



Position Details

CSIRO Early Research Career (CERC) Postdoctoral Fellowship– CSOF4

THE FOLLOWING INFORMATION IS FOR APPLICANTS

Advertised Job Title	CSIRO Postdoctoral Fellowship in Molecular Simulation of Mineral Carbonation Reactions
Job Reference	93805
Tenure	Specified Term of 3 years Full-Time
Salary Range	AU\$92,624 to AU\$101,459 per annum plus up to 15.4% superannuation
Location(s)	Perth (Kensington), Western Australia Whadjuk Noongar Country
Relocation Assistance	Will be provided to the successful candidate if required
Applications are open to	All candidates
Position reports to the	Team Leader, Experimental and Computational Geochemistry
Client Focus – Internal	100%
Client Focus – External	0%
Number of Direct Reports	0
Enquire about this job	Contact Yuan Mei at yuan.mei@csiro.au or phone +61 8 6436 8943
How to apply	Apply online at https://jobs.csiro.au/ Internal applicants please apply via Jobs Central If you experience difficulties when applying, please email careers.online@csiro.au or call 1300 984 220.

Acknowledgement of Country

CSIRO acknowledges the Traditional Owners of the land, sea and waters, of the areas that we live and work on across Australia. We acknowledge their continuing connection to their culture and pay our respects to their Elders past and present. View our [vision towards reconciliation](#).

Child Safety

CSIRO is committed to the safety and wellbeing of all children and young people involved in our activities and programs. View our [Child Safe Policy](#).

Role Overview

CSIRO Early Research Career (CERC) Fellowships provide opportunities to scientists and engineers who have completed their doctorate and have less than three years of relevant research experience. These Fellowships aim to develop the next generation of future leaders of the innovation system through:

- A differentiated career development program to deliver capability excellence and breadth across all facets of the national innovation system;
- Research training via strategic research and development projects with a clear focus that will deliver real impact through science and engineering excellence;
- An innovative culture supporting the development and demonstration of original thinking and expertise leading to peer recognition; and
- Opportunities to develop skills and experience in collaborative research teams to effectively work within national and global multi/transdisciplinary and multi-stakeholder environments.

CERC Fellows are appointed for three years or full-time equivalent.

The CarbonLock Future Science Platform

Future Science Platforms (FSPs) are an investment in boundary-pushing science that will underpin innovation and has the potential to reinvent and create new industries for Australia. These multi-disciplinary, multi-year initiatives bring together diverse networks of partners – including early career researchers – to build the foundations of tomorrow’s breakthroughs.

Nationally and internationally, reaching net-zero emissions and beyond will require new methods of permanently removing significant amounts of carbon from the atmosphere that are fast, scalable, and responsible. CarbonLock, CSIRO’s Permanent Carbon Locking Future Science Platform (FSP) will address this challenge by driving radical innovation at the nexus of biology, chemistry and engineering in negative emissions technology and their integration to permanently remove atmospheric carbon dioxide in novel and unconventional ways.

One approach to help achieve the net-zero missions is reacting CO₂ with selected rocks and turning it into solid carbonate minerals to lock CO₂ permanently via natural or man-made processes called “mineral carbonation”. This natural mineral carbonation process is slow and we need to accelerate the process via human-made industrial approaches. Therefore, we need to understand the mechanism and the breakdown reactions of mineral carbonation, including CO₂ dissolution in brines and geo-fluids; dissolution of silicate minerals and precipitation of carbonate minerals. With reliable chemical-physical properties of those reactions, we can accurately model mineral carbonation reactions at different temperatures, pressures and fluids/minerals composition and build the large-scale geological model for permanent carbon locking.

Leveraging the new HPC-Setonix in Pawsey supercomputer centre, in this project, the CERC Fellow will conduct molecular simulation of mineral carbonation reactions to provide a molecular-level understanding of CO₂-fluid-rock interactions at a wide range of fluid composition, and T-P conditions. The calculated thermodynamic and kinetic properties will help build geochemical and reactive transport modelling to assess the mineral carbonation potential and to design the reaction pathway for an accelerated mineral carbonation process.

Duties and Key Result Areas

Working alongside senior research scientists and engineers, the CERC Postdoctoral Fellow will:

- Conduct molecular simulations to study the microstructure of the mineral-water interface, and to understand the mechanism and fundamental control (thermodynamics and kinetics) of mineral carbonation reactions
- Work with experimentalists to combine molecular simulations with mineral replacement experiments to cross-check the available and new experimental results
- Perform geochemical modelling to assess the mineral carbonation potential and to design the reaction pathway for an accelerated mineral carbonation process
- Work as part of an interdisciplinary team of researchers, contributing to the collaboration between the CSIRO Mineral Resources and CarbonLock Future Science Platforms (FSP).
- Work with university collaborators and provide mentorship and supervision to high-degree research students
- Carry out research investigations requiring originality, creativity and innovation
- Record, manage, and analyse data/information using relevant domain data science techniques.
- Proactively undertake development to grow effective researcher capabilities to support career goals
- Adhere to the spirit and practice of CSIRO's Values, Code of Conduct, Health, Safety and Environment procedures and policy and diversity initiatives.
- Other duties as directed

The CERC Fellow learning, development and training program is developed between the CERC Fellow and their CSIRO supervisor. The program will focus on enhancing the Fellow's capabilities to the level expected of an independent researcher and will include on-the-job and course-based development encompassing:

- Discipline-specific techniques and protocols
- Professional growth
- Project management
- Communication and influencing skills
- Working and collaborating with others

Selection Criteria

Essential

Under CSIRO policy only those who meet all essential criteria can be appointed.

1. A doctorate (or will shortly satisfy the requirements of a PhD) in a relevant discipline area, such as Geochemistry, Chemistry, Physics or Material Science with a focus on molecular simulations.

Please note: To be eligible for this role you must have **no more than 3 years** (or part-time equivalent) of postdoctoral research experience.

2. Demonstrated experience in applying molecular modelling approaches to solve applied problems in for example geochemistry, chemistry, material or environmental sciences.
3. Demonstrated knowledge in reaction kinetics, thermodynamics and geochemical modelling, especially in the context of water-rock interactions.
4. High-level written and oral communication skills with the ability to represent the research team effectively internally and externally, including the presentation of research outcomes at national and international conferences.
5. A sound history of publication in peer-reviewed journals and/or authorship of scientific papers, reports, grant applications or patents.
6. A record of scientific innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.

Desirable

1. Demonstrated experience and skill in scientific programming and high-performance computing.
2. General knowledge of mineralogy, petrology, and geochemistry.
3. Knowledge of the fundamentals and application of mineral carbonation approaches.
4. Knowledge of mineral replacement and synchrotron-based spectroscopy experiments.
5. General knowledge in data science and machine learning.
6. Demonstrated ability to remain productive, positive and resilient in complex, ambiguous and/or uncertain environments.
7. The ability to work effectively as part of a multi-disciplinary, potentially regionally dispersed research team, plus the motivation and discipline to carry out autonomous research.

Required Competencies

- **Teamwork and Collaboration:** Cooperates with others to achieve organisational objectives and may share team resources in order to do this. Collaborates with other teams as well as industry colleagues.
- **Influence and Communication:** Uses knowledge of other party's priorities and adapts presentations or discussions to appeal to the interests and level of the audience. Anticipates and prepares for others reactions.
- **Resource Management/Leadership:** Allocates activities, directs tasks and manages resources to meet objectives. Provides coaching and on the job training, recognises and supports staff achievements and fosters open communication in the team.
- **Judgement and Problem Solving:** Investigates underlying issues of complex and ill-defined problems and develops appropriate response by adapting/creating and testing alternative solutions.
- **Independence:** Recognise and makes immediate changes to improve performance (faster, better, lower cost, more efficiently, better quality, improved client satisfaction).
- **Adaptability:** Copes with ambiguity or situations that lack clarity. Adapts readily to changing circumstances and new responsibilities (which may include activities outside own preferences)

in the interests of achieving team objectives. Recognises the need for and undertakes personal development as a result of changes.

To be appointed as a CERC Fellow within CSIRO, candidates are required to have **submitted** their doctoral thesis at the time of commencement, as a minimum requirement, if PhD conferment has not been obtained. If a candidate has submitted, but their PhD has not yet been formally attained, the starting salary will be CSOF4-1 (\$89,680). Upon CSIRO receiving written confirmation that the PhD has been awarded (within a six-month period from the commencement date), the salary will be increased to the negotiated level and the difference will be back-paid to the Officer's start date.

Special Requirements

Appointment to this role is subject to provision of a pre-employment background check and may be subject to other security/medical/character clearance requirements as follows:

- The successful candidate will undertake a pre-employment background check. Please note that individuals with criminal records are not automatically deemed ineligible. Each application will be considered on its merits.
- If the successful candidate is not an Australian Citizen or Permanent Resident, they may be required to undergo additional security clearances, which may include medical examinations and an international standardised test of English language proficiency (i.e. IELTS test).- <https://ielts.com.au/>

Our Value Proposition

We want CERC Fellows to join our world-class science, engineering and digital teams to solve big, complex problems that make a real difference to the future of Australia and the world.

You'll get to work with some of the most talented minds in their fields, not just in Australia, but in the world. At CSIRO, we spark off each other, learn from each other, trust each other and collaborate closely to achieve more than we could individually.

Find out more about our CSIRO Early Research Career (CERC) Fellow Experience Employee Value Proposition (EVP) [here](#).

About CSIRO

We solve the greatest challenges through innovative science and technology. Visit [CSIRO Online](#) and [Mineral Resources](#) for more information. To find out more about the CarbonLock FSP, please visit [our website](#).

CSIRO is a values-based organisation. In your application and at interview you will need to demonstrate behaviours aligned to our values of:

- People First
- Further Together
- Making it Real
- Trusted