UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Terahertz Laser Spectroscopy, Faculty of Engineering

Salary: Grade 7 (£33,199 – £39,609 p.a.)

Reference: ENGEE1096

Closing date: 26 August 2019

Fixed-term for 3 years

We will consider flexible working arrangements

Research Fellow in Terahertz Laser Spectroscopy
School of Electronic and Electrical Engineering, Faculty of Engineering

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

This project supports a recently awarded £1.5M UKRI Future Leaders Fellowship programme, which aims to develop the first high-sensitivity terahertz-frequency (THz) laser systems for use in molecular spectroscopy. This will underpin future studies of gas-phase reaction processes within the Earth's upper atmosphere, and industrial sensing applications. The THz band of the electromagnetic spectrum lies between the infrared and microwave regions, and could offer the potential to perform speciated measurements of key atmospheric reaction products (e.g., peroxy radicals) that cannot readily be achieved using conventional instruments. Until recently, however, THz systems have been too large and complex for use outside specialised laboratories, and their sensitivity and frequency-precision have been too poor for use in reaction studies.

In this project, you will develop the first THz-frequency cavity-enhanced and multi-pass gas-phase spectroscopy systems, using quantum-cascade lasers (QCLs), developed at the University of Leeds. These devices are compact, yet high-powered sources of coherent THz radiation, providing thousands of times higher THz intensity than any other solid-state device. You will design, construct and characterise custom gas cells and optics, and develop THz-QCL-based gas-spectroscopy systems, delivering the sensitivity required for atmospheric chemistry studies. You will also undertake a theoretical analysis of atmospheric reactions and predict THz system response. You will work within an interdisciplinary team of early-career academics, research fellows and postgraduate researchers in both the School of Electronic and Electrical Engineering and the School of Chemistry.

You will have a strong background in Analytical, Atmospheric or Physical Chemistry, Chemical Engineering, or a related discipline. You will have a proven track-record in developing high-sensitivity cavity-enhanced laser spectroscopy or cavity-ringdown spectroscopy systems, together with an enthusiastic, proactive approach to research within an interdisciplinary team.

What does the role entail?

As a Research Fellow, your main duties will include:

- Developing multi-pass and cavity-enhanced THz spectroscopy systems;
- Designing custom gas cells and system optics;
- Configuring measurement instrumentation (including data acquisition and analysis hardware, motion controllers, mass-flow controllers and lock-in amplifiers), and programming instrumentation control software in LabVIEW, MATLAB or Python;
- Performing system sensitivity characterisation, using calibration gases;
- Using molecular spectroscopy catalogue data and reaction-kinetic models to predict THz system response;
- Generating and pursuing independent and original research ideas in the appropriate subject 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 work;
- Preparing papers for publication in leading international journals and disseminating research results through other recognised forms of output;
- 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;
- 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.

What will you bring to the role?

As a Research Fellow you will have:

- A PhD (or close to completion) in Atmospheric, Analytical or Physical Chemistry, Chemical Engineering, or a closely allied discipline;
- Extensive experience of developing high-sensitivity cavity-enhanced absorption spectroscopy or cavity ring-down spectroscopy systems;
- A strong background in laser spectroscopy of gas phase species;
- A strong track-record in new instrumentation development, and experimental hardware control using LabVIEW, MATLAB or similar;
- Good time management and planning skills, with the ability to meet tight deadlines and work effectively under pressure;
- A proven track record of peer-reviewed publications in high impact factor journals;
- Excellent written and verbal communication skills including presentation skills;
- Proven ability to manage competing demands effectively, responsibly and without close support;
- A proven ability to work well both individually and in a team;
- A strong commitment to your own continuous professional development.

You may also have:

- Experience of THz laser techniques, or quantum-cascade laser applications;
- Experience of analysis of UV-pumped photolysis reactions;
- Experience of experimental or theoretical research in atmospheric chemistry;
- Experience of modelling gas-phase reaction kinetics, and/or molecular dynamics;
- Experience of assisting PhD students and postdoctoral colleagues with their research;
- Experience of pursuing external funding to support research.

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 Alexander Valavanis, UKRI Future Leaders Fellow
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Email: a.valavanis@leeds.ac.uk

Additional information

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

A diverse workforce
The Faculty of Engineering is 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.

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.