UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Synthesis and Characterisation of Metal-organic Frameworks, Faculty of Engineering and Physical Sciences

Salary: Grade 7 (£41,064 – £48,822 p.a.) Due to funding restrictions, an appointment will not be made higher than £43,482 p.a.

Reporting to: Dr Andrea Laybourn

Closing date: Friday 03 July 2026

Reference: EPSCH1131

Fixed term (36 months - to complete specific time limited work).

Location: Leeds main campus

We are open to discussing flexible working arrangements.

Research Fellow in Synthesis and Characterisation of Metal-Organic Frameworks,
Institute of Process Research and Development (iPRD), School of Chemistry.

Are you an experienced and ambitious researcher looking for your next challenge? Do you want to further your career in one of the UK's leading research-intensive Universities? Are you looking to apply your skills in synthesis and characterisation of metal-organic frameworks to the development of new stimuli-responsive materials?

Overview of the Role

Metal-organic frameworks (MOFs) have gained substantial attention from both academic and industrial sectors because of their exceptional porosity and their tailorable structures and properties. Use of MOFs in areas such as catalysis (e.g. CO_2 valorisation) and healthcare (including biomarker sensing and drug delivery) offer great promise for tackling major global challenges in energy, pollution reduction, and the diagnosis and treatment of diseases.

This project, funded through a UKRI Future Leaders Fellowship, will:

(i) build on our development of microwave flow reactor platforms for the discovery, optimisation, and scale-up of MOFs specifically targeting stimuli-responsive materials with new structures and particle characteristics;
(ii) deliver new understanding of MOF self-assembly processes and structure-property relationships using a range of in-, on- and off-line characterisation techniques including X-ray and electron diffraction, electron microscopy, IR and UV-vis spectroscopies, and gas sorption.

By combining MOF synthesis platforms (including one integrated with inline analysis to probe self-assembly mechanisms) with comprehensive structural characterisation, this project will fast-track the development of high-performance MOFs and overcome challenges in reproducibility, unlocking their commercial exploitation.

We are seeking a Research Fellow to lead the synthesis and characterisation of new stimuli-responsive metal-organic frameworks (MOFs), using both flow and microwave

reactor platforms and complementary experimental approaches. A major part of this role will be the design and execution of synthetic strategies to produce novel MOFs, followed by detailed characterisation to understand their structures, properties, and functional behaviour.

In parallel, you will investigate MOF nucleation and crystallisation mechanisms, measuring *in situ* formation and growth rates under both conventional and microwave heating. You will develop and apply kinetic models and compare reaction pathways across different heating regimes to build a comprehensive understanding of how structure and function emerge during synthesis.

You will employ advanced characterisation techniques, including, where appropriate, X-ray atomic pair distribution function (PDF) analysis, total/diffuse scattering, and electron diffraction (ED), alongside more routine X-ray diffraction.

You will work closely with a Research Fellow developing automated flow microwave platforms, as well as with PhD researchers. Together, you will integrate experimental data and mechanistic understanding into evolutionary algorithms and optimisation workflows to accelerate the discovery of high-performance MOFs. You will also collaborate with colleagues across the Institute for Process Research and Development (iPRD) and the School of Chemistry at the University of Leeds to establish these capabilities towards MOF production.

The role includes dedicated time at major facilities such as the Flow-XI facility (Leeds), Diamond Light Source, and the National Electron Diffraction Facility (Warwick). As this role is funded by Dr Andrea Laybourn's UKRI Future Leaders Fellowship, you will be provided with opportunities for travel to partner universities and there is financial support to attend national and international conferences and training courses.

You will have a PhD in Chemistry, Materials Science, Physics, or a related discipline, with experience in the synthesis of MOFs and their characterisation using X-ray diffraction techniques. You will bring a demonstrable track record of designing and executing synthetic strategies, analysing crystallographic data and developing insight into materials behaviour/properties.

Experience in either powder or single-crystal X-ray diffraction is essential for this role. Experience with *in situ* characterisation, mechanistic studies, or advanced diffraction-based methods such as electron diffraction, pair distribution function (PDF)

analysis or total/diffuse scattering would be highly advantageous, but these are not prerequisites. Experience with flow chemistry or microwave technologies would also be beneficial, though are optional. As part of the role, you will have the opportunity to train on new techniques. This post would be ideal for an ambitious, curious, and innovative researcher who enjoys working in a diverse and interdisciplinary team, is excited to learn new skills, and is keen to develop new experimental capabilities. You should be motivated to share knowledge openly and support and train others within the group.

Main duties and responsibilities

- Designing and executing synthetic strategies for the preparation of new stimuli-responsive metal-organic frameworks (MOFs) using a range of experimental approaches, including batch, flow, and microwave platforms;
- Carrying out detailed structural and functional characterisation of synthesised MOFs, including the analysis of X-ray diffraction data and, where appropriate, the use of advanced methods such as PDF analysis, total/diffuse scattering, and electron diffraction;
- Investigating MOF nucleation and crystallisation mechanisms;
- Actively engaging with collaborators, including spending time at partner facilities at appropriate stages of the project;
- Generating and pursuing independent and original research ideas in the appropriate research area;
- 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;
- Evaluating methods and techniques used and results obtained by other researchers and to relate such evaluations appropriately to your own research;
- Making a significant contribution to 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;
- Maintaining your own continuing professional development and acting as a mentor to less experienced colleagues as appropriate;

- Contributing to the training of both undergraduate and postgraduate students, including assisting with the supervision of projects in areas relevant to the project.

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.

Qualifications and skills

Essential

- A PhD (or have submitted your thesis before taking up the role) in Chemistry, Materials Science, Physics or a closely allied discipline;
- A strong background in synthesis of metal-organic frameworks (MOFs);
- Substantial experience in advanced X-ray diffraction techniques and analysing crystallographic data for investigating structure and functional behaviour;
- Good time management and planning skills, with the ability to meet tight deadlines and manage competing demands effectively without close support;
- 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;
- A proven ability to work well both independently and in a team;
- A strong commitment to your own continuous professional development.

Desirable

- Experience of pursuing external funding to support research;
- Experience in microwave and/or flow technologies;
- Experience in X-ray atomic pair distribution function (PDF) analysis, total/diffuse scattering, or electron diffraction (ED);
- Experience with experimental methods for investigating mechanistic behaviour.

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 **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:

Dr Andrea Laybourn, UKRI Future Leaders Fellow and Associate Professor
Email: A.Laybourn@leeds.ac.uk

Additional information

Faculty and School Information
Further information is available on the research and teaching activities of the Faculty of Engineering & Physical Sciences, and the School of Chemistry.

Working at Leeds
We are a campus-based community and regular interaction with campus is an expectation of all roles in line with academic and service needs and the requirements of the role. We are also open to discussing flexible working arrangements. To find out more about the benefits of working at the University and what it is like to live and work in the Leeds area visit our Working at Leeds information page.

A diverse workforce
As an international research-intensive university, we welcome students and staff from all walks of life and from across the world. We foster an inclusive environment where all can flourish and prosper, and we are proud of our strong commitment to student education. Within the Faculty of Engineering and Physical Sciences we are dedicated to diversifying our community and we welcome the unique contributions that individuals can bring, and particularly encourage applications from, but not limited to Black, Asian and ethnically diverse people; people who identify as LGBT+; and people with disabilities. Candidates will always be selected based on merit and ability.

The Faculty of Engineering and Physical Sciences are proud to have been awarded the Athena SWAN 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.

Information for disabled candidates
Information for disabled candidates, impairments or health conditions, including requesting alternative formats, can be found under the 'Accessibility' heading on our How to Apply information page or by getting in touch by emailing HR via hr@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.

Salary Requirements of the Skilled Worker Visa Route
Please note that this post may be suitable for sponsorship under the Skilled Worker visa route but first-time applicants might need to qualify for salary concessions. For more information, please visit the Government's Skilled Worker visa page.

For research and academic posts, we will consider eligibility under the Global Talent visa. For more information, please visit the Government's page, Apply for the Global Talent visa.