Information on Postgraduate Research Scholarship - Ref: VCS-FES-06-22

Faculty:	Engineering and Science	Department:	Computing and Mathematical Sciences
Lead Supervisor:	Dr Catherine Tonry		
Project Title:	Enhancing Electrolysis with External Fields		
Project Description:	Water electrolysis is a promising option for carbon free-production of hydrogen. The process uses electricity to split water (H_2O) molecules into Hydrogen and Oxygen gas. Hydrogen has many diverse uses from electrochemical hydrogen fuel cells, the next generation of internal combustion engines, domestic heating to jet fuel. Renewable electricity sources such as solar and wind can be used to power the electrolysis process hence, all these applications do not produce CO_2. However, a major problem is the efficiency of the electrolytic process. Hydrogen and Oxygen bubbles blanket the electrodes, creating localised discontinuities in electrical conductivity and the electrolysis process becomes self-limited. We hypothesise that external fields (ultrasound / electromagnetic), can disrupt bubbles to increase the efficiency of the process. Sonification breaks bubbles into a cloud of smaller bubbles, potentially leading to decreased electrical mean free path, hence, increased conductivity. A magnetic field generates a Lorentz force that can control the migrating H^+ and OH^- ions. External fields can also promote the extraction of bubbles through acoustic streaming and electromagnetic forces. This PhD will be computational in nature using state of the art numerical models developed at the University of Greenwich to simulate the process. For those with a Machine Learning Background there will also be opportunities to incorporate Physics Informed Machine Learning into the problem.		
Duration:	3 years, Full-Time Study or 6 years, Part-Time Study		

Bursary available (subject to satisfactory performance):
Year 1: £17,668 plus London weighting where applicable (FT) or pro-rata (PT) Year 2: In line with UKRI rate Year 3: In line with UKRI rate

In addition, the successful candidate will receive a contribution to tuition fees equivalent to the university's Home rate, currently £4,596 (FT) or pro-rata (PT), for the duration of their scholarship. International applicants will need to pay the remainder tuition fee for the duration of their scholarship.

This fee is subject to an annual increase.

Person Specification of Essential (E) or Desirable (D) requirements:

Criteria:	E or D
Education and Training:	

• 1st Class or 2nd class, First Division (Upper Second Class) honours degree or a taught master's degree with a minimum average of 60% in all areas of assessment (UK or UK equivalent) in a relevant area to the proposed research project	E
• For those whose first language is not English and/or if from a country where English is not the majority spoken language (as recognised by the UKBA), a language proficiency score of at least IELTS 6.5 (in all elements of the test) or an equivalent UK VISA and Immigration secure English Language Test is required, if your programme falls within the faculty of Engineering and Science a language proficiency score of at least IELTS 6.5 overall with a minimum of 6.0 in all elements of the test or an equivalent UK VISA and Immigration secure English Language Test is required. Unless the degree above was taught in English **and** obtained in a majority English speaking country, e.g. UK, USA, Australia, New Zealand, etc, as recognised by the UKBA.	E
Experience & Skills:	
• Previous experience of undertaking research (e.g. undergraduate or taught master's dissertation)	E
• Experience in programming in C, C++ or Fortran	D
• Experience of numerical modelling techniques, e.g. computational fluid dynamics, computational chemistry, or molecular dynamics	D
• Experience of numerical modelling packages, e.g. OpenFOAM, COMSOL, ANSYS, STAR-CCM+ or equivalent	D
Personal Attributes:	
• Understands the fundamental differences between a taught degree and a research degree in terms of approach and personal discipline/motivation	E
• Able to, under guidance, complete independent work successfully	E
Other Requirements:	
• This scholarship may require Academic Technology Approval Scheme approval for the successful candidate if from outside of the EU/EEA	E
• The scholarship must commence before 30th *June 2023*	E

Closing date for applications:	*midnight UTC on 8/5/2023*
For further information contact:	**Dr Catherine Tonry (c.tonry@gre.ac.uk)**

Making an application:
Please read this information before making an application. Information on the application process is available at: https://www.gre.ac.uk/research/study/apply/application-process. Applications need to be made online via this link. **No other form of application will be considered**.

All applications **must include** the following information. **Applications not containing these documents will not be considered.**
- **Scholarship Reference Number (Ref)**– included in the personal statement section together with your personal statement as to why you are applying
- **a CV including 2 referees** *
- **academic qualification certificates/transcripts and IELTs/English Language certificate if you are an international applicant or if English is not your first language or you are from a country where English is not the majority spoken language as defined by the UK Border Agency** *

upload to the qualification section of the application form. Attachments must be a PDF format.

Before submitting your application, you are encouraged to liaise with the Lead Supervisor on the details above.