# 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 Machine Learning and Artificial Intelligence in the Materials Sciences |
| Job Reference | 67629 |
| Tenure | Specified Term of 3 years Full-time  |
| Salary Range | AU$86,434 to AU$94,679 pa (pro-rata for part-time) + up to 15.4% superannuation |
| Location(s) | CSIRO Manufacturing Clayton and Data61 within the Artificial Intelligence/Machine Learning Future Science Platform |
| Relocation Assistance | Will be provided to the successful candidate if required |
| Applications are open to | * Australian/New Zealand Citizens and Australian Permanent Residents
* Australian temporary residents currently residing in Australia (visa sponsorship may be provided to eligible candidates)
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| Position reports to the | Senior Research Scientist |
| Client Focus – Internal | 95% |
| Client Focus – External | 5% |
| Number of Direct Reports | 0 |
| Enquire about this job | Ben Muir via email at ben.muir@csiro.au or phone +61 3 9545 2452 |
| 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. |

### Role Overview

The Machine Learning and Artificial Intelligence Future Science Platform (MLAI FSP) will build an exciting new research portfolio to leverage CSIRO’s deep domain expertise and experience. Historically, combinatorial approaches have been used to map out experimental design spaces for discovering new chemicals, materials and formulations in various manufacturing industries. While effective, these methods often require the planning and fabrication of thousands of samples in order to reach an appropriate performance characteristic. For simple chemical systems, this approach can be quite effective. However, it becomes intractable for solving chemical formulation challenges, particularly in scenarios where the system is incorporated into a practical device and subject to new environmental and chemical requirements. Issues with sample throughput, workflow bottlenecks and the cost of procuring raw input materials for undertaking thousands of experiments begin to spiral, as does the associated labour cost. As a member of the Platform team you will work with top CSIRO scientists and engineers to develop new machine learning and artificial intelligence methods with a specific emphasis on solving significant science questions. Together we will build the next generation of science tools using high performance computing infrastructure and cloud technologies to underpin the next generation of Australian science. This role sits within the Hybrid Prediction activity area within the MLAI FSP and will work closely with leading analytical capability in Data61 in collaboration with CSIRO Manufacturing.

Your research will focus on applying Machine Learning and Artificial intelligence to the **analysis of sample material** data sets and in the **design of the experiments** as part of a data driven science initiative to accelerate material optimisation workflows. Themes that will be explored include the use of Machine Learning and Artificial Neural Networks for Materials Science Characterisation data sets, Hybrid Prediction, Decision making, Hyperspectral mapping, Data Visualisation, Design of Experiments and Dimensionality reduction. Solving these types of challenges will open new vistas of scientific knowledge and positive impact in fields such as polymer science, flow chemistry and battery science. This will be done within national and international settings, and as part of a diverse multidisciplinary team.

### Duties and Key Result Areas:

Under the direction of senior research scientists and engineers, Postdoctoral Fellows will:

* Develop and implement machine learning or artificial intelligence expertise as applied to both the analysis of material sample data sets, as well as in the design of the experiments as part of a data driven science initiative to accelerate material optimisation workflows.
* Implement these methods efficiently on CSIRO specific high throughput testing systems including robotic synthesis and analysis platforms, and in the domain of flow chemistry.
* Carry out evaluation of the developed software to demonstrate its competitiveness and fitness for purpose. Taking responsibility for functionality, performance and robustness.
* Actively participate in experimental based research program, including sample preparation and analysis.
* Carry out high impact research of strategic importance to CSIRO, with the aim of achieving innovative and wide-reaching scientific outcomes and ideas for further research.
* Collaborate with members of a diverse project team and external partners to ensure research directions can lead to lasting impact in application domains.
* Implement these methods efficiently using programming tools such as R, Python and TensorFlow.
* Carrying out evaluation of the developed software to demonstrate its competitiveness and fitness for purpose. Taking responsibility for functionality, performance and robustness.
* Carry out high impact research of strategic importance to CSIRO, with the aim of achieving innovative and wide-reaching scientific outcomes and ideas for further research.
* Collaborate with members of a diverse project team and external partners to ensure research directions can lead to lasting impact in application domains.
* Undertake regular reviews of the latest literature in artificial intelligence and machine learning.
* Publish results in relevant international scientific venues (high-level journals and conferences).
* Interpret and present research findings in artificial intelligence and machine learning to research scientists and practitioners from a wide range of other scientific areas.
* Communicate effectively and respectfully with all staff, clients and suppliers in the interests of good business practice, collaboration and enhancement of CSIRO’s reputation.
* Adhere to the spirit and practice of CSIRO’s policies and guidelines, including values, health, safety & environment, diversity initiatives and zero harm goals.
* Requirement to represent CSIRO externally, including in public forums, with industry or the research sector or with Government.
* Other related duties as directed.

[**The CERC Postdoctoral Fellow learning and development program**](http://www.csiro.au/en/Careers/Student-and-graduate-programs/Postdoctoral-fellowships)is developed between the CERC Postdoctoral Fellow and their CSIRO supervisor. The program will focus on enhancing the Fellows’ 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**

#### 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 Platform-relevant discipline area, such as machine learning, artificial intelligence, computer science, statistics, data analytics, applied mathematics or applied physics.

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

1. A history of professional and respectful behaviours and attitudes in a collaborative environment.
2. Solid knowledge of machine learning, artificial intelligence, and statistics, and the ability to understand and develop mathematically-founded machine learning algorithms and their development in toolkits such as TensorFlow, PyTorch or mlpack.
3. High level computational and programming skills (in Python, R, or C++) to build machine learning models and conduct analyses.
4. High level written and oral communication skills with the ability to effectively represent the research team internally and externally, including publishing in peer reviewed journals and/or authorship of scientific papers, reports, and presenting at national and/or 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, preferably across diverse and inclusive teams.

## **Desirable:**

1. Experience in Chemistry, Polymers or Materials Science.
2. **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.**
3. Experience in Time of Flight Secondary Ion Mass Spectrometry (ToF-SIMS) experimentation and analysis or Experience in electrochemistry.
4. LabView programming experience and/or experience using high-performance computing clusters and source code versioning systems such as Git.
5. Experience or interest in one or more of the following: deep neural networks including recurrent neural networks; Bayesian statistical methods for studying predictive error or uncertainty arising from models; statistical emulators, applied to deterministic or physical models, particularly environmental and agricultural models; model calibration and optimisation techniques.

To be appointed as a CERC Postdoctoral Fellow within CSIRO, candidates will be expected to commence employment by December 2020/January 2021. Candidates are also required to have **submitted** their PhD 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 ($83,687). 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 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 Postdoc 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.

CSIRO Early Research Career (CERC) Postdoctoral Fellow Experience Employee Value Proposition (EVP). Find out more [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/)!

Find out more about CSIRO [Manufacturing](https://www.csiro.au/en/Research/MF) and [CSIRO Data61](https://www.csiro.au/en/Do-business/RandD/Do-business-Data61)