Diversity in Engineering PhD Scholarship
The University of Edinburgh

Clean Water from Clean Energy

The Diversity in Engineering PhD Scholarship has been created by the University of Edinburgh for the first time in 2010 to promote gender and cultural diversity awareness in the engineering discipline. The stipend is linked to an extracurricular School of Engineering wide activity of diversity that the recipient will lead. The studentship is available for a candidate of any nationality with a background in environmental/ process/chemical/energy engineering, physics, chemistry or environmental science (or equivalent) interested in water treatment and renewable energy – and an interest in the promotion of equality & diversity.

Aims of this Project

The technology addresses the issue of providing safe drinking water in remote areas where water quality and quantity are highly variable and energy supply is unreliable or unavailable. The water quality issues of concern are dissolved contaminants such as fluoride, nitrate and arsenic. The goal of this PhD project is to further develop a renewable energy (RE) powered electrodialysis reversal (EDR) system – nicknamed REEDR – for autonomous treatment of drinking water that can overcome shortfalls of reverse osmosis (RO) technology in the desalination of brackish and high salinity waters.

The specific aims are to:

- Commission a new system and determine energy efficiency and removal of dissolved contaminants by this system
- Investigate the impact of fluctuating energy and electrode reversal on fouling prevention
- Determine advantages of REEDR for brackish water over the more established RO technology, in the areas of:
    i) reduced maintenance by controlling fouling (blocking) of the membranes;
    ii) increased efficiency (water output per unit energy consumed); and
    iii) system robustness to energy fluctuations.
- Identify safe operating window for REEDR when operating from fluctuating renewable energy power supplies.
- Investigate energy sacrifice and performance gain of possible pre-treatment stages.
- Develop robust system prototype ready for long term testing in remote field locations including developing countries and participate in such a field trial.
- Make a significant contribution to the promotion of diversity in the School as well as the Engineering community.

The project is embedded into a range of activities at Edinburgh and Heriot-Watt where renewable energy powered membrane systems are developed and tested. The team consists of 5-6 PhDs working in this specific area at present. The project has received initial proof of concept funding from Scottish Enterprise.

Facilities

The University of Edinburgh as well as the School of Engineering is a successful host to a large number of PhD Candidates through their graduate school with a vast range of courses in career development for students on offer. Research facilities are located in the new William Rankine Building (Schäfer) with the environmental engineering laboratories being equipped with new and cutting edge facilities.
Heriot-Watt University – also located in the city of Edinburgh – is collaborating on this project and provides the energy and systems engineering research base for this project, already hosting a number of solar- and wind-powered filtration systems. This collaborative research represents one of the research strands being pursued by the newly formed Scottish Institute for Solar Energy Research (SISER) – see: http://siser.eps.hw.ac.uk/research/water.html. The joint Edinburgh and Heriot-Watt team engages in a yearly research retreat that facilitates inter-group collaboration as well as personal and career development.

Candidate

Excellent, self-motivated candidates are sought who enjoy working in an international and interdisciplinary research team. A first class honours or upper second is the minimum qualification requirement. Independent work, strong self-motivation, eagerness to publish in high ranking journals, awareness of equality and diversity, good team spirit and excellent communication skills are important assets of the successful candidate. Experience in industry and/or awareness of international development issues will be beneficial.
In the spirit of this scholarship applications are open to all nationalities and candidates are invited to outline their interest and intended engagement in diversity promotion.
Interested candidates are encouraged to prepare a brief 2-3 page research proposal outlining their research motivation and citing current literature on the topic and sending curriculum vitae (including three academic referees and publication list) as well as academic transcripts (preferably via email) to:

Professor Andrea Schäfer, Chair of Environmental Engineering, School of Engineering, The University of Edinburgh, William Rankine Building, The King's Buildings, Edinburgh EH9 3JL, UK
Tel +44(0) 131 650 7209 - Fax +44(0) 131 650 6781 Email Andrea.Schaefer@ed.ac.uk
Professor Bryce Richards, Professor in Solar Energy Systems, School of Engineering and Physical Sciences, James Nasmyth Building, Heriot-Watt University, Edinburgh, EH14 4AS, United Kingdom
Tel +44(0) 131 451 3614 - Fax +44(0) 131 451 3129 email: B.S.Richards@hw.ac.uk