Newcastle University PhD Studentship award

Title
Harnessing microbially mediated redox processes for sustainable water treatment

Value of award
Full UK/EU fees (eligibility criteria applies to EU students) and annual living allowance of £14,777 (at the 2018/19 UKRI rate)

Number of awards
1

Start date and duration
September 2019 for 3.5 years

Application closing date
31st January 2019

Overview
Providing clean water for all remains one of the main challenges for humanity and thus is one of the UN's Sustainable Development Goals (SDG6). In this project, we will address this challenge by investigating the potential of a recently discovered process involving natural sedimentary minerals to sustainably treat water. The process relies on the production of hydroxyl radicals to degrade organic pollutants during the reaction of reduced iron in clay minerals with oxygen and the sustainable regeneration of clay mineral reduced iron by microbes under anoxic conditions. However, it is currently unknown whether treatment efficiency can be maintained over several cycles of use and re-generation under realistic environmental conditions. Using mesocosm experiments, we will evaluate the sustainability of the treatment and regeneration processes; monitor the evolution and efficiency of the microbial communities driving clay mineral reactivity regeneration (via DNA/RNA metabarcoding); and examine the suitability of ecological indicators and analytical techniques as novel, low-cost tools for performance monitoring. This interdisciplinary project will provide the proof of concept that a low energy, low input (waste) water treatment system harnessing microbially mediated redox processes of iron-bearing clay minerals can be operated sustainably and at scale. The overall aim is to demonstrate a feasible water treatment approach for high, middle, and low-income countries alike.

Sponsor
Engineering and Physical Sciences Research Council (EPSRC)

Name of supervisor(s)
Dr Anke Neumann, School of Engineering
Dr James Kitson, School of Natural and Environmental Sciences

Eligibility Criteria
Your background should be in environmental chemistry, geochemistry, microbiology or a related discipline (minimum 2:1 honours degree or international equivalent), with experience in the laboratory. You should be motivated to engage in interdisciplinary work and to conduct extensive laboratory work, including aqueous and solid phase analyses (HPLC, ICP-MS, XRD, Mössbauer
spectroscopy) and molecular biology techniques (DNA/RNA sequencing, metabarcoding). Experience in any of these techniques would be advantageous.

The award is available to UK/EU applicants only. Depending on how you meet the EPSRC’s eligibility criteria, you may be entitled to a full or a partial award.

How to apply
You must apply through the University’s online postgraduate application system. To do this please ‘Create a new account’.

All relevant fields should be completed, but fields marked with a red asterisk must be completed. The following information will help us to process your application. You will need to:

- insert the programme code 8040F in the programme of study section
- select ‘PhD Civil Engineering (Environmental)’ as the programme of study
- insert the studentship code ENG037 in the studentship/partnership reference field
- attach a covering letter and CV. The covering letter must state the title of the studentship, quote reference code ENG037 and state how your interests and experience relate to the project
- attach degree transcripts and certificates and, if English is not your first language, a copy of your English language qualifications

You should also send your covering letter and CV to Dr Anke Neumann.

Contact
For further details, please contact Dr Anke Neumann (anke.neumann@ncl.ac.uk) or Dr James Kitson (james.kitson@newcastle.ac.uk).