# Position Details

## CSIRO Early Research Career (CERC) Postdoctoral Fellowship– CSOF4

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| The following information is for applicants |
| Advertised Job Title  | CSIRO Postdoctoral Fellowship in Molecular Recycling of Waste Plastics |
| Job Reference | 87106 |
| Tenure | Specified Term of 3 years full-time |
| Salary Range | AU$89,926 to AU$98,504 pa + up to 15.4% superannuation |
| Location(s) | Clayton, Victoria |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | * Australian/New Zealand Citizens,
* Australian Permanent Residents and
* Australian temporary residents currently residing in Australia (visa sponsorship may be provided to eligible onshore candidates
 |
| Position reports to the | Fellowship supervisory team, and Team Leader Polymer Chemistry |
| Client Focus – Internal | 90% |
| Client Focus – External | 10% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Almar Postma via email at almar.postma@csiro.au or phone +61 3 9545 2555; Graeme Moad via email at graeme.moad@csiro.au or phone +61 3 9545 2509 |
| 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](https://www.csiro.au/en/about/Indigenous-engagement/Reconciliation-Action-Plan).

### 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 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.**

CSIRO Manufacturing’s Advanced Materials & Processing Manufacturing Program is seeking to appoint a CERC Fellow to develop a continuous-catalytic process for depolymerising polymers.

Plastics have been revolutionary in numerous sectors, and many of the positive attributes of modern life can be attributed to their use. However, plastics are often treated as disposable commodities, which has led to an ever-increasing accumulation of plastic and plastic by-products in the environment, and an unacceptable growth of microplastic and nanoplastic pollution. This environmental crisis is being addressed, by developing recycling methods to deal with the legacy of plastic waste. However, effective solutions, are still to be forthcoming. In this context, we must develop methods in which given plastics might be recycled with minimal material loss, the lowest energy cost, and the least potential for polluting the environment - turning waste material into a valuable resource.

In this project we aim to develop low energy, scalable processes for molecular recycling of waste plastics based on catalytic depolymerization. The processes to be investigated are catalytic hydrogenolysis, electrocatalytic depolymerization and oxidative scissioning. There will be scope for the CERC Fellow to develop new processes that align with the direction of the project.

The CERC Fellow will be guided by a multidisciplinary team including supervisors and co-supervisors; Almar Postma and Graeme Moad (Manufacturing), Krishnan Murugappan (Mineral Resources) and Gerald Pereira (Data61). The Fellow will have full opportunity to network with other researchers in CSIRO and members of the BOTTLE Consortium.

### Duties and Key Result Areas

Under the direction of senior research scientists and engineers, this CERC Fellow will:

* + Examining processes for recycling of waste plastics by continuous, low energy, (electro)catalytic depolymerization. Processes to investigated include electocatalytic depolymerization and catalytic hydrogenolysis and oxidative chain scissioning and will involve examining different catalyst systems and process conditions.
	+ Collaborate on the development of catalysts, and fluid dynamics modelling & evolutionary design of catalytic static mixers in continuous flow hydrogenolysis/hydrolysis reactors.
	+ Refinement of computer design workflow and improve experimental validation of 3D printed static mixer designs
	+ Explore depolymerization via oxidative, hydrogenolytic or mechanochemically induced scissioning by reactive extrusion or catalytic static mixer technology.
	+ Carry out innovative, impactful research of strategic importance to CSIRO that will, where possible, lead to novel and important scientific outcomes.
	+ Recognise and exploit opportunities for innovation and the generation of new theoretical perspectives, and progress opportunities for the further development or creation of new lines of research
	+ Utilise design thinking methodology to plan and prepare research proposals, and apply non-academic impact methodology to research projects
	+ 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 Code of Conduct, Health, Safety and Environment procedures and policy, Diversity initiatives and Zero Harm goals.
* Other duties as directed.

The CERC Fellow learning, development and training programis 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). The doctorate must be in a relevant discipline area, such as organic chemistry, polymer chemistry, or chemical engineering.

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

1. Experience and knowledge in polymer chemistry (polymer synthesis, polymer modification, polymer depolymerization, polymer characterization).
2. Skills and experience with characterization techniques used in organic and polymer chemistry. Such techniques may include but are not limited to, NMR, IR, mass spectrometry, Raman, UV, light scattering (ELS, DLS), SEC, HPLC, GC, microscopy, rheological and electrochemical characterization.
3. 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.
4. A sound history of publication in peer reviewed journals and/or authorship of scientific papers, reports, grant applications or patents.
5. A record of science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.

## **Desirable**

1. Experience with polymers in continuous flow chemistry.
2. Experience and knowledge of polymer electrochemistry.
3. Knowledge of organic reaction mechanisms particularly those relevant to catalytic, depolymerization processes.
4. Experience with reactor design.
5. Experience with reactive extrusion.
6. **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.**
7. Remain productive, positive and resilient in complex, ambiguous and/or uncertain environments.

## **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 to this CERC Fellowship role within CSIRO, candidates will be expected to commence employment by 31 January 2023. Candidates are also 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 ($87,068). Upon CSIRO receiving written confirmation that the PhD has been awarded (within a six month period from 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 may be subject to conditions including provision of a national police check as well as other security/medical/character clearance requirements.

* The successful candidate will be asked to obtain and provide evidence of a National Police Clearance or equivalent. 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](https://www.csiro.au/en/careers/postdoctoral-fellowships).

## **About CSIRO**

We solve the greatest challenges through innovative science and technology. Visit [CSIRO Online](http://www.csiro.au/) and

[Data61](https://www.csiro.au/en/about/people/business-units/Data61)

[Manufacturing](https://www.csiro.au/en/Research/MF)

[Mineral Resources](https://www.csiro.au/en/Research/MRF)

for more information.

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