

THE UNIVERSITY OF MANCHESTER
PARTICULARS OF APPOINTMENT
FACULTY OF SCIENCE & ENGINEERING
SCHOOL OF MATERIALS
DIVISION OF XRAY IMAGING
RESEARCH ASSOCIATE: IMAGING VOLCANIC PROCESSES ON A SYNCHROTRON
VACANCY REF: S&E-10519

Salary: Grade 6 £31,604 to £38,833 per annum according to experience

Hours: Full time

Duration: Fixed term from 1 October 2017 until 30 September 2018

Location: Harwell, Oxfordshire

Enquiries about the vacancy, shortlisting and interviews:

Name: Professor Peter Lee

Email: peter.lee@manchester.ac.uk

BACKGROUND

The University of Manchester: Prof. Lee's Group

You will work in Prof. Peter D. Lee's Group based in the offices and laboratories at the Research Complex at Harwell (RCaH, <http://www.rc-harwell.ac.uk>), Rutherford Appleton Laboratory (RAL), in Oxfordshire. The group's research projects are strongly linked to the large facilities at the Harwell Campus, including Diamond Light Source, ISIS Neutron source and the Central Laser Facilities.

You will be employed by the School of Materials at The University of Manchester (UoM), which is a world-renowned centre of excellence. The School of Materials is the largest academic Materials department in the United Kingdom. It is an internationally recognized centre of excellence in materials research with activities across a broad spectrum of structural and functional materials. Prof Lee directs a group of ca. 20 post-doctoral researchers, PhD students, support staff and students developing X-ray synchrotron and laboratory source imaging, image quantification and image based multi-scale modelling techniques. These techniques are applied to help address research challenges ranging from assessing novel materials for joint replacements through to aero engine applications.

Prof. Lee also co-directs the Manchester X-ray Imaging Facility (MXIF, www.mxif.manchester.ac.uk), which is based at Harwell; the MXIF was awarded the 2013 Queen's Anniversary Prize for contributions to New Techniques in X-Ray Imaging of Materials Critical for Power, Transport and Other Key Industries. The MXIF combines a wide array of facilities, ranging from state-of-the-art μ CT laboratory machines to the Diamond-Manchester Branchline and supports over 90 industries, 35 UK universities, and scientists from 25 countries worldwide. In addition to the beamline, the MXIF has a wide range of laboratory CT machines from the nano to macro scale, with two based at Harwell and the rest in Manchester. The MXIF is led by Prof. Lee at the RAL site and Prof. Phil Withers in Manchester. You will interact with a wide range of academics from Manchester, other universities, and industrial researchers from around the world, and will be expected to regularly travel to Manchester and the Industrial Collaborators.

JOB DESCRIPTION

Your core role will be to apply synchrotron, laboratory x-ray source and other modalities to image key phenomena in volcanology. Although this will be your core focus, you will also assist in other activities in the group. You will use bespoke *in situ* rigs (e.g. the P2R *in situ* press and Alice high temperature furnace) to quantify the three-phase flow in samples at magmatic temperature using fast synchrotron x-ray tomography. You will analyse the time resolved 3D images using existing image processing techniques. Ideally you will also develop new image processing techniques. The aim of these studies is to gain insights into the microstructural processes in magma that ultimately influence the timing and the strength of volcanic eruptions. The group's unique experimental setup has the capability of studying *in situ* processes such as dilatancy, vesiculation, rheology, solute transport mechanisms and crystal growth. You will be working as part of Prof. Lee's group of 30 researchers employed by the University of Manchester (UoM) based at the Harwell Campus, and will collaboratively work on both the core project and help on others. The role will require travel within the UK and internationally to interact with collaborators.

The role requires excellent record keeping, timely delivery, interactions with the larger research team, and outstanding written and verbal communications skills.

Main Responsibilities

Indicative key responsibilities are listed below, with new responsibilities being assigned by Prof. Lee:

- To plan and conduct laboratory & synchrotron x-ray imaging of magma in 3D and 4D to test scientific hypotheses
- To use other imaging modalities for correlative imaging in combination with x-ray imaging
- To analyse 4D data sets by implementing data segmentation strategies, and ideally develop, image quantification algorithms
- To interpret the images / quantification from a volcanology perspective.
- To publish research in high quality academic journals
- Deliver presentations at conferences and seminars or exhibit work in other appropriate events such as public engagement.
- To contribute to the preparation of experiments, and writing beamtime proposals
- Conduct risk assessment and take responsibility of the health and safety of experiment and

others involved

- To help supervise postgraduate student projects
- To develop and deliver Training Workshops (including collaboratively with DLS/STFC as part of postgraduate and continuing education programme for Diamond Users, and also for courses run for the Centres for Doctoral Training, CDTs)
- Work as part of a team of dynamic students, Research Associates, Academics and support staff
- To host and assist Researchers (PG to Prof) from UoM and other universities to the RCaH.

PERSON SPECIFICATION

Please highlight in your application how you meet each of these criteria.

Essential

- PhD or equivalent experience in image analysis, earth sciences, geodynamics, materials science or an appropriate science field
- An in depth knowledge of imaging and image analysis, ideally applied to X-ray tomography
- Experience in programming and/or algorithm development for image analysis
- Experience using image analysis programmes including ImageJ, Avizo, Matlab
- An in depth knowledge of at least one of:
 - Volcanology
 - Rheology in high temperature fluids (e.g. magmatic to metals)
 - Microstructural characterisation techniques
- Knowledge of at least one of the following areas:
 - Experience in design & use of experiments and experimental rigs for high temperature or high pressure experiments
 - Experience of X-ray tomography experiments
 - Experience of conducting experiments using a synchrotron or neutron source
- An excellent publication record in a relevant field
- Outstanding communications skills in English
- Knowledge of safe working practices in laboratories
- Demonstrated ability to work independently and as part of a team, successfully completing complex research programmes, developing original research
- Proven project & time management skills, multi-tasking and ability to meet deadlines

Desirable

- Experience with Digital Image or Digital Volume Correlation techniques

You should be eager to learn and implement complex time lapse 3D experiments at a synchrotron as well as to develop image analysis techniques in packages such as Matlab, Avizo or ImageJ. You will be closely working with a team of experts that will provide training in specialist areas where you have gaps in knowledge on the condition that the overall skill levels and experience are appropriate.