UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Nuclear Fuel Dissolution (2 roles)

Faculty of Engineering and Physical Sciences

Salary: Grade 7 (£33,797 – £40,322 p.a.)

Reference: EPSPE1002

Closing date: 10 November 2019

Fixed-term for 24 months

We will consider flexible working arrangements

Research Fellow in Nuclear Fuel Dissolution (2 roles)
School of Chemical and Process Engineering

Are you an experienced and ambitious researcher looking to tackle one of the UK's biggest challenges? Do you have an interest in nuclear fuel and waste management? Do you want to further your career in one of the UK's leading research intensive Universities?

Two opportunities have arisen to work at the School of Chemical and Process Engineering (CAPE); initially on Phase 2 of the UK Government's Nuclear Innovation Programme on recycling (run through BEIS) and then on EPSRC's ATLANTIC Programme. The common theme between the two programmes is investigation into several aspects related to nuclear fuel dissolution, as part of a future recycle process.

To deliver this programme we are building on a close knit community of expertise that was created in Phase 1 of the NIP on recycle, EPSRC's PACIFIC programmes, as well a number of EU Framework programmes; which dealt with recycling of nuclear fuel and bring together a team of over 20 experts from 12 leading universities in the field of nuclear fission.

Our team has already established close collaborative links with EU FP7 programmes such as SACSESS and ASGARD; strengthening the breadth and depth of expertise and allowing a continuing presence on the H2020 programme GENIORS.
The work involves investigating:

- Chemical conditioning of dissolution liquors prior to feeding forward into a separation process
- Physical conditioning of dissolution liquors prior to feeding forward into a separation process
- Investigating the scale up effect on fuel dissolution, focusing on single fuel pellets
- Developing electrochemical sensors give real time data on speciation

For the first two aspects (linked to NIP Phase 2), CAPE's role is to work closely with NNL and Lancaster University on the conditioning of liquors that result from dissolution of nuclear fuel. Conditioning is required ensure the removal of certain species (e.g. iodine) before the liquor is fed to a solvent extraction stage. Removal of solids is also a factor. The current process is to do this batchwise, but this project will look at


developing a continuous process, probably using a NOx sparge and tested on the 100ml's scale. The aim is to identify an alternative to centrifugation for removing insoluble fission products and PuO2, as well as fuel assembly fines. The end point will be the proof of concept of the chosen technology in its ability to remove solids, with a maximum size of 1 to 5microns. Solids of similar type to those being used to test tolerance in centrifugal contactors will be used, with additional experiments using uranium and or cerium oxide as a surrogate for Pu.

For the latter two aspects (linked to ATLANTIC), the work will investigate the scale up effect of fuel dissolution, focusing on the kinetic effects of reaction conditions on single pellets. Initially, work will be carried out on a simulant pellet (SIMFUEL) where the stoichiometry of the dissolution will be tested by measuring reaction rates with varying nitric/nitrous acid concentrations. Dissolution of oxide fuel is known to be sensitive to nitrous acid concentration. Will then continue with uranium pellets, working in our newly commissioned uranics laboratory. We will also link into work at the University of Edinburgh, where an electrochemical sensor will be developed to give real time data on speciation. The end point of the task will be a kinetic equation for dissolution that will link back to the detailed tests in Lancaster.

What does the role entail?

As a Research Fellow your main duties will include:

- Constructing and operating laboratory scale rigs and working with modellers to cross link data for validation purposes;
- Managing aspects of the project and co-ordinating work with internal academic staff and external collaborators;
- Developing research objectives and proposals and contributing to setting the direction of the research project and team including preparing proposals for funding in collaboration with colleagues;
- Assisting in the training of undergraduate and postgraduate taught students by co-supervising research projects in related areas;
- Uphold and enhance the internationally excellent reputation of the School by building collaborations with other academics, external stakeholders and users of research outputs;
- Work within and apply the standard operating procedures, health and safety regulations and quality assurance procedures of the School;

- Generating and pursuing independent and original research ideas in the appropriate subject area;
- Evaluating methods and techniques used and results obtained by other researchers and to relate such evaluations appropriately to your own work;
- Communicating or presenting research results through publication or other recognised forms of output;
- Preparing papers for publication in leading international journals and independently writing reports;
- Preparing presentations to disseminate research findings to both the academic and industrial communities, and to the wider public, at both a national and international level;
- Working both independently and also as part of a larger team of researchers, engaging in knowledge-transfer activities where appropriate and feasible;
- Maintaining your own continuing professional development and acting as a mentor to less experienced colleagues as appropriate.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

What will you bring to the role?

As a Research Fellow you will have:

- A PhD in a relevant engineering or physical science subject, or an established research track record from industry;
- A strong background in laboratory and/or pilot scale experimentation in a university research laboratory environment;
- Evidence of involvement in experimental research projects on aqueous chemistry of heavy metals, ideally lanthanides or actinides;
- Experience in the supervision of students and postgraduate researchers;
- Excellent time management and planning skills; with the ability to meet tight deadlines, work effectively under pressure and work flexibly, where necessary, to fulfil the needs of the research project;
- Excellent interpersonal and communication skills, including evidence of having presented/published work at a high academic level;
- A proven ability to work well both individually and as part of a team;
- A strong commitment to your own continuous professional development.

How to apply

You can apply for this role online; more guidance can be found on our How to Apply information page. Applications should be submitted by 25th October 2019, **23.59** (UK time) on the advertised closing date.

Contact information

To explore the post further or for any queries you may have, please contact:

Professor Bruce Hanson, Professor of Nuclear Process Engineering
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Email: b.c.hanson@leeds.ac.uk

Additional information

Faculty and School Information
Further information is available on the research and teaching activities of the School of Chemical and Process Engineering.

A diverse workforce

The Schools in the Faculty of Engineering & Physical Sciences are proud to have been awarded the Athena SWAN Bronze or Silver Award from the Equality Challenge Unit, the national body that promotes equality in the higher education sector. Our equality and inclusion webpage provides more information.

Working at Leeds
Find out more about the benefits of working at the University and what it is like to live and work in the Leeds area on our Working at Leeds information page.

Candidates with disabilities
Information for candidates with disabilities, impairments or health conditions, including requesting alternative formats, can be found on our Accessibility information page or by getting in touch with us at disclosure@leeds.ac.uk.

Criminal record information

Rehabilitation of Offenders Act 1974

A criminal record check is not required for this position. However, all applicants will be required to declare if they have any ‘unspent’ criminal offences, including those pending.

Any offer of appointment will be in accordance with our Criminal Records policy. You can find out more about required checks and declarations in our Criminal Records information page.