# 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 Food Polymer Extrusion |
| Job Reference | 97383 |
| Tenure | Specified Term of 3 years  Full-time |
| Salary Range | AU$96,329 to AU$105,517 pa  plus up to 15.4% superannuation |
| Location(s) | Melbourne, Victoria, Australia |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | All Candidates |
| Position reports to the | Senior Scientist, Food Macromolecules |
| Client Focus – Internal | 70% |
| Client Focus – External | 30% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Dr Simon Loveday via email at simon.loveday@csiro.au |
| 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](mailto: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).

**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](https://www.csiro.au/en/about/policies/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 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.**

Extrusion is an industrial process that applies heat and shear to blend and transform polymer mixtures into micro- and meso-structured materials with targeted functionality. Extrusion of food biopolymers (protein, starch, fibre) can create fibrous structures with meat-like texture, i.e. meat analogues. So far, meat analogues have not been able to deliver an eating experience that convinces meat-eaters to switch to planet-friendly alternatives.

The bottleneck slowing meat analogue innovation is a lack of knowledge about the structural and biochemical transformations occurring in the extruder barrel and die. Transformations are thought to include denaturation, aggregation, liquefaction, polymer alignment and syneresis. However experimental measurement of biopolymer structures inside an extruder is extremely difficult because of the temperatures and pressures involved, and current knowledge is mostly limited to ‘offline’ analysis of cooled extrudate.

We are proposing to ‘look inside’ the barrel and die of an operating extruder, and probe biopolymer structural transformations using small angle neutron scattering (SANS). Neutron beams can penetrate through metal extruder components, and the neutrons’ trajectories will be subtly perturbed by the polymer structures inside. By measuring neutron scattering patterns, we can infer biopolymer structures and test hypotheses about structural transformations under different conditions.

We are aiming to establish an experimental platform for *in situ* small angle neutron scattering studies of extrusion processes. This will involve commissioning a small extruder inside a neutron scattering instrument, and collecting scattering data while the extruder is operated under conditions relevant to meat analogue manufacture. Advanced machine learning tools will be developed or deployed to extract structural information from scattering data, and conceptual and analytical frameworks developed to build process-structure-function understanding that enables rapid optimisation of product quality.

The CERC Fellow will be supported by a team of experts at CSIRO, Monash University, Australia’s Nuclear Science and Technology Organisation (ANSTO) and Wageningen University and Research (The Netherlands). The CERC Fellow will be based in Melbourne, but must be able to carry out research visits (1-4 weeks, several times a year) at the ANSTO Lucas Heights campus near Sydney.

### Duties and Key Result Areas

* Lead a design and feasibility study for extruder commissioning at ANSTO
* Build a knowledge base by running lab-scale extrusion trials with various conditions and formulations, and analysing extrudate samples offline
* Work with machine learning experts to develop frameworks for automated analysis of scattering data
* Work with biophysics experts to develop conceptual and mathematical models of polymer phase behaviour in extrudates
* 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.
* 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 Making Safety Personal goals.

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 polymer physics, biophysics, food science, process engineering or chemical engineering.

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

1. Expertise in conceptualising and validating structure-function linkages in dynamic, heterogeneous soft material systems. The ability to formulate hypotheses about molecular and structural processes occurring in soft materials at wide-ranging length and time scales, and to explain how these processes interact across structural hierarchies to drive product functionality.
2. Experience in advanced characterisation of soft materials, e.g. rheology, microscopy, particle sizing.
3. Experience in the design, execution, and analysis of experiments with the purpose of gaining new understandings of a physical system.
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 science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.
7. A demonstrated can-do mindset that facilitates respect, collaboration, support, inclusiveness and accountability in the workplace.

## **Desirable**

1. Experience with extrusion processing.
2. Experience with neutron or X-ray scattering techniques.
3. Experience with characterisation of plant-based meat analogues.
4. The ability to remain productive, positive and resilient in complex, ambiguous and/or uncertain environments.
5. **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 to this CERC Fellowship role within CSIRO, candidates will be expected to **commence employment by 31 January 2025**. 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 ($93,267). 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 is subject to provision of a pre-employment background check and may be subject to other security/medical/character clearance requirements.

* 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](https://www.csiro.au/en/careers/career-opportunities/Postdoctoral-fellowships).

## **About CSIRO**

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