# Research Scientist –CSOF 5

Role summary for potential applicants

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| Advertised Job Title**:** | Research Scientist - Designing and constructing extremophile biobricks and chassis through synthetic biology |
| Reference Number**:** | 37941 |
| Classification**:** | CSOF5 |
| Salary Range: | $92,591-$100,199 plus up to 15.4% superannuation |
| Location**:** | Floreat, WA |
| Tenure: | Specified Term until June 2020 |
| Relocation assistance**:** | May be provided to a successful candidate |
| Applications are open to: | [ ]  Australian Citizens Only[ ]  Australian Citizens and Permanent Residents Only* [x]  All Candidates
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| Functional Area**:** | Research Scientist/Engineer |
| % Client Focus - Internal: | 100 |
| % Client Focus - External: |  |
| Reports to the: | Team Leader (Anna Kaksonen) |
| Number of Direct Reports: | No direct reports  |

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| **Role Overview:** |
| [Future Science Platforms](http://www.csiro.au/en/About/Future-Science-Platforms) are an investment in science that underpins innovation and that has the potential to help reinvent and create new industries for Australia. FSPs will see us grow the capability of new generation of researchers and allow Australia to attract the best students and experts to work with us on future science. They are strategic investments aimed at developing capacity in areas of identified future importance for Australia. FSPs are both impact and science focused, developing innovative scientific solutions with industry, government and university partners. They support world class, coherent and creative research teams which integrate science and delivery over the long term, looking to the future science needs of CSIRO and our partners with a 5 to 10 year vision. To position Australia to build a vibrant synthetic biology research and development community to support the bio-based industries and ecoengineering activities of tomorrow, CSIRO has established the [Synthetic Biology FSP](https://research.csiro.au/synthetic-biology-fsp/) (SynBioFSP). Synthetic Biology (SynBio) is the design and construction of biological parts, devices, and organisms (usually based on DNA-encoded componentry); and their application for useful purposes. The SynBioFSP has a mission to develop capacity in synthetic biology within CSIRO and across Australia, in a collaborative and transparent manner. Science capability will be strongly aligned with CSIRO business unit capabilities and will allow CSIRO to deliver novel future outcomes for external partners. The program has a $13 million funding envelope over the first three years. We aim to:1. Build the foundational capabilities to advance SynBio research, including significant investment in social licence to operate
2. Drive national coordination by making these foundational capabilities widely available to the broad research community, governments, and industry for the development of novel industrial products, pharma, biocontrol agents, and strategies for building ecosystem resilience to environmental change, and
3. Build strong partnerships, collaborations, and connections across the innovation sector to develop these novel products and applications responsibly.

The Synthetic Biology FSP (SynBioFSP) is developing a research portfolio which will be spread across CSIRO and a wide variety of partner organisations (universities, industry, NGOs, other research organisations, etc.), both national and international. The research portfolio is dynamic and will evolve over time on the basis of strategy and performance. Research projects will sit within one or more priority [Application Domains](https://research.csiro.au/synthetic-biology-fsp/application-domains/) (Environment & Biocontrol, Chemicals & Fibres, Organelles & Endosymbionts) and one or more [Science Domains](https://research.csiro.au/synthetic-biology-fsp/science-domains/) (Integrative Biological Modelling, Engineering Novel Biological Components, Assembling Novel Biosystems, Maximising Impact). The SynBio FSP will embed a social and behavioural science agenda to address issues around social licence to operate.Synthetic biology combines life sciences, information technologies, and engineering to allow the creation of desired functionalities. It utilises DNA component (i.e. biobricks) standardisation, de novo design and plugging of modular genetic circuits into suitable host organisms (chassis) to design novel biocatalysts and other products. Extremophilic microorganisms are increasingly considered a valuable asset to synthetic biology and various industries as they are innately tolerant to environmental extremes and enable processes to work beyond the normal range. Extremophiles have a number of strategies to cope with adverse conditions including modifications in their cell structure and biochemical activities. For example, thermophiles and psychrophiles exhibit a tendency to change their lipid membrane composition to avoid temperature stress, halophiles accumulate osmolytes in the cytoplasm to alleviate the effect of the high salt concentrations, acidophiles and alkaliphiles use ion transport pumps for the cell homeostasis, and barophiles tolerate high pressures by increasing the content of unsaturated fatty acids in their membranes. Moreover, some microbes exhibit metal tolerance through internal positive membrane potential that creates a chemiosmotic gradient against which metal cations must move; the formation of metal sulfate complexes reducing the concentration of the free metal ion; efflux proteins that pump metals out of the cytoplasm or conversion of the metal to a less toxic form. While the neutrophilic fast growing microorganisms, such as *Escherichia coli*, commonly used as host organisms in synthetic biology are suboptimal for industrial applications with harsh operating conditions, the integration of novel, genetically tractable extremophilic microorganisms with synthetic biology provide significant opportunities for developing very robust chassis and biobricks that can tolerate several simultaneous stress factors. These could be used as the building blocks for advanced bioprocesses for sustainable resources industries, allowing the extraction of value from low grade ores and waste streams, the utilisation of which would otherwise not be possible e.g. due to toxicity of impurities in the materials or salinity of available water sources. This would create economic impact from recovered revenue and social impact through the creation of new mine operations and extension of the life of existing ones. Moreover, the extremophile host organisms and genetic elements could be used to construct robust biocatalysts for green chemical synthesis that may require harsh process conditions.**The overall objective** of this project is design and construct robust extremophile chassis and biobricks for the resources industry through synthetic biology and metabolic modelling. The project is proposed to have two complementary modules with the following focus areas. **Module 1:** Designing and constructing extremophile biobricks and chassis through synthetic biology**Module 2:** Metabolic modelling of extremophile synthetic biology constructsEach of the modules is proposed to be accomplished with a new hire to be recruited for the project.This role will focus on module 1 of the project, namely designing and constructing extremophile biobricks and chassis through synthetic biology. The incumbent of this position is expected to interact with a Postdoctoral Fellow selected for the module 2 modelling part as the program will be interactive and iterative in nature. |

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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.
* Identify suitable extremophilic host organisms which can carry out desired metabolic reactions for target process applications
* Use cutting edge genomics, bioinformatics and systems biology tools and genomic data available in existing databases to develop a deep understanding of the genetic elements responsible for stress response (e.g. resistant enzymes/proteins, stress response pathways) which make microorganisms more robust and resistant to extreme or fluctuating growth conditions and to select resistance genes for the synthetic constructs.
* Through careful experimental design, select suitable resistance biobricks and, using synthetic biology tools, incorporate them into the chosen extremophilic host organisms to create constructs that are viable in extreme conditions and contain additional desired properties.
* Design and conduct laboratory scale experiments to verify the performance of those synthetic organisms for the target bioprocesses.
* Engage with external collaborators from Montana State University, University of Western Australia and Tampere University of Technology and conduct research visits to the collaborating universities.
* Develop and execute an engagement plan with regulators, industry, environmentalists and the community to evaluate their views on the use of engineered microorganisms for applications in the resource sector.
* Undertake regular reviews of relevant literature and patents.
* Produce progress reports and high quality scientific papers suitable for publication in peer review journals together with other project participants.
* Prepare appropriate conference papers and present those at conferences as agreed with your supervisor.
* Contribute to the development of innovative concepts and ideas for further research.
* 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 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 and Inclusion initiatives and Zero Harm goals.
* Undertake appropriate training courses organised by CSIRO.
* Other duties as directed.
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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 and postdoctoral research experience in a relevant discipline area, such as synthetic biology, molecular biology, bioengineering or related field.
2. **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.**
3. **Publications: A record of publications in quality, peer reviewed journals.**
4. **Collaboration:** A history of professional and respectful behaviours and attitudes in a collaborative environment.

***Essential criteria***1. Strong background knowledge and demonstrated ability to design and carry out experiments, analyse and interpret data in one or more of the following areas: synthetic biology, molecular biology, bioinformatics, bioengineering or related field.
2. Practical experience in one or more of the following areas: synthetic biology, molecular biology, bioengineering, genetic engineering, genomics, bioinformatics, systems biology, extremophile microbiology or related field.
3. Demonstrated originality, creativity and innovation in solving conceptual and experimental problems and introducing new directions and approaches.
4. **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.**
5. A record of science innovation and creativity, plus the ability & willingness to incorporate novel ideas and approaches into scientific investigations.

***Desirable criteria***1. Demonstrated experience in working with non-model microorganisms, ideally extremophiles
2. Demonstrated experience working with, or interactions with, metabolic modellers
3. Demonstrated experience in working with or good understanding of biotechnical processes for environmental and industrial applications.
4. Demonstrated experience in working with external clients and service providers and engagement with various interest groups.

***CSIRO Values:***As Australia’s Innovation Catalyst, CSIRO has strategic actions underpinned by behaviours aligned to: * Excellence in science,
* Inclusion, trust & respect,
* Health, safety & environment
* Deliver on commitments.

In your application and at interview you will need to demonstrate alignment with these behaviours. |

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| **Other Information:** |
| **How to Apply**Please apply for this position online at [www.csiro.au/careers](http://www.csiro.au/careers). You will need to upload your cover letter and resume/CV as ONE document, expressing your interest in the role and addressing each of the Selection Criteria. Please provide sufficient relevant information to enable the selection panel to assess your suitability against the Selection Criteria. Should your application proceeds to the next step, you may be asked to provide additional information.If you experience difficulties applying online call 1300 984 220 and someone will be able to assist you. Outside business hours please email: csiro-careers@csiro.au**Referees**: If you do not already have the names and contact details of two previous supervisors or academic/ professional referees included in your resume/CV please add these before uploading your CV.**Contact:** If after reading the selection documentation you require further information please contact Dr Anna Kaksonen by email at anna.kaksonen@csiro.au or by phone at +61 93336253.**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). **About the SynBio FSP Future Science Platform** For more information, see the [Synthetic Biology FSP](https://research.csiro.au/synthetic-biology-fsp/) website. |