

# HDR PROJECT SUMMARY

## ALUMINA REFINERIES' NEXT GENERATION TRANSITION (ALUMINEXT) PROJECT – ALUMINA CALCINATION

### HDR PROJECT DESCRIPTION

The Alumina Refineries' Next Generation Transition (ALUMINext) Project will address both the short-term need to de-risk relatively high TRL technologies that can be incorporated as a retro-fit to reduce emissions from current alumina refineries and advance the development of novel technologies needed to unlock a step-change in increased efficiency and reduced cost in next generation net zero refineries. To mitigate risk and increase process efficiency in electrification or H<sub>2</sub> retrofitting/replacement. More details of the fundamentals of these processes within the environments of alumina calciners (retrofitting or next generation) are needed to support the development of new calcination technology.

### PROJECT OBJECTIVES

There is insufficient understanding of how new calciner reactors will behave under the atmosphere of operating in steam and or with electrification or hydrogen combustion, leading to risks of unexpected outages and not meeting the smelter grade alumina (SGA) standards. This project will provide the new experimental data of the behaviour of alumina particles under the conditions of emerging net-zero processes reactors, namely for operation under steam-rich environments.

### PROJECT SCOPE

The scope of this project includes the generation of new insight into alumina calcination reactions within a steam environment. Lab scale reactor experiments will be conducted under the conditions relevant to emerging net-zero processes reactors, aiming to enhance kinetic models and product quality analysis.

### QUALIFICATIONS AND EXPERIENCE

Candidates are required to have:

- A Master's degree or a Bachelor's degree with Honours in a relevant field such as Chemical Engineering, Mechanical Engineering, or a closely related field.
- A strong background in thermodynamics, reaction engineering, heat transfer, and materials science.
- Experience in experimental design and laboratory techniques for conducting chemical reactions and materials characterisation.
- Experience with techniques such as X-ray diffraction (XRD), scanning electron microscopy (SEM), differential scanning calorimetry (DSC), and thermogravimetric analysis (TGA).
- Demonstrated problem-solving skills and attention to detail.
- Creativity and ability to develop innovative solutions to challenging problems.

To determine your eligibility for studying at The University of Adelaide visit: [adelaide.edu.au/graduate-research](https://adelaide.edu.au/graduate-research)

For further enquiries and more details, please contact Dr Woei Lean Saw:

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### PRIMARY UNIVERSITY SUPERVISOR

- Dr Woei Lean Saw  
The University of Adelaide

### CO-SUPERVISORS

- Professor Gus Nathan  
The University of Adelaide

### PROJECT PARTNER

- The University of Adelaide

### PROJECT TYPE

- PhD

### DATE ADVERTISED

- Wednesday 8 May 2024

# HILT CRC POSTGRADUATE PROGRAM

**Are you interested in receiving training from world-leading researchers, whilst working with industry partners on real-world problems?**

**Join the HILT CRC postgraduate program for a research career in de-risking decarbonisation for heavy industry.**

Through engagement with industry and universities we are committed to training the heavy industry workforce of the future through practical, demand driven research projects with world-leading teams and facilities.

We offer Higher Degrees by Research (HDR) through a PhD or Masters qualification for up to 3.5 years duration, providing you with the opportunity to acquire world-leading training in a field of growing demand to take your engineering career further.

By joining our postgraduate research program, you will work on real industry problems and challenges with the potential for immediate high-impact practical results to decarbonise heavy industry.

**When undertaking a research degree with us, you will also gain:**

**Expert knowledge** – designed specifically for the heavy industry sector and draws on your foundation of engineering knowledge by developing further skills tailored to transitioning the steel, iron, alumina and cement industries to reduce heavy industry's carbon emissions.

**Invaluable networking opportunities and professional development** – benefit from opportunities to collaborate and network with multiple industries and research experts and teams via participating in the HILT CRC specialised webinars, yearly conferences, and master classes.

**Career outcomes** – linked with industry and government, you will gain hands on industry experience to help you develop the skills required to operate in a new low-carbon economy, become an expert in your field, and enhance your employability.

**A platform for communicating your findings** – your research findings may be presented at industry conferences, published, commercialised and in turn, create a positive impact on society.

## Financial Support and Scholarships

We can provide full, co-funded or top-up scholarships to eligible postgraduate students (Higher Degree by Research students at both Master and PhD levels) across our three research programs at our partner universities. The distribution of funding is at the discretion of the principal (main) supervisor of the project and may be used for student stipend, costs associated with the research project or other expenditure related to the project.

Any student interested in undertaking a postgraduate scholarship is encouraged to review the [Scholarship Guidelines](#) and complete the [HDR Scholarships Application Form](#). Details for how to apply for postgraduate scholarships are included in the guidelines.

## How to Apply

All HILT CRC prospective postgraduate students are required to enrol in their degree through their host institution as per the normal university application process. Therefore, students need to meet the requirements stipulated by the host university to enrol (e.g. appropriate Honours or Masters degree).

## Further Information

For more details about the postgraduate research opportunities and projects, and financial support with HILT CRC, contact us at [hdr@hiltcrc.com.au](mailto:hdr@hiltcrc.com.au)