# Position Details

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

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| The following information is for applicants |
| Advertised Job Title | CSIRO Winanga-y Postdoctoral Fellowship in Modelling the Rheology/Sensory of Bolus Formation and Swallowing |
| Job Reference | 84768 |
| Tenure | Specified Term of 3 years Full-time  |
| Salary Range | AU$89,926 to AU$98,504 pa (pro-rata for part-time) + up to 15.4% superannuation |
| Location(s) | Werribee, Victoria |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | All Candidates |
| Position reports to the | Fellowship supervisory team, and Team leader, Sensory and Consumer Science |
| Client Focus – Internal | 90% |
| Client Focus – External | 10% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Amy Logan via email at amy.logan@csiro.au |
| How to apply | Apply online at <https://jobs.csiro.au/> Internal applicants please apply via Jobs CentralIf 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.

We are thrilled to be able to deliver on the commitment we made in our strategy to invest in frontier science with the CSIRO Agriculture & Food Winanga-y Postdoctoral Fellowship scheme. The word Winanga-y (pronounced win-na-gnay) is a cultural asset gifted by the Gomeroi Nation in Myall Vale to CSIRO's Agriculture and Food Business Unit to name the new Postdoctoral Fellowship Scheme. Winanga-y means to understand, know, remember, and think.

CERC Fellows **are appointed for three years or full-time equivalent** andthis role provides an exciting opportunity for a new CERC Fellow to model the rheological-sensory nexus of bolus formation, in-mouth dynamics and swallowing.

‘Safe-to-swallow’ texture modified foods (TMFs) are used as a therapeutic strategy for those with swallowing difficulties, including older Australians where a decrease in muscle strength critical for chewing and swallowing leads to an increased risk of aspiration pneumonia or choking. While the mechanisms to develop TMFs is understood to a limited degree, there is a knowledge gap on the relationship between oral processing, rheology and the formation of a bolus to influence flow behaviour of the food as it is transported to the back of the throat. Much can be done to improve our understanding, including how modified food structures influence bolus transfer, and how the in-situ properties of the bolus as it is swallowed aligns with industry guidelines for TMFs. Materials with suitable rheological properties for swallowing typically create degraded sensory experience and reduce appetite which contributes to difficulty in such consumers maintaining lean muscle mass which contributes also to morbidity.

One major limitation is our inability to safely access human participants for validation studies, particularly those with severe swallowing difficulties due to the high risk of choking.

The model will encompass healthy and pathological physiologies that can assist in evaluating swallowing safety, comprising physiochemical and structural properties of different food materials, descriptive sensory analysis, and individual variations to predict how food is manipulated into a bolus and swallowed.

An *in-silico* model of swallowing will need to represent:

• the physiological movements of the teeth, tongue, pharyngeal tissues,

• mechanical breakdown of ingested food, including fracturing, softening of solid food by liquids and thermal effects such as melting,

• tastant and aroma release during chewing and swallowing, and

• the sensory perception of physical attributes such as particle size and flavour concentrations.

Some of these aspects have been developed by Data61 for the Virtual mouth model, however this model has been used primarily for early mastication and many new features are required for swallowing. Additionally, characterisations of material behaviour such as elastic, fracture, water absorption, softening and melting, must be performed specifically for existing TMFs.

The CERC Fellow will be jointly supervised by Amy Logan, Aarti Tobin and Lukas Danner (Agriculture and Food, Food Program), and Simon Harrison and Paul Cleary (Data61). In addition to the Fellowship’s supervisory team, the Fellow will have the opportunity to interact with other researchers in CSIRO to broaden their scientific skills and networks.

### Duties and Key Result Areas:

Under the direction of the supervisory team, the CERC Postdoctoral Fellow will:

* + Perform experiments to characterise the material properties of TMFs;
	+ Assess the mechanical breakdown and bolus formation of the TMFs, including sensory perception; and
	+ Develop an *in-silico* model of bolus formation and swallowing.
	+ 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 Making Safety Personal goals.
* Other duties as directed.

The CERC Fellow learning, development and training programis developed between the CERC Fellow and their CSIRO supervisors. 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

## **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.

## **Selection Criteria**

CSIRO is an Equal Opportunity employer working hard to recruit world-class talent that represents the diversity across our society. As part of our commitment to Aboriginal and Torres Strait Islander employment outcomes, preference will be given to Aboriginal and Torres Strait Islander candidates who meet the role 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 chemical engineering, chemistry, physics, food/material science, sensory, oral processing, medicine, physiology, computer or data science, mathematics.

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. Experience in the physico-chemical characterisation and analysis of soft materials, such as food systems e.g. rheology, tribology, texture analysis, particle sizing, descriptive sensory analysis, microscopy, water holding capacity.
2. Experience in the use of computational modelling and simulation to create novel understandings of physical processes.
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 in the development and processing of protein- and vegetable-based food systems.
2. Experience in the development of TMFs and an understanding of the IDDSI guidelines for swallowing difficulties.
3. Experience in bioinformatics for studying novel aspects of physical systems.
4. **Scientific programming skills with expertise in C++ and/or F90.**
5. Remain productive, positive and resilient in complex, ambiguous and/or uncertain environments.
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.**

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 (AU$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.

Include if relevant:

* The successful candidate will be asked to obtain and provide evidence of a National Police Check or equivalent. Please note that people 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. To find out more visit us [online](http://www.csiro.au/)!

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

* 1. People First
	2. Further Together
	3. Making it Real
	4. Trusted

Find out more about CSIRO [Agriculture and Food](https://www.csiro.au/en/Research/AF)

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