

Research associate in mechanochemical carbon capture

Department	Civil & Environmental Engineering (www.strath.ac.uk/civeng/)		
Faculty	Faculty of Engineering (www.strath.ac.uk/engineering/)		
Staff Category	Research	Reference No	598625
Reports To	Prof Rebecca Lunn	Grade:	7
Salary Range:	£36024-£44263	Contract Type:	Fixed term (42 months)
FTE	1 (35 hours/week)	Closing Date	25/03/2024

Job Advert

The Department of Civil and Environmental Engineering seeks to recruit a talented researcher for a 42-month Research Associate position to work on mechanochemical carbon capture in silicate rocks. This position is funded by the EPSRC MACO2 project: 'Mechanochemical processing of silicate rocks for direct carbon capture' led by Prof Rebecca Lunn.

The aim of the project is to develop a mechanochemical carbon capture process to decarbonize traditionally difficult-to-decarbonize processes such as cement manufacturing and mining. The project is based on our exciting new finding (published in Nature Sustainability) that we can use mechanical energy to trap CO₂ into common rocks, such as granite and basalt. Once trapped, the CO₂ remains insoluble and thermally stable, making this a promising carbon capture technique during rock crushing. The research will focus on identifying where and how the CO₂ is chemically trapped within rocks during mechanochemical reactions and to understand the factors that affect trapping efficiency (e.g. temperature, rock type, humidity, gas composition and pressure).

The successful researcher will be an enthusiastic individual who is keen to work as part of a multi-disciplinary team conducting laboratory-based research in a new field that has the potential to increase our ability to meet net zero carbon targets by 2050. The project will investigate mechanochemical reactions under different pressures, temperatures, and gas compositions. The candidate will be required to deploy a number of laboratory techniques, including: Elemental Analysis, Mass Spectrometry, X-Ray Diffraction, X-Ray Photoemission Spectroscopy, Infrared Reflection Absorption Spectroscopy (IRRAS), Scanning Electron Microscope, and X-Ray Microtomography. We do not expect candidates to already be proficient in these techniques, however, experience of some would be advantageous.

The successful researcher will be based in the Department of Civil and Environmental Engineering at the University of Strathclyde in Glasgow, UK and will have the opportunity to integrate and work alongside our industrial project advisory board, which includes Weir Group, Satarla and Drax. They will also have the opportunity to conduct research using spectroscopy equipment and Brookhaven National Laboratories in the USA, who are supporting the project. You will join a diverse and multidisciplinary team composed of three academic staff, two post-doctoral researchers, and two PhD students. The Department has over £6.2 million of current UKRI research projects in the Centre for Ground Engineering and Energy Geosciences and the researcher will join an enthusiastic and friendly team of postgraduate and postdoctoral researchers that research a range solutions increasing climate resilience and meeting Net Zero carbon targets.

To be considered for the role, you should have a relevant undergraduate degree (e.g. Materials science, Chemistry, Environmental Chemistry, Physics, Geoscience or another relevant Science or Engineering degree) and have successfully completed a PhD in a relevant or transferable field (e.g. Direct air capture, mineral chemistry, crystalline materials, physical chemistry, mineralogy). You should be creative, with the ability to apply initiative and problem solve and have excellent communication skills.

Job Description

Brief Outline of Job:

You will play an important role in supporting the delivery of the EPSRC-funded MACO2 project: 'Mechanochemical processing of silicate rocks for direct carbon capture'. You will undertake research in the analytical chemistry and geotechnical laboratories in the Department of Civil & Environmental Engineering at the University of Strathclyde. You will be part of a team conducting an experimental campaign to identify the mechanochemical reaction processes and understand the effects of variable experimental conditions of GHG trapping efficiency. You will disseminate your findings in a timely manner with support from senior colleagues within the project team through peer-reviewed journal publications and attend national and international conferences. You will have the opportunity to conduct research at Brookhaven National Laboratory (USA). You will play a leading role in shaping the direction of this new and novel technology and contribute to achieving a reduction in GHG emissions from difficult-to-decarbonize industries.

Main Activities/Responsibilities:

1.	Carry out mechanochemical experiments under a variable parameter space
2.	Conduct individual and collaborative research, including determining appropriate experimental methods and contribute to the development of new experimental methods.
3.	Conduct post experiment analysis of materials using the extensive analytical facilities within CEE.
4.	As part of the research group on direct carbon capture, play a major role in the delivery of the MACO2 projects, with guidance from senior colleagues as required.
5.	Write up research work for publication, individually or in collaboration with colleagues, and disseminate results at project meetings, via peer reviewed journal publications and via presentation at international & national conferences and workshops.
6.	Contribute to the securing of funds for research, including collaborative drafts of grant proposals and planning for future proposals for follow-on funding.
7.	Join external networks to share information and ideas, inform the development of research objectives and to identify potential sources of funding.
8.	Collaborate with colleagues on the development of knowledge exchange activities by, for example, participating in initiatives which establish research links with industry.
9.	Contribute to supervision of postgraduate students within the research group.
10.	Liaise with colleagues and students in the research group and report to external project partners (both from academia and industry)
11.	Plan and manage own workload, with guidance from colleagues as required.
12.	Contribute to teaching in the department as required by, for example, running tutorials and supervising practical work.
13.	Continually update knowledge and understanding in the field to inform research activity.

Person Specification

Educational and/or Professional Qualifications

(E=Essential, i.e. a candidate must meet all essential criteria to be considered for selection, D=Desirable)

- E1 Good honours undergraduate degree or Masters Degree in a relevant science or engineering discipline (e.g. Materials science, Chemistry, Environmental Chemistry, Physics, Geoscience or another relevant Science or Engineering degree)
- E2 PhD (or equivalent professional experience) in an appropriate discipline (e.g. Direct air capture, mineral chemistry, crystalline materials, physical chemistry, mineralogy).

Experience

- E3 Some experience of relevant laboratory-based research (e.g. elemental analysis, mass spectrometry, XRD, XCT, IRRAS, SEM)
- D1 Experience in mechanical testing of geomaterials and carrying out mechanochemical experiments

E4 Sufficient breadth or depth of knowledge in the relevant discipline/s to contribute to research programmes and to the development of research activities.

D2 Experience of multi-disciplinary research

D3 Experience of student supervision

Job Related Skills and Achievements

E5 Developing ability to conduct individual research work and to disseminate results

E6 Ability to use initiative, creativity and judgment in applying and developing research methods

E7 Ability to plan and organise own workload effectively

D4 Ability to write high quality journal papers

D5 Developing ability to prepare research proposals

Personal Attributes

E8 Ability to work both independently and within a multi-disciplinary team.

E9 Excellent interpersonal and communication skills, with the ability to listen, engage and to present complex information in an accessible way to a range of audiences

Application Procedure

Applicants are required to complete an application form including the name of three referees who will be contacted without further permission, unless you indicate that you would prefer otherwise. Applicants should also submit a Curriculum Vitae and a covering letter detailing the knowledge, skills and experience you think make you the right candidate for the job. Applicants should also complete the Equal Opportunities Monitoring Form.

Other Information

Further information on the application process and working at Strathclyde can be found on our website (<http://www.strath.ac.uk/hr/workforus>).

Informal enquiries about the post can be directed to Professor Rebecca Lunn, Professor of Ground Engineering, (rebecca.lunn@strath.ac.uk).

Conditions of Employment

Conditions of employment relating to the Research staff category can be found at: [Conditions of Employment](#).

Rewards and Benefits

Our staff have access to a wide range of outstanding benefits that include financial rewards, family friendly and wellbeing benefits and career development opportunities, details of which can be found [here](#).

Probation

Where applicable, the successful applicant will be required to serve a 9 month probationary period.

Pension

The successful applicant will be eligible to join the Universities' Superannuation Scheme. Further information regarding this scheme is available from [Payroll and Pensions](#).

Relocation

Where applicable, the University offers a relocation package to support new employees who meet the eligibility criteria. The relocation package is offered as a contribution towards costs incurred, and is designed to be flexible, allowing staff to use the financial support available in the way that will be most helpful to them. Further details are outlined in the Relocation Policy.

Interviews

Formal interviews for this post will be held on a date to be confirmed.

Equality and Diversity

The University of Strathclyde is a socially progressive institution that strives to ensure equality of opportunity and celebrates the diversity of its student and staff community. Strathclyde is people-oriented and collaborative, offering a supportive and flexible working culture with a deep commitment to our equality, diversity and inclusion charters, initiatives, groups and networks.

We strongly encourage applications from Black, Asian and minority ethnicity, women, LGBT+, and disabled candidates and candidates from lower socio-economic groups and care-experienced backgrounds.

University Values

The University's Values capture what we're all about: who we are, what we believe in and what we stand for. [Our Values](#) have been derived from how we act and how we expect to be treated as part of Strathclyde.

