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**Funded PhD Positions in Microalgae Cell-Wall Analysis**

**and Enzymatic Disruption (2 x Scholarships Available)**

Dr. Ronald Halim

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UCD Conway Institute, BiOrbic Bioeconomy Research Centre

**MicroLysis – Understanding the ultrastructure of microalgae cell walls to enable energy-efficient and non-degradative biomass fractionation**

**Project description:** We seek **two** motivated and enthusiastic PhD candidates to work on an Irish Research Council project in microalgae cell-wall analysis and enzymatic disruption

Microalgae can play a critical role in the global effort to capture CO2 emissions, bioremediate wastewaters and produce sustainable biofuels and food/feed/pharmaceutical products (*e.g.*, ω-3 lipids, protein). Microalgal products are mostly intracellular in nature and can only be made accessible after liberation from cell-wall encapsulation. The cell walls of industrially promising microalgae genera (such as ω-3 rich *Nannochloropsis* and protein-rich *Chlorella)*, however, are comprised of multilayered biopolymers that confer the cells with formidable defence against external processing. The high-energy requirements and degradative nature of mechanical cell disruption to release intracellular products remains a critical barrier to microalgae commercialisation. Enzyme treatment is an attractive alternative to mechanical cell disruption due to its low-energy requirements and substrate-specific nature limiting product degradation, but the high-cost of purified enzymes makes this treatment commercially prohibitive especially for production of low-value products.

MicroLysis aims to develop a low-cost enzymatic cell-disruption for the scalable fractionation of *Chlorella* and *Nannochloropsis* biomass. The project will first investigate the ultrastructure of microalgae cell walls before using these insights to design enzyme treatments that are specifically tailored to the wall structure. The 2-step investigation will allow for a minimization of enzyme requirements and a reduction in commercial costs. The specific objectives of two PhD students are:

* To use advanced biochemical, physical and microscopic methods to study the architecture of microalgae cell walls and monitor how these models change with cultivation on different wastewaters (PhD 1).
* To use the cell-wall models developed above to design low-cost enzyme treatments that are specifically tailored to the microalgae species (PhD 2).

**Requirements:** The candidates should have a good primary degree (first or 2.1 Honours) and/or Master’s in Biotechnology, Chemical/Bioprocess Engineering, Food Technology, Microbiology, Molecular Biology, Plant Science, Analytical Chemistry or related disciplines. They should be prepared to work in a professional manner in a multidisciplinary team and engage with industry partners and collaborators. Candidates should demonstrate the ability to write reports, prepare journal articles, deliver presentations, work independently and as part of a team. Previous lab experience and publications in microalgae are a significant advantage.

**Award**s**:** Both PhDs will be conducted under the supervision of Dr. Ronald Halim at UCD Biosystems and Food Engineering (<https://people.ucd.ie/ronald.halim>). The students will gain training/experience in microalgae cultivation and bioanalytical techniques (*e.g.*, microscopy, GCs) and have access to core technologies in genomics, microscopy, and flow cytometry at UCD Conway Institute. Each scholarship provides a yearly living stipend of €18,500 and contribution to university fees for three years. Both EU/UK and international candidates are welcomed. The students will also have access research infrastructure and support at BiOrbic, Ireland’s national Bioeconomy Research Centre.

**Stipend for each scholarship:** €18,500 (tax-free) per annum plus tuition fee contributions of €5,750 p.a.

**Project Duration:** 3 years

**Deadline to submit applications:** 4th October 2022, 5 p.m. Irish Standard Time.

**Expected project commencement date:** November 2022 – January 2023

**Application procedure:** To apply, please email full CV, a cover letter and copies of degree transcripts by the deadline to ronald.halim@ucd.ie for the attention of Dr Ronald Halim. Please provide any relevant details on research/work experience and study motivation in your CV and cover letter. Please label your email as ‘Application for PhD MicroLysis project – Your Name’. In your CV, please provide contact details of two referees (we will not contact them without your permission). Informal queries on the project can be made to Dr Ronald Halim (ronald.halim@ucd.ie).