UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Microfluidics and Crystallisation, School of Chemistry

Salary: Grade 7 (£32,548 - £38,833 p.a.)

Reference: MAPCH1079

Closing date: 1 March 2018

Fixed-term for two years, with possible extension

We will consider job share/flexible working arrangements

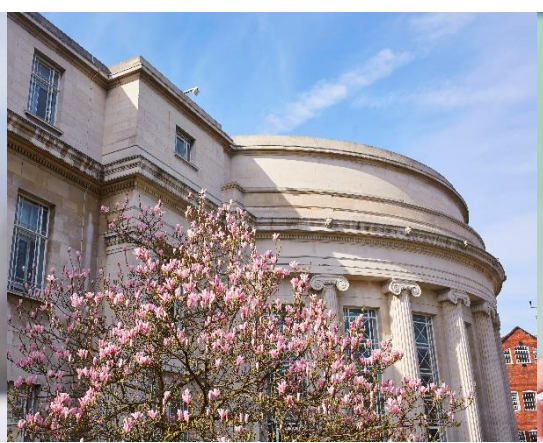
Research Fellow in Microfluidics and Crystallisation
School of Chemistry, Faculty of Mathematics and Physical Sciences

Are you an ambitious researcher looking for your next challenge? Do you have an established background in microfluidics? Do you want to further your career in one of the UK's leading research intensive universities?

We are looking for an outstanding Research Fellow to join our collaborative project between Professor Fiona Meldrum in the School of Chemistry and Professor Hugo Christenson in the School of Physics and Astronomy. The project will exploit microfluidic and confined systems to study and interact with crystallisation processes with outstanding spatial and temporal resolution, and the position will be funded by an EPSRC Platform Grant.

Understanding the mechanisms which govern crystallisation promises the ability to inhibit or promote crystallisation as desired, and to tailor the properties of crystalline materials towards a huge range of applications. Biomineralisation provides a perfect precedent for this approach, where organisms achieve control currently unparalleled in synthetic systems. This is achieved because mineralisation occurs within controlled environments in which an organism can interact with the nascent mineral. Thanks to recent advances in microfabrication techniques and analytical methods we finally have the tools required to bring such control to the laboratory. You will be involved in using flowing droplet devices to investigate and control nucleation, and using static chambers to interact with crystallisation processes over longer length and time scales to achieve spatio-temporal control to rival that in biomineralisation.

You will have a PhD (or will have submitted your thesis prior to taking up the appointment) in Physical Sciences or a closely related field, and you will have a background in microfluidics and have experience in the design and manufacture of microfluidic systems.


What does the role entail?

As a Research Fellow your main duties will include:

- Designing, planning and conducting a programme of investigation, in consultation with Professor Fiona Meldrum and Professor Hugo Christenson;
- Organising and carrying out experimental work using droplet microfluidic systems to investigate the crystallisation of inorganic and organic substances;
- Organising and carrying out experimental work using microfluidic-based static chambers to investigate crystallisation processes;
- Designing and manufacturing microfluidic systems for crystallisation studies;
- Developing strategies for studying crystallisation on-chip using a range of analytical techniques;
- Analysing and interpreting data from techniques such as Raman microscopy, X-ray Diffraction and electron microscopy in collaboration with other members of the research group;
- Using synchrotron-based methods for characterising crystallisation on-chip;
- Generating independent and original research ideas and methods;
- Making a significant contribution to the dissemination of research results by publication in leading peer-reviewed journals, and by presentation at national and international meetings;
- Working independently and as part of a larger team of researchers, both internally and externally to develop new research links and collaborations and engage in knowledge transfer activities where appropriate;
- Contributing to the supervision of junior researchers and PhD students and acting as a mentor to less experienced colleagues;
- Evaluating methods and techniques used and results obtained by other researchers and relating such evaluations to your own research;
- Contributing to, and encouraging a safe working environment.

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 (or will have submitted your thesis prior to taking up the appointment) in Physical Sciences or a closely allied discipline;
- A strong background in droplet microfluidic systems;
- Experience in the design and manufacture of microfluidic systems
- Experience in conducting analysis on-chip;
- The ability to design, execute and write up research independently;
- A developing track record of peer reviewed publications in international journals;
- Excellent communication skills, both written and verbal and the ability to communicate your research at national and international conferences;
- Good time management and planning skills, with the ability to meet tight deadlines;
- A proven ability to work well both independently and as part of a team;
- A strong commitment to your own continuous professional development, including learning new experimental and analytical methods.

You may also have:

- Experience in experimental crystallisation;
- Experience in characterisation techniques used for studying crystallisation processes such as X-Ray diffraction, IR spectroscopy, and electron microscopy.

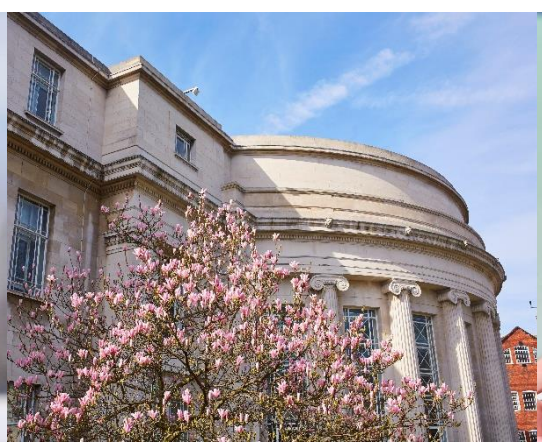
How to apply

You can apply for this role online; more guidance can be found on our How to Apply information. Applications should be submitted by **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 Fiona Meldrum, Professor of Inorganic Chemistry
Tel: +44 (0)113 343 6414
Email: F.Meldrum@leeds.ac.uk


Additional information

About the project

The ability to control crystallisation processes promises the generation of nanomaterials with target optical and catalytic properties, the production of pharmaceuticals with the desired polymorph and morphology, the prevention of scale deposition in boilers and oil wells, control over weather processes and ice formation in the atmosphere, and bone and teeth regeneration. To address this challenge, however, it is essential that we understand how crystals form and grow. Indeed, while crystallisation is a topic which has been studied for centuries, it is only recently – with the development of analytical techniques which make it possible to characterise the molecular-scale processes which underlie these phenomena – that we have been able to make a start in understanding these complex processes.

This project will use physical environments – specifically confined volumes – to control crystallisation processes. We will use segmented-flow (droplet) microfluidic devices as an experimental platform that will enable us to study crystallisation with unprecedented degrees of spatial and temporal regulation. Indeed, with their ability to generate huge numbers of droplets, to support the rapid mixing of reagents, to provide excellent time resolution, support multi-step reactions and offer impurity-free environments, segmented-flow microfluidic devices provide ideal environments in which to study crystallisation – and enable experiments which simply could not be performed in bulk solution. For example, by employing a pico-injector (Li et al *Small*, (2017) 13, 1702154) we have shown that we can achieve highly reproducible precipitation of calcium carbonate within droplets. Offering insight into the control mechanisms that operate in biomineralisation processes we will also study crystallisation within a “Crystal Hotel”, which comprises a set of distinct rooms of controlled size (down to 200 nm) within a single device, with each room representing a different stage in the reaction (Gong et al, *Adv. Mater*, (2015), 27, 7395–7400; Kim et al, *Angew Chem*, (2017), 56**,** 11885-11890). This provides a basic model of the privileged environments in which biominerals form and mimics many of the features – such as confinement, flow, and orientation that occurs in biology. Coupling synchrotron-based techniques such as FTIR (Li et al *Lab Chip*, (2017), **17**, 1616-1624) and XRD to microfluidic-based systems further promises unprecedented insight into the mechanisms of crystal nucleation and growth.


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.

A diverse workforce
The Faculty of Mathematics and Physical Sciences is proud to have been awarded the Athena SWAN Bronze 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.

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 on our Criminal Records information page.