# 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 Shifting Gears for Food Safety: Contaminant Detection with Machine Learning Driven Electrochemical Nanosensors |
| Job Reference | 84509 |
| 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) | Brisbane, Queensland |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | All Candidates |
| Position reports to the | Team/group leaders in Agriculture and food, Manufacturing, H&B and Data61. |
| Client Focus – Internal | 0% |
| Client Focus – External | 0% |
| Number of Direct Reports | 0 |
| Enquire about this job | Dr. Joost Nelis; [Joost.Nelis@csiro.au](mailto:Joost.Nelis@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).

### 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.**

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.

One of the great challenges in modern analytical chemistry is to enable selective, real-time, on-site trace compound quantification at a cost-efficient price in an industrial setting without the need for highly skilled chemists. Some excellent examples are quantification of antibiotic residues or pesticides in foodstuffs. Performing these tasks on-site will reduce testing costs and enhance food safety by enabling food processors to act pro-actively and detect contaminants in real time and in smaller lots. Most reported on-site sensing solutions aiming to perform this task apply a recognition element to reach adequate sensitivity and selectivity. However, biorecognition often requires long incubation times and compromises sensor stability, while increasing sensor cost, which is sub-optimal.

In this project, we aim to build a machine-learning driven electrochemical platform using nanomaterial-modified electrodes for the selective detection of key trace-level food contaminants without the use of a biorecognition element. The CERC Fellow will be embedded in a multi-disciplinary team of scientists with expertise in analytical chemistry, electrochemistry, nanomaterial science, mass spectrometry and machine learning. Supported by the team, the CERC Fellow will (i) combine various material science and electrochemical techniques to enhance sensor sensitivity and create a unique electrochemical fingerprint for the target analyte in a complex food matrix and (ii) deploy machine-learning algorithms to automatically recognise the electrochemical fingerprints and quantify the targets in their matrix. The CERC Fellow will also benchmark the developed sensors against targeted mass spectrometry assays. The detection system will be thoroughly validated, and a TLR4-5 prototype developed to make the product ready for further commercialisation.

### Duties and Key Result Areas

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

1. Develop electrochemical assays for small molecule detection using screen printed electrodes and nanomaterial modifications to enhance sensitivity and selectivity.
2. Develop quantitative assays using analytical chemistry techniques such as extraction, detection and chromatography method development.
3. Collaborate on the development of chemometric/ machine learning approaches to determine target presence and or concentration.
   * 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**

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 analytical chemistry, electrochemistry, material science or computer science.

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 classical analytical chemistry techniques such as extraction, detection and chromatography method development.
2. A good understanding of electrochemical techniques (e.g., differential pulse voltammetry, cyclic voltammetry, EIS) and developing electrochemical detection methods.
3. Well versed in written and oral communication, including the presentation of research outcomes at conferences, a sound history of publication in peer reviewed journals, contribution to grant applications, patents etc.
4. A record of science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.
5. Demonstrated ability to support a positive work culture that promotes collaboration, inclusiveness, and accountability in the workplace.

## **Desirable**

1. Experience in using computer science approaches (e.g., machine-learning, chemometrics) for spectra analyses/compound classification or quantification.
2. Experience in developing molecular imprinted polymers for the binding of small molecules.
3. Experience in the use of nanomaterials to enhance electrochemical sensor sensitivity and selectivity.
4. 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 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 ($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

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)

Find out more about CSIRO [Health and Biosecurity](https://www.csiro.au/en/Research/BF)

Find out more about CSIRO [Manufacturing](https://www.csiro.au/en/Research/MF)

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