed as received. For questions or further details regarding the project, please contact Dr Sivaprakash Sengodan, s.sengodan@imperial.ac.uk.
Closing Date: February 28, 2019

For questions regarding the admissions process, please contact Materials student office (materialsstudentoffice@imperial.ac.uk). Formal applications can be completed online but only after informal enquiries: http://www3.imperial.ac.uk/materials/research/phdopportunities while information about the Department can be found at http://www3.imperial.ac.uk/materials.

Committed to equality and valuing diversity, we are also an Athena SWAN Silver Award winner, a Stonewall Diversity Champion, a Disability Confident Employer and are working in partnership with GIRES to promote respect for trans people.

The College is a proud signatory to the San-Francisco Declaration on Research Assessment (DORA), which means that in hiring and promotion decisions, we evaluate applicants on the quality of their work, not the journal impact factor where it is published. For more information, see https://www.imperial.ac.uk/research-and-innovation/about-imperial-research/research-evaluation/