# Postdoctoral Fellowship – CSOF4

Role summary for potential applicants

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| Advertised Job Title**:** | CSIRO Postdoctoral Fellowship in Tandem Perovskite Solar Cells |
| 58806 | 58806 |
| Classification**:** | CSOF4 |
| Salary Range: | AU $82k to AU $93k plus up to 15.4% superannuation |
| Location**:** | Newcastle, New South Wales |
| Tenure: | Specified Term of up to 3 years (or part time equivalent) |
| Relocation assistance**:** | Will be provided to the successful candidate if required. |
| Applications are open to: | Australian Citizens Only  Australian/New Zealand Citizens and Australian Permanent Residents Only   * All Candidates |
| Functional Area**:** | Research Scientist / Engineer - Postdoc |
| % Client Focus - Internal: | 80% |
| % Client Focus - External: | 20% |
| Reports to the: | Team Leader, Solar Materials |
| Number of Direct Reports: | 0 |

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| **Role Overview:** |
| **Postdoctoral Fellowships** at CSIRO provide opportunities to scientists and engineers who have completed their doctorate and have less than three years relevant postdoctoral work experience. These fellowships will help launch their careers, provide experience that will enhance their career prospects, and facilitate the recruitment and development of potential leaders for CSIRO.  Postdoctoral Fellows **are appointed for up to three years or part time equivalent** and will work closely with a leading Research Scientist or Engineer in their respective field. They carry out innovative, impactful research of strategic importance to CSIRO with the possibility of novel and important scientific outcomes. They present the findings in appropriate publications and at conferences.  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 Perovskite semiconductors in the emerging area of multi-junction or tandem solar cells.  ***Science Background – Perovskite semiconductors and multi-junction devices***  Metal-halide perovskite structures have emerged as an inexpensive and revolutionary family of photoactive semiconductors in thin-film photovoltaics and one of the most highly investigated topics in high-impact publications. Current solar cell technologies are mostly based on silicon wafers (~95% of the 75GWp produced annually) with the world-record for single-junction cells now 26.7% light power-to-electrical conversion efficiency (PCE). In industry that translates to silicon modules at around 20-22% PCE. Recently, metal-halide perovskite (materials with an ABX3 structure) have emerged as an inexpensive and revolutionary family of photovoltaic (PV) materials. The simple fabrication process of perovskite-based devices, and their compatibility with other materials, put them in a unique position to penetrate an expanding PV market.  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 Perovskite semi-conductors as a photoactive material in single and 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%. Often the surface of a silicon wafer is textured and effective in reduction of parasitic reflections, improving light absorption and converting more light to electricity. A truly effective tandem device will limit any interference with or incorporate a textured surface, ideally through a conformal coating.  The **Postdoctoral Fellow** will explore deposition technique / reagent-material / film-thickness parameters and target optimisation of the top-cell in a tandem device by systematically investigating the conditions for depositing a conformal perovskite coating on a complementary semiconductor bottom-cell. Realisation of an effective tandem structure will require the Fellow to innovate in investigation, identification and mitigation of energetic loss mechanisms at the electrode interfaces. Careful design, screening and optimisation of conformal coatings will significantly improve the perovskite top-cell device performance and consequently the overall multi-junction cell. |

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| **Duties and Key Result Areas:** |
| * Under the direction of senior research scientists, carry out innovative, impactful research of strategic importance to CSIRO that will, where possible, lead to novel and important scientific outcomes. * Plan and carry out research that contributes and expands on existing photovoltaic research within the Solar Energy Technologies Group. * Design, implement and conduct research in the fabrication and characterisation of perovskite-silicon or related semiconductor photovoltaic devices. * Incorporate novel approaches to scientific investigations by adapting and/or developing original concepts and ideas for new, existing and further research. * 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 perovskite 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. * Work collaboratively with colleagues within your team, the business unit and across CSIRO. * 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 Values, Health, Safety and Environment plans and policies, Diversity initiatives and Zero Harm goals. * Undertake an appropriate training and development program developed by CSIRO. * Other duties as directed by the Group Leader.   **CSIRO’s postdoctoral training program**is developed between the Postdoctoral Fellow and a senior CSIRO scientist. 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   <http://www.csiro.au/en/Careers/Student-and-graduate-programs/Postdoctoral-fellowships> |

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| **Selection Criteria:** |
| *Under CSIRO policy only those who meet all essential criteria can be appointed*  ***Pre-Requisites:***   1. **Education/Qualifications:** 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 relevant postdoctoral experience.*   1. **Communication: High level written and oral communication skills with the ability to represent the research team effectively internally and externally, including at national and international conferences.** 2. **Publications: A record of publications in quality, peer reviewed journals.** 3. **Behaviours:** A history of professional and respectful behaviours and attitudes in a collaborative environment.   ***Essential Criteria:***   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 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 perovskite solar cells, perovskite-silicon tandem solar cells or other related thin-film technologies; 4. Relevant experience in solution processed thin-film photovoltaics, especially perovskite solar cells, such as fabrication and device function including relevant professional experience obtained through alternative career paths; 5. **The ability to work effectively as part of a multi-disciplinary, regionally dispersed research team, plus the motivation and discipline to carry out autonomous research.** 6. A record of science innovation and creativity, plus the ability and willingness to incorporate novel ideas and approaches into scientific investigations.   **Desirable Criteria:**   1. Demonstrated knowledge of the optical physics related to photovoltaic component materials and device function; 2. Experience in the field of electrochemistry, cell efficiency determination and/or the measurement of charge mobility of perovskite solar cells and/or thin-film photovoltaic cells.   **As Australia’s Innovation Catalyst, CSIRO has strategic actions underpinned by behaviours aligned to**:   * Excellent science * Inclusion, trust & respect * Health, safety & environment * Delivery on commitments.   **In your application and at interview you will need to demonstrate alignment with these behaviours.**  To be appointed as a 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 (AU$82,450).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 security/medical/character clearance requirements. Applicants who are not Australian Citizens or Permanent Residents may be required to undergo additional security clearance processes; which may include medical examinations and an international standardised test of English language proficiency (i.e. IELTS test).- <http://www.ielts.org/default.aspx> |

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| **Other Information:** |
| **How to Apply**  Please apply for this position online at <https://jobs.csiro.au/> and enter requisition number **58806**. Internal applicants please apply via ‘Jobs Central’ in SAP (click ‘Recruitment’)  Please load your CV (Maximum 2MB). You may also be required to respond to some screening questions.  If you experience difficulties applying online call 1300 984 220 for assistance. Outside Australian business hours please email: [csiro-careers@csiro.au](mailto:csiro-careers@csiro.au).  **Referees**: Please provide contact details of two previous supervisor or academic/professional referees in your resume/CV. We will ask your permission before making contact.  **Contact:** If after reading the position details above you require more information please contact:  **Dr Gregory Wilson**via email: [Greg.Wilson@csiro.au](mailto:Greg.Wilson@csiro.au) or phone: **+61 2 4960 6017**  Please do not email your application directly to Dr Wilson. Applications received via this method may not be considered by the selection panel.  **About CSIRO**  Australia is founding its future on science and innovation. Its national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.  Find out more! [www.csiro.au](http://www.csiro.au).  We work flexibly at CSIRO, offering a range of options for how, when and where you work. Talk to us about how this role could be flexible for you.  Find out more! [CSIRO Balance](https://www.csiro.au/en/careers/the-csiro-experience/balance)  **CSIRO Energy**  We are pioneering low-emission technologies that create value for industry and households and provide the knowledge which will help guide Australia towards a smart, secure energy future.  Through our scientists and research facilities, CSIRO Energy is playing an essential role in achieving reduced emissions and the better use of energy resources. Our solar project priorities focus on research at the National Solar Energy Centre and examine the technical, economic, environmental and transitional issues for uptake of new energy technologies.  See more: [www.csiro.au/energy](http://www.csiro.au/energy)  The **Solar Energy Technologies Group** represents CSIRO’s core capability in solar thermal and photovoltaic technologies for power generation and energy storage. Our photovoltaic research activities cover the entire technology chain including new materials discovery, device fabrication and optimisation, materials characterisation and cell performance determination, energy yield and device durability.  **About the region – Newcastle, NSW Australia**  Located in Newcastle, the CSIRO Energy Centre and National Solar Energy Centre is the headquarters for CSIRO Energy and is a focal point in Australia for energy research. Our Energy Centre sets a new benchmark in ecologically sustainable design by showcasing energy generation initiatives, building demand reduction and supply options in conjunction with a significant research and development program across numerous science and engineering domains.  Connected to major Australian capital cities by Newcastle Airport and only a two hour drive north of Sydney, you will find Newcastle, a modern city boasting a rich heritage and stunning coastline. A top ten city in Lonely Planet's guide, Newcastle is ideally situated between amazing beaches, world-class wineries in the Hunter Valley, a world-heritage listed rainforest at Barrington Tops and Australia’s largest salt water lake – Lake Macquarie.  Newcastle is Australia’s sixth largest city, the only regional Australian city located simultaneously on the beach and the harbour waterfront, boasts a picturesque foreshore area that is the perfect place to while away the hours in one of the harbourside cafes, bars or restaurants.  For more information on [Visit Newcastle](http://www.visitnewcastle.com.au/)  or watch the short video on [Newcastle and the Hunter Valley Region](https://youtu.be/mUT_s97GzRw) |