Project Title - Building a fundamental understanding of factors affecting efficiency of Supercritical UV disinfection technology

Host University - Massey University

Industrial Partner – NovoLabs Ltd.

Academic Supervisor(s)

Assoc. Prof. Nicola Brown
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Industrial Supervisor(s)

Andy Shilton
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Project Description

This PhD project will investigate, model, and optimise Supercritical UV™ disinfection technology - a breakthrough New Zealand disinfection technology developed by NovoLabs™ for treating low-clarity liquids such as wastewaters, industrial liquids, liquid food and beverages, etc.

Conventional UV systems lose effectiveness when UV transmittance (UVT) drops below about 40 percent due to light attenuation and particle shielding. Supercritical UV™ disinfection systems overcomes these limitations through its patented design.

NovoLabs™ is a young company spun out of university research (recently awarded as the best spin out company in Australasia in 2024), but it has already treated more than 4 billion litres of liquid in commercial applications. The technology is patented in countries representing over 70 percent of global GDP. To support growth and expansion of the product range, a deeper mechanistic understanding of the technology is being developed.

The student will review and experimentally investigate multiple parameters that may impact the efficiency of the system. These studies will identify which parameters most strongly govern delivered dose and thus energy use.

The overall goal is to establish a detailed mechanistic understanding validated via through real-world performance testing on operating Supercritical UV™ disinfection systems.

Supervision will be shared between Associate Professor Nicola Brown of Massey University and Professor Emeritus Andy Shilton, who is the inventor of Supercritical UV™, ensuring both academic rigour and industrial relevance.

By lowering UV energy demand and eliminating the need for chemical dosing to make disinfection possible with legacy technologies, this research aligns with Aotearoa New Zealand's Emissions Reduction Plan, the Carbon Neutral Government Programme, and UN SDGs 6, 7, 9, and 13, integrating Māori principles of kaitiakitanga and mauri ora to deliver sustainable, low-emission innovation that protects wai and strengthens community wellbeing.

Student Time Split

University base for student (university, campus, department):

Massey University, Turitea, School of Food Technology and Natural Sciences.**Industry base for student (company, site, address):**

NovoLabs, Palmerston North, 7/9 Noel Rodger Place, Milson.

Expected Time Split Between University and Industry Partner (in months):

25% University and 75% NovoLabs

Rationale for Time Split

The student will be provided with office facilities located at NovoLabs along with access to NovoLabs R&D space, design and prototyping facilities. Microbiological testing and analysis as well as discussions with Associate Professor Nicola Brown will be conducted at Massey University which is just 15 minutes way.

Application

To apply for this project please first read the guidance document and then then complete the application form on the Applied Doctorates Scheme website.