# 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 Tandem Perovskite Solar Cells |
| Job Reference | 76681 |
| Tenure | Specified Term of 3 years  Full-time |
| Salary Range | AU$88,163 to AU$96,573 pa (pro-rata for part-time) + up to 15.4% superannuation |
| Location(s) | Newcastle, New South Wales |
| 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 onshore candidates) |
| Position reports to the | Team Leader, Solar PV Durability |
| Client Focus – Internal | 80% |
| Client Focus – External | 20% |
| Number of Direct Reports | 0 |
| Enquire about this job | Contact Benjamin Duck via email at [Benjamin.Duck@csiro.au](mailto:Benjamin.Duck@csiro.au) or phone +61 2 4960 6011 |
| 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. |

### Role Overview

**CSIRO Early Research Career (CERC) Postdoctoral Fellowships** provide opportunities to scientists and engineers who have completed their doctorate and have less than three years relevant postdoctoral work 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 Postdoctoral Fellows **are appointed for three years or part time equivalent.**

CSIRO Energy has established the National Solar Energy Centre (NSEC) in Newcastle to conduct world class research and development in solar processes, components and photovoltaics. Our Solar Energy Technologies Group now welcomes a self-motivated and innovative **Postdoctoral Fellow** from a physical chemistry, chemistry, physics, engineering or materials science background wanting to join an exciting, interdisciplinary team in the priority area of silicon substrate optimisation in the emerging area of multi-junction or tandem solar cells.

***Science Background – Silicon-Perovskite tandem cells and multi-junction devices***

Silicon is a core industrial commodity for a >120GW global photovoltaics market, in addition a key component in next generation multi-junction technologies. Innovation in tuning silicon wafers specifically for use in tandem technologies is critical to leveraging current supply chains, enabling emerging technologies to enter the market rapidly, at scale. Yet use of standard industrial wafers does not allow multijunction or tandem devices to reach their full potential. Through the use of such techniques as laser doping of the silicon semiconductor, improved charge transport properties and effectively improved tandem cell configurations can be obtained. CSIRO has developed a perovskite fabrication process based on atomic layer deposition (ALD), physical vapour deposition (PVD) and chemical vapour deposition (CVD) that can be applied to the silicon substrate. This Fellowship will focus on optimising the silicon wafer for use in tandem cells and work closely as part of a strong Australian and International team of collaborators.

Our research team is investigating new device design and processes to increase device performance and has a focus on fabrication and measurement of thin-film photovoltaic devices, with an emphasis in this Fellowship on silicon wafers as a preferred semi-conductor substrate in tandem junction devices. The incorporation of Perovskite semiconductor as the top-junction in a two-junction perovskite-silicon tandem stack operating in normal sunlight can achieve PCE up to 34%. A truly effective tandem device will limit charge transport bottlenecks at interfaces of the semiconductor junctions and enable a step change in perception of passivation for front and rear contact devices.

The **Postdoctoral Fellow** will design, trial and optimise laser doping strategies, demonstrate innovative/proof-of-concept perovskite-on-silicon tandem cells that utilise industrially sourced silicon substrates and collaborate and contribute more broadly to the experimental program of the Group in tandem cell technologies. The Fellow, working in collaboration with the team optimising the perovskite top-cell, will lead and own the development and demonstration of a new type of laser doping technique for silicon semiconductors specifically applied to demonstrating a new class of multijunction photovoltaic cell and consequently the overall multi-junction cell.

### Duties and Key Result Areas:

* Plan and carry out research that contributes and expands on existing photovoltaic research within the Solar Technologies Group.
* Design, implement and conduct research in the fabrication and characterisation of perovskite-silicon or related semiconductor photovoltaic devices.
* Research and develop new device designs, fabrication processes and characterisation methods for the fundamental understanding of photovoltaic function as it applies to cell performance of silicon semiconductors incorporated in tandem device architectures.
* Undertake regular reviews of relevant literature and patents.
* Produce high quality scientific and/or engineering papers suitable for publication in quality journals, for client reports and granting of patents.
* Prepare appropriate conference papers and present those at conferences as agreed with your supervisor.
* Make a contribution to the effective functioning of the research team and help deliver CSIRO’s organisational objectives and plans.

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

* + 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 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 relevant discipline area, such as Chemistry, Physical Chemistry, Physics or Engineering relevant to Photovoltaics.

*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. Detailed fundamental knowledge of physical chemistry and solid-state physics as it relates to photovoltaic function.
2. A sound understanding of the fundamental issues and present challenges relating to the operation of silicon semiconductors, perovskite and tandem photovoltaic devices and the development of new architectures for such photovoltaic technologies.
3. Enthusiasm for and experience with laboratory work including fabrication of devices and the physical, chemical and electrochemical measurement of new photovoltaic devices – particularly silicon solar cells, perovskite-silicon tandem solar cells or other related silicon semiconductor technologies.
4. Relevant experience in doping strategies for semiconductors such as design of optimum laser doping grid, gas compositions and testing methodologies that dramatically improve the charge transport interface of silicon as a substrate including relevant professional experience obtained through alternative career paths.
5. 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.
6. A sound history of publication in peer reviewed journals and/or authorship of scientific papers, reports, grant applications or patents.
7. A record of science innovation and creativity, including the ability & willingness to incorporate novel ideas and approaches into scientific investigations.

## **Desirable:**

1. Demonstrated knowledge of the optical physics related to photovoltaic component materials and device function;
2. Demonstrated experience and knowledge of atomic layer deposition (ALD), laser doping or gas composition optimisation as applied to silicon or perovskite semiconductors;
3. Experience in the field of electrochemistry, cell efficiency determination and/or the measurement of charge mobility of silicon, perovskite or tandem photovoltaic cells.
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.**

To be appointed to this CERC Postdoctoral Fellowship role within CSIRO, candidates will be expected to commence employment by December 2021/January 2022. To be appointed as a CERC Postdoctoral Fellow within CSIRO, candidates are 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 ($85,361). 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.
* The successful candidate will be required to undertake a pre-employment medical examination prior to commencement.
* 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/)!

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 [Energy](https://www.csiro.au/en/Research/EF)