



## School of Chemical and Physical Sciences

### PhD Scholarship in Materials Science or Chemical Engineering for the Development of Novel Controlled-Release Fertilisers and Manufacturing Processes

**Study area(s):** Engineering; Technology; Science  
**Scholarship level:** Doctoral; Doctoral (fully funded)  
**Closing date(s):** 30 April 2024  
**Tenure:** Three years  
**Number offered:** One  
**Value:** \$35,000 (please see additional information)

#### History and purpose

The New Materials and Technologies Development Research Team led by Professor James Johnston in the School of Chemical and Physical Sciences, Te Herenga Waka—Victoria University of Wellington, is seeking a highly motivated and dedicated **PhD candidate in chemistry, materials science or chemical engineering** (or similar), to contribute to our research programme on the development, characterisation, applications, and manufacture of new materials and products derived from our proprietary, nanostructured calcium silicate material, produced sustainably from geothermal resources.

The successful candidate will be an integral part of a dynamic and multi-disciplinary research team working on the chemistry and process engineering, manufacturing methods, performance testing, and refinement of novel controlled-release fertilisers and other materials, that utilise the proprietary nanostructured calcium silicate (CaSil) material together with expertise and knowhow developed by the team.

This PhD project combines particular aspects of chemistry, engineering, and agriculture. It has the potential to contribute to more sustainable agricultural and horticultural farming practices. The overall aim of the research area is to develop, characterise, optimise and demonstrate the effectiveness of new and more efficient fertiliser products where the nutrient availability from the fertiliser matches plant demand more closely, thereby reducing the run-off of excess nutrients to surface waters and preventing pollution.

The PhD research project will involve further developing our understanding of the chemistry, characteristics and performance properties of these nanostructured calcium silicate based

composite fertiliser materials, together with scaling the science and technology to pilot plant operation and production. Also on-farm trials of the composite fertilisers produced. The research will be guided by the propensity to upscale the science and engineering to commercial scale and the overall technical and economic feasibility.

The PhD candidate will utilise and build upon the substantial proprietary knowledge already developed by the team on the laboratory scale development and glasshouse demonstration of CaSil-based fertiliser products, together with our experience in scale-up, pilot plant operation and product performance testing.

### **Responsibilities:**

- Meet the requirements of a PhD research programme in Chemistry or Engineering at Victoria University of Wellington.
- Be an active and contributory member to the New Materials and Technologies Development Research Team led by Professor James Johnston in the School of Chemical and Physical Sciences, Victoria University of Wellington.
- Conduct laboratory work relating to the preparation, characterisation and performance testing and optimisation of controlled nutrient-release fertilisers based on nanostructured calcium silicate.
- Develop and demonstrate innovative manufacturing methods at a laboratory scale that will lead a pilot plant scale development for the production of these novel fertilisers.
- Collaborate with experts to design and carry out field trials to assess the efficacy of the developed fertilisers in real-world agricultural and horticultural settings.
- Engage in pilot plant work to scale up the preferred manufacturing method(s) and ensure feasibility on a larger scale operation.
- Collaborate with industry partners to determine how the manufacturing method(s) can be integrated into current fertiliser manufacturing processes and industry needs.
- Analyse and interpret the laboratory and pilot plant data and results obtained, and use them to optimise the product performance, process chemistry and engineering, and inform the next steps of the development.
- Carry out an initial high level feasibility and economic study for a commercial manufacturing process.
- Document research findings in scientific publications and reports. Prepare and deliver presentations at New Zealand and International Conferences as required. Also for meetings with industry partners.
- Engage with industry and other personnel involved in the research programme as required, in a professional manner.
- Assist with the pilot plant scale operation for the production of the nanostructured calcium silicate material as required.
- Other tasks as required for the project.

## Who is eligible?

- Applicants must have completed a Master's degree or Bachelor's degree with Honours in Chemistry or Chemical Engineering, with First or Upper Second Class Honours (or similar), or an equivalent GPA score.
- The Chemistry qualification should have an emphasis on materials science, the Chemical Engineering qualification on process engineering, or similar.
- Candidates must meet the entry requirements for a PhD degree in Chemistry or Engineering at Victoria University of Wellington.
- Applicants must be able to commence their PhD programme by mid 2024. Māori students are strongly encouraged to apply.

## Selection criteria

- A Master's degree or Bachelor's degree with Honours in Chemistry or Chemical Engineering (or similar), with First or Upper Second Class Honours (or similar), or an equivalent GPA score.
- The Chemistry qualification should have an emphasis on materials science, a Chemical Engineering qualification on process engineering, or similar.
- A demonstrated passion for research and a keen interest in new product and process development, scale-up, and progression to commercialisation.
- Demonstrated excellence in laboratory and practical skills and experience in designing and conducting experiments, including the construction and assembly of equipment as required. Experience in pilot scale operation will be beneficial.
- Strong analytical and problem-solving abilities.
- Preferably have experience in working and communicating with industry and Māori organisations.
- Effective communication and presentation skills for collaborating with both research colleagues and industry partners.
- The ability to work independently and as part of a collaborative team.
- Satisfy the English language requirements as per the Victoria University of Wellington PhD degree entry requirements.

## Application process

Enquiries and Applications should be provided by email and addressed to:

Professor James Johnston  
School of Chemical and Physical Sciences  
[jim.johnston@vuw.ac.nz](mailto:jim.johnston@vuw.ac.nz)

**Applications should include:**

- A personal statement of interest in the position and opportunity, together with an explanation of relevant background experience and what you wish to achieve from the study.
- Certified Academic Transcript including qualifications, courses and grades.
- Curriculum Vitae including a list of publications and conference presentations (if any).
- The names, positions and email addresses of two suitably qualified and experienced who can be approached by the University and asked to provide references.
- Experience in working with industry or on industry-related projects.
- Preferred start date.
- Other information considered to be relevant.

**The closing date for applications is 30 April 2024.**

The selected applicant has to then apply formally for a PhD Place at Victoria University of Wellington.

For further information click on the following link to [apply for a doctoral admission](#).

## **Selection process**

The successful recipient will be selected by Professor James Johnston and members of his Research Team.

## **Additional information**

The value of the scholarship is \$35,000 stipend per annum plus PhD Tuition Fees for 3 years.

Assistance with travel to Wellington may be provided.

The Scholarship will be paid directly to the student as monthly stipend payments and PhD tuition fees will be paid directly to the University.

## **Regulations and conditions**

1. A completed online application must be submitted by 4.30 pm on the closing date. Late or incomplete applications will not be accepted. Any required supporting documentation (including references) must also be received by 4:30pm on the closing date in order for the application to be considered.
2. The Successful recipient must have gained acceptance into the PhD programme in Chemistry or Engineering at Victoria University of Wellington.
3. The research is externally funded and integral with industry engagements. Accordingly, the student will be required to enter into Non-disclosure agreement(s) as required. Also the student does not have any claim to Intellectual Property developed during the research.

4. Should the recipient withdraw from Victoria University of Wellington during the tenure of this scholarship or fail to achieve a satisfactory progress, partial repayment of the Scholarship will normally be expected. Recipients must advise the Scholarships Office if they intend to withdraw.
5. Recipients are expected to act as Ambassadors for Victoria University of Wellington and participate in appropriate events or marketing if requested.

## **Contact**

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