Flinders UNIVERSITY

Centre for Marine Bioproducts Development

RESEARCH PROJECT AND SCHOLARSHIP OPPORTUNITIES @ CENTRE FOR MARINE BIOPRODUCTS DEVELOPMENT, FLINDERS UNIVERSITY

CENTRE FOR MARINE BIOPRODUCTS DEVELOPMENT

The Centre for Marine Bioproducts Development (CMBD) is a cross-college research centre with members from Flinders University's College of Medicine and Public Health and College of Science and Engineering. It is the first facility and grouping of expertise of its kind in the southern hemisphere. Since 2007, the Centre operates through collaborations, partnerships and networks with like-minded researchers and industry partners to progress regional and global blue bio-economies. CMBD, Flinders University is the bid leader of the successful Marine Bioproducts Cooperative Research Centre (MB-CRC) in Round 22 with a total of $270 million R&D investment including the federal funding of $59 million over 10 years. MB-CRC bring together 68 industry and research partners together to enable the wide-ranging, decade-long R&D program to transform Australia's emerging marine bioproducts sector into a sustainable, clean, and globally competitive industry.

The ocean contains unknown varieties of new marine bioresources, spawning innovation in food production, health and nutrition, and fuel and energy alternatives. We are diving deep and developing new marine bioproducts and the latest bioprocessing technologies, focussing on green and circular manufacturing. We are globally recognised as research leader on Australia's marine bioresources – up to 95% of which are not found anywhere else in the world.

CMBD novel marine bioproducts scope is diverse, aiming to develop sustainable and profitable seafood and functional foods, marine nutraceuticals and cosmeceuticals, marine bioproducts and biomaterials, biomedicine and marine biofuels industries, and the advanced manufacturing processes to manufacture them in the circular economy context.

CMBD's mission is to lead the discovery, innovation and industry adoption of commercial bioprocesses and bioproduct based on Australia's marine biodiversity to enhance the Australian marine biotechnology industry as a major contributor to the international Blue Bioeconomy.

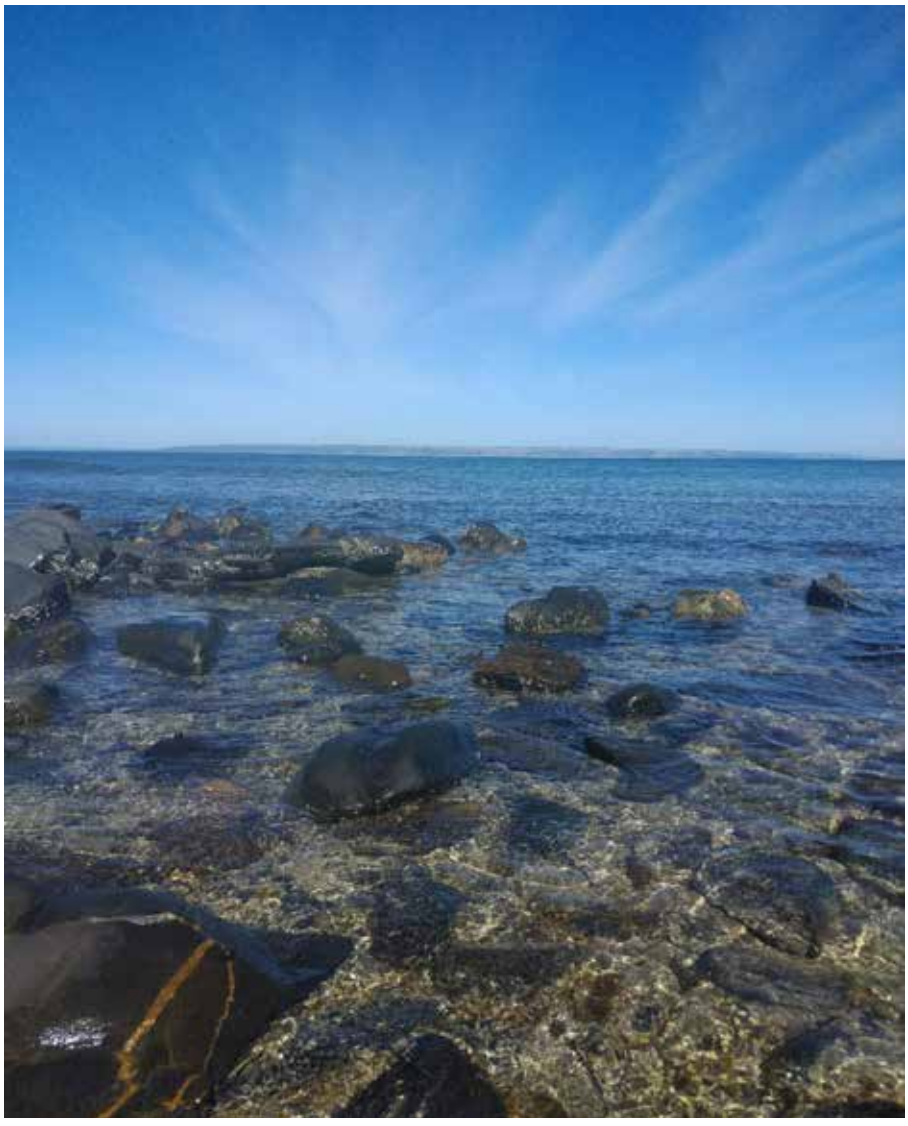
Our research is as unique as the ocean life we are investigating. We are leading a new wave in marine biotechnology application, industry enhancement and environmental protection for sustainable industries of the future.

RESEARCH OPPORTUNITIES

CMBD conducts marine bioprocesses, bioproducts and biotechnology research in conjunction with a wide range of disciplines including medicine, health, disease treatment and prevention, food sciences, agriculture, aquaculture, environmental protection and management, renewable energy and biotechnological engineering.

Highly motivatived researchers and engineers at CMBD are leading breakthrough innovations. We invite the next generation of Australian and international postgraduate students (Honours, Masters and PhD) to become involved in this research. We offer the opportunity to make a significant impact in the fast-growing third generation industry in sustainable marine bioproducts.

To express your interest for the project areas below and find out more refer to “HOW TO APPLY FOR A RESEARCH PROJECT” on the last page.



“SHAPING THE AUSTRALIAN THIRD GENERATION OF MARINE BIOPRODUCTS INDUSTRY FOR SUSTAINABLE GROWTH.” - CMBD

SCHOLARSHIPS AND TOP-UP SCHOLARSHIPS

PHD APPLICANTS:

CMBD rewards academic excellence and encourages domestic and international applicants to apply for various scholarships from Flinders University, the Australian government, their home countries and any other third party sources. The standard Australian PhD scholarship is currently valued at $28,597 (tax-free) per year for a duration of three years. CMBD will offer a 'Top-Up scholarship' of an additional $5,000 per year to a value of $33,597 (tax-free) per year for those PhD applicants who have secured other scholarships. For PhD students who have demonstrated outstanding academic performance in their first year, the Top-Up scholarship of $10,000 will be offered per year for years 2 and year 3 of their PhD candidature to a value of $38,597 (tax-free) per year.

CMBD also offers a research project-based scholarship at the standard rate for excellent PhD candidates, and we encourage you to make contact for us to ascertain that you meet the eligibility requirements and selection criteria in each project area.

MASTERS OF BIOTECHNOLOGY APPLICANTS:

The Biotechnology postgraduate program at Flinders is designed to provide you with advanced theoretical scientific knowledge and strong research training plus an understanding of industry and business matters required for modern biotechnology.

Flinders University is a pioneer in biotechnology education in Australia and places a strong emphasis on research training with a 10-month research project.

CMBD will offer a scholarship of $5,000 per student for outstanding Masters of Biotechnology students who have gained a minimum GPA 6.0 (out of 7.0) and/or demonstrated academic excellence and research potential. These students will undertake their 10-month Masters research project under the supervision of HDR supervisors at our Centre. Our staff run world-class research programs in a wide range of areas of biotechnology, including cancer and immunology research, biomaterials, bio-processing, plant disease resistance and biocontrol, enzyme applications, therapeutic drug discovery, functional foods, bio-energy, water quality, and marine and environmental biotechnology.

BIOTECHNOLOGY (HONOURS) APPLICANTS:

CMBD accepts applicants who will conduct their Bachelor of Science (Honours) (Biotechnology) degree in the core research areas of marine bioproducts, bioprocesses and biotechnology. The Honours year will be composed of a one-month intensive entrepreneurship topic in how to take biotechnology discoveries to the marketplace; and a 9-month research project focusing on a selected research topic under the supervision of HDR supervisors at the CMBD.

The Centre will offer a scholarship of $5,000 per student for outstanding Honours applicants who have gained a minimum GPA 6.0 (out of 7.0) and/or demonstrated academic excellence and research potential.

Photo below
Vice-Chancellor's Prize for Doctoral Thesis Excellence 2018. Prof Robert Saint, Dr Suvimol Charoensiddhi, Dr Qi Yang, Prof Chris Franco

Food and nutraceutical developments from marine under-utilised bioresources

DEGREE OFFER: PhD/Masters/Honours

HOST UNIVERSITY: Flinders University, Adelaide, Australia

HOST LABORATORY: Centre for Marine Bioproducts Development

TOTAL DURATION: Three years with a maximum 4 years for PhD/10-month for Masters and Honours.

STARTING DATE: Any time in the year for approved PhD candidates; two intakes, either in February or July for Masters and Honours students. We welcome students who wish to forward plan their project.

PROJECT DESCRIPTION

Team Research Area Description

In Australia, marine bioresources including microalgae, seaweeds, and seafood processing by-products, are abundantly availabe and enriched with a variety of functional ingredients, nutrients, and bioactive compounds. They have been identified as a sustainable promising bioresource for development of various functional foods and nutraceutical products. However, extraction of these valuable components from such marine bioresources for commercial product development is still a challenge. This project will investigate extraction efficiency of various marine bioproducts using different emerging and patented technologies includinig Supercritical Fluid Extraction (SFE), Microwave-Assisted Extraction (MAE), Ultrasound-Assisted Extraction (UAE), Pulse Electric Field (PEF), and Vortex Fluid Device (VFD). These technologies have demonstrated high extraction yields, are low cost, and are characterised by shorter processing times and lower solvent use. The extracted products will be characterised and analysed in composition, functionalities, bioactivities, and nutritional values to determine their potential applications in product development as well as commercialisation. This project will recruit one PhD and two Masters/Honours students working with different bioresources for developing a variety of targeted products.

Project Details

i. The PhD candidate will develop efficient and feasible technologies for production of bioactive peptides, nutritional proteins, and protein-based meat alternatives from microalgae, as these organisms are exceptionally rich in protein and have been identified as a sustainable unconventional protein source for human consumption. This position will investigate efficiency of different technologies on cell disruption, protein extraction, fractionation and purification of proteins and biopeptides. Bioinformatic tools will be used for predicting potential biopeptides derived from known sequences of microalgal proteins and for screening potential enzymes in-silico prior to experimentally conducting hydrolyses. The feasibility and scalability of using different technologies (chromatography, membranes, macroporous filtration, tangential flow filtration) for fractionation and purification of protein and biopeptides will be also be analysed. The PhD candidate will conduct several biochemical and cellular assays to determine potential applications of the extracted proteins and biopeptides. Large-scale production of food and nutraceutical products will be computer-simulated using commercial software to investigate the economic feasibility for up-scaled manufacturing.

ii. One Master/Honour candidate will develop a green biorefinery technology for recovery of chitin, protein, and minerals from shrimp processing by-products (SPBs). The candidate will investigate efficiency of deproteinisation, demineralisation, and depigmentation of SPBs using microwave- and ultrasound-assisted technologies in combination with green extraction solvents, e.g. enzymes, food organic acids, deep eutectic solvents. Efficacy will be assessed through the determination of degrees of deproteinisation, demineralisation, and depigmentation. The extracted products will be characterised using HPLC, ICP-MS, UV-VIS, FTIR to determine their purity, acetylation degree, molecular weight, and structural spectra. Functional properties (fat/cholesterol binding, emulsification, foaming ability and stability) and quality attributes (nutritional profiles, digestibility, bioavailability) of these products will also be investigated for evaluation.

iii. Another Master/Honour candidate will work on developing commercial products from lobster bioproducts including chitin, protein, and minerals. Lobster protein and minerals derived from lobster shells may have bioactive and therapeutic properties for developing nutraceutical products, as they contain anti-oxidant carotenoids and have a high calcium content. This position will engage in profiling bioactive patterns of lobster shell proteins using bioinformatic tools and proteomic techniques. Biomineralisation and bioavailability of lobster waste will also be investigated using cellular assays. Moreover, lobster chitin will be converted from insoluble crystalines into dissolutionised micro/nano fibres for developing bioactive packages, drug carriers or vaccine adjuvants. Chemical, morphological, and functional characterisation will be conducted for chitin derivatives and chitin-based products to evaluate their commercialisation potential.

Preferred Project Criteria

i. Knowledge in the fields of biotechnology, biochemistry, chemical analysis, food science and technology, processing technologies, product and process development.

ii. Tolerant of seafood smells and free of seafood allergies.

iii. Ability to work independently and collaborate with other researchers using different extraction technologies, purification, characterisation, and statistical analysis.

iv. PhD applicants will provide relevant academic references.

Marine microbial natural products development for industry application

DEGREE OFFER: PhD/Masters/Honours

HOST UNIVERSITY: Flinders University, Adelaide, Australia

HOST LABORATORY: Centre for Marine Bioproducts Development

TOTAL DURATION: Three years with a maximum 4 years for PhD/10-month for Masters and Honours.

STARTING DATE: Any time in the year for approved PhD candidates; two intakes, either in February or July for Masters and Honours students. We welcome students who wish to forward plan their project.

PROJECT DESCRIPTION

Team Research Area and Description

The Marine Microbial Biotechnology team at CMBD focusses on biodiscovery research from marine microbes and microbe-derived products development for industry application using diverse biotechnological approaches. Microbes are sourced from varying marine organisms, such as marine sponges and plants, as well as macro- and microalgae. Industrial applications primarily target food and pharmaceutical industries. The microbiome analysis approach developed in-house using advanced Next Generation Sequencing, will provide a distinctive technical advantage for microbiome-based research.

Project Details

i. Agricultural chemistry application: marine bacteria-derived herbicides or antibiotics
Marine-derived bacteria are a major source of novel natural products with diverse potential bioactivities. While most of the screening studies have targeted human diseases, the potential for agrichemical activities such as antibacterial, antifungal, and herbicidal activities for agricultural applications remain largely under-explored. This project focusses on screening herbicidal activities of extracts from Australian marine sponge-associated actinobacteria, with a view to discovering and developing a new generation of marine-derived herbicides to tackle the global problem of increased herbicide resistance. Seed germination assays will be used to evaluate herbicidal activity of actinobacteria-derived metabolites produced under different cultivation conditions. Selected active metabolite extracts will be tested in greenhouse screening trials. Inhibitory effects will be investigated to evaluate the potency of potential herbicidal compounds. Antibacterial activity screening assays will be conducted to select target extract fractions in order to identify the compound candidates with promising function as antibiotics for biocontrol application. Biochemical techniques (e.g. Thin Layer Chromatography, High Performance Liquid Chromatography) will be employed to identify, characterise and purify target compounds.

ii. Marine microbial enzymes for industry application
Marine organisms – such as bacteria, fungi, sponges, and algae – have long been recognised as an untapped source of enzymes, but only a tiny fraction of marine enzymes have been commercialised. Scientific research has demonstrated that marine bacteria produce a wide range of enzymes fit for industrial applications and marine bacteria are generally considered to be one of the main sources of novel industrial enzymes. Thus, this project will investigate the diversity of bacterially produced enzymes, such as amylases-, lipases- and proteases – produced by bacteria associated with a marine host, (e.g. marine sponges and seaweeds), and to screen the activities of the microbial enzymes. Bacteria will be cultivated by fermentation for the production of enzymes. Both qualitative assays and spectrophotometric assays will be applied to determine the activities. SDS polyacrylamide gel electrophoresis (PAGE) will be used for characterisation of proteins based on differences in molecular weight and protein will be purified by ammonium sulfate precipitation using dialysis and chromatographic techniques.

Preferred Project Criteria

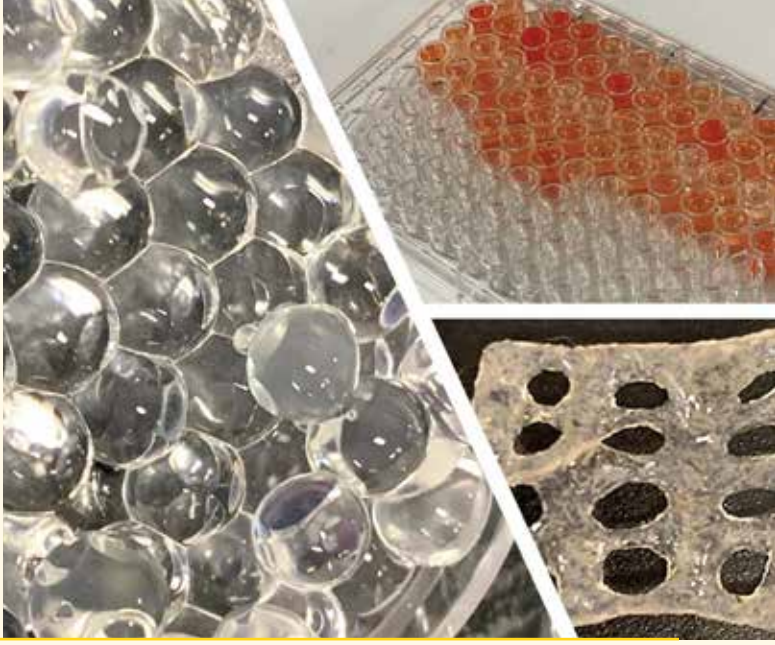
i. Knowledge in the fields of microbiology, molecular biology, marine biology, or biotechnology.

ii. Applicants will have experience working in laboratories.

iii. Participation in scientific conferences and/ or membership in scientific/ industry Associations and Societies.

iv. PhD applicants are expected to have published research articles or review articles in relevant fields.

Novel 3D-bioprinting biomaterials and bioinks



DEGREE OFFER: PhD/Masters/Honours

HOST UNIVERSITY: Flinders University, Adelaide, Australia

HOST LABORATORY: Centre for Marine Bioproducts Development

TOTAL DURATION: Three years with a maximum 4 years for PhD/10-month for Masters and Honours.

STARTING DATE: Any time in the year for approved PhD candidates; two intakes, either in February or July for Masters and Honours students. We welcome students who wish to forward plan their project.

PROJECT DESCRIPTION

Team Research Area and Description

All research degrees (PhD/Masters & Honours) will undertake research in the area of Marine Biomaterials to develop 3D-Bioprinting platforms at the centre. The projects are inter-disciplinary and offer opportunities for national and international collaboration. The aim of the research includes development of a comprehensive design and fabrication process flow diagram, in-depth physio-chemical characterisation of biomaterials to address Critical Quality Attributes (CQA) of products and Quality by Design (QbD). The projects will involve innovative technologies from functional chemistry, biochemistry and biomedical to develop artifical scaffolds for tissue and organ regeneration. The application of novel biomaterials will be focussed in skin care and neuronal organoids for tissue regeneration using 3D-bioprinting technology. Masters & Honours candidates will be involved in projects on analytical characteristation of biopolymers, chemical modification of biopolymers and preliminary testing on 3D-bioprinting. The PhD project will include design and development of biomaterial scaffolds for bioink, computational modelling for constructing scaffolds, formulation of bioink for 3D-bioprinting, in-vitro testing of bioink and feasibility assessment for 3D-bioprinting.

Project Details

i. Structural modification of alginate to develop novel 3D-Bioprinting biomaterials
The proposed research is cutting-edge in renewable biomaterials science, particularly with regards to enhancing mechanical stability and structural integrity of 3D-scaffold biomaterials. It aims to generate scientific understanding on the development of tuneable properties in alginate-based biomaterial scaffolds suitable for tissue engineering and 3D- bioprinting for artificial tissue and organ replacements. Alginate is a polysaccharide from brown seaweed and composed of -D-mannuronic acid (M-block) and -L-guluronic acid (G-block) which typically form a co-polymer. The G blocks in alginate are the primary binding sites that impart viscosity to the resulting alginate solution which interacts with Ca^{2+} ions to cross-link to form hydrogels. Alginate-based biomaterials have been in development for a decade, but cell and tissue applications require modification of the physico-chemical properties of natural alginate to improve mechanical strength. Mechanical stability is an important attribute that needs to be achieved for a material to be deemed suitable as a biomaterial for producing 3D-tissue regeneration scaffolds. By utilizing the functional groups of alginate (- COOH, -OH), the approach aims to create supramolecular structures to control mechanical strength of the material and achieve structural stability, mimicing native cellular matrices. This project will include application of in-house patented technology – the Vortex Fluidic Device to slice the structure of alginate to alter its physico-chemical properties.

Analytical techniques including SEM, FTIR, NMR, HPLC, XRD, XPS, TGA, DSC, DLS will be used to characterise novel biomaterials. Biomaterials will be tested for 3D-bioprinting at industrial scale.

ii. Developing novel bioinks for 3D-bioprinting
3D-printing using biomaterials as ink can create devices, implants, scaffolds for tissue engineering, diagnostic platforms, and drug delivery systems. The development of 3D-printing requires materials that not only possess excellent mechanical properties, biocompatible and self-repairing features but are also degradable. Most biomaterials in 3D-printing are synthetic degradable polymers such as poly (lactic acid), poly(lactic-co-glycolic) acid. Biomaterials derived from natural polymers such as alginate are considered potential candidates that can replace synthetic polymers, based on abundance and sustainability and versatile properties. However, 3D-printed objects using these materials currently lack tuneable mechanical strength and require frequent part replacements of damaged parts. The in-house developed biomaterials will be used to test applicability to 3D-printing and investigate bio-functionalities. The bioink will be extruded with cells using 3D-bioprinter for specific bioprinting subjects using a computational modelling software and in-depth cell proliferation and survival kinetics will be conducted. Cell integrity, regeneration and growth will be studied in 2D and 3D models. Explorations of 3D-printing conditions for cell and tissue growth using new type of materials will investigate effects of temperature, printing speed and resolution to optimise the mechanical properties.

Preferred Project Criteria

i. Knowledge in the fields of microbiology, chemical engineering, biotechnology or material science.

ii. Demonstrated research experience in analytical characterisation – NMR, HPLC, FTIR, SEM, DMA.

iii. Demonstrated skills in cell culture and in-vitro toxicology studies.

iv. Demonstrated well-developed interpersonal skills and ability to work in team environment.

v. Demonstrated literature review skills.

Development of Australian seaweed-based functional food and bioplastic

DEGREE OFFER: Honours

HOST UNIVERSITY: Flinders University, Adelaide, Australia

HOST LABORATORY: Centre for Marine Bioproducts Development

TOTAL DURATION: 10-months

STARTING DATE: Two intakes, either in February or July, and we welcome students who wish to forward plan their project.

PROJECT DESCRIPTION

Project Details

i. Vegan friendly functional food development from South Australian seaweed

Vegan is a type of vegetarian diet that excludes meat, dairy, eggs and all other-animal derived ingredients. The global demand for vegan foods/ingredients is rising with many willingly accepting a drastic lifestyle change. There is increasing consumer awareness and perception related to the potential benefits of animal-derived products. The market size was valued at USD 12.69 billion in 2018 and is projected to expand at a CAGR of 9.6% from 2019 to 2025, up to USD 14 billion. According to Vegan Australia (www.veganaustralia.org.au), "To be healthy we must all make sure we are consuming the right balance of nutrients". Furthermore, research has shown that seaweed plays a vital role in marine life and is the primary source of food for a variety of creatures in the ocean. A broad range of health benefits have been associated with the consumption of seaweed, with macroalgal preparations and extracts now a common sight in health-food stores and pharmacies. The bioactive compounds responsible for these effects are diverse, ranging from the structural polymers that account for much of the plant biomass, to small compounds present only at trace quantities. Seaweeds contain essential vitamins and minerals, such as vitamins K and B, iodine, iron, and zinc together with plant compounds that have strong antioxidant effects.

Whilst the edible whole seaweeds for human consumption market is dominated by China, Japan and South Korea, Western consumers are becoming increasingly fond of seaweed food products, such as sushi and seaweed salads, a trend facilitated by the perception of being healthy and natural. Abundant species along Australia's Southern coastline, include brown algae belonging to the genera Durvillaea, Macrocystis and Sargassum, and green algae including Ulva spp. (sea lettuce), Monostroma spp. and Caulerpa spp. (seagrapes), are consumed in soups and salads by coastal communities around the world.

This project will recruit one Honours student working on South Australian seaweed, Ecklonia radiata biomass for developing a variety of targeted vegan-friendly food products with commercialisation potential for the Australian market.

This position will investigate customer demand, segmentation and market trend of vegan-friendly functional food products for Australia and identification of particular commercial interests for product forms; developing various prototype products which will be chemically analysed and spectrometrically characterised using HPLC, ICP-MS, UV-VIS, FTIR to determine their functional properties (fat/cholesterol binding, emulsification, foaming ability and stability) and quality attributes (nutritional profiles digestibility, bioavailability), culminating in the development of advanced processing and formulation technologies, and novel functional seaweed foods/ingredients products; validation of health and nutritional benefits in vitro or in vivo; and techno-economic assessment for commercialisation.

ii. Development of marine polysaccharides-derived bio-composite materials for innovation in environmentally friendly food packaging products

By 2050, plastic waste is expected to increase to 12 Gt. Of this waste (6.3 Gt), only 21% is being recycled or incinerated, whereas the remaining 79% either enter landfills or are released into the environment. Many plastics take more than 100 years to fully degrade, highlighting the need to either reduce plastic use or use degradable bioplastics. In addition, 4.8 of the 12.7 million tons of land-based plastic debris escape into the ocean annually, increasing the plastic component of marine litter to 80%. This contributes to increased death rates of marine organisms due to the entanglement in and ingestion of plastic waste. In addition, many chemicals are additives in plastic materials. These microplastics, nanoplastics and chemicals can cause various harmful effects in marine life, such as hormone disruption and reproductive abnormalities. Therefore, bioplastics derived from bio-based polymers from natural bioresources are being increasingly used commercially in many industries. However, despite the urgent need for sustainable and biodegradable materials for mass-produced commercial products, the use of biopolymers and theirs composites in modern engineering and industry setting still has many limitations.

Seaweed contain large quantities of renewable biopolymers. A wide range of naturally occurring polymers derived from seaweeds such as alginates, carrageenan, and agar are proposed to be used in different products, while many others remain underutilized (i.e., fucoidan, ulvan). These biopolymers have shown great characteristics for various applications due to their unique film-forming ability and excellent mechanical properties. These properties can be further improved following various modification techniques i.e. reinforcement and blending. The potential of seaweed as filler in polymer composites provides evidence to improve the thermal, physical, and mechanical properties of synthetic polymer matrices. Seaweed therefore is a highly renewable resource for the development of biocompatible and environmentally friendly materials.

This project will recruit one Honour student working on seaweed and chitin ploysaccharide-based bioplymers to develop novel bio-composite materials for environmently friendly food packaging products. This position will investigate customer demand, segmentation and market trend of bioplastic materials and products for food packaging; developing various prototype biofilm materials with different physical/chemical properities, including, Scanning Electron Microscopy (SEM) Analyses, characterisation of density, thickness, water solubility, testile property, water vapour permeability, etc; and, culminate in the development of various innovative food packaging prototype products and techno-economic assessment for commercialisation.and chitin ploysaccharide-based bioplymers to develop novel bio-composite materials for environmently friendly food packaging products. This position will involve investigating customer demand, segmentation and market trend of bioplastic materials and products for food packaging; developing various prototype biofilm materials with different physical/chemical properities, including, Scanning Electron Microscopy (SEM) Analyses, characterisation of density, thickness, water solubility, testile property, water vapour permeability, etc; and, culminating in the development of various innovative food packaging prototype products and techno-economic assessment for commercialisation.

Preferred Project Criteria

i. Knowledge in the related fields of biotechnology, biochemistry, chemical analysis, food science and technology, processing technologies, product and process development.

ii. Familiar with food product developement procedure, standards and regulations.

iii. Ability to work independently or collaborate with other researchers in use of varyingtechnologies for product development and analysis.

"PHD RESEARCH AT CMBD IS A STEPPING STONE INTO A REWARDING PROFESSIONAL CAREER IN BIOTECHNOLOGY."

- CMBD

Functional food product development from marine and terrestrial bioresources

DEGREE OFFER: PhD/Masters/Honours

HOST UNIVERSITY: Flinders University, Adelaide, Australia

HOST LABORATORY: Centre for Marine Bioproducts Development

TOTAL DURATION: Three years with a maximum 4 years for PhD/10-month for Masters and Honours.

STARTING DATE: Any time in the year for approved PhD candidates; two intakes, either in February or July for Masters and Honours students. We welcome students who wish to forward plan their project.

PROJECT DESCRIPTION

Team Research Area and Description

The Marine Health and Nutrition Products team at CMBD focuses on researching and developing functional food products based on the "Edible medicines theory and practice" which is applied in ancient medicine and cutting-edge modern biotechnology for developing medicine and food technologies from both marine and terrestrial environments. We are aiming to develop a series of functional foods containing ingredients that add more than just nutrition, to improve the quality of life and for better overall health and wellbeing of the human population.

Project Details

i. Functional food research based on bioactive extracts of sea cucumber and Ginseng
The growing population of sub-healthy people and increased ratios of older people in society has led to an increasing demand for healthy products with functional attributes such as anti-fatigue, improving memory activity, immunomodulating, and age-delaying. Sea cucumber and Ginseng have been investigated and reported to show activities in these areas. Moreover, they have been used, especially in the Southeast Asian region, for thousands of years due to the high medicinal properties and nutritional value. Based on long-standing research involving sea cucumbers and Ginseng, our team aims to develop two functional foods with different efficacies. One will focus on improving health through anti-fatigue and immune-modulation; and the second will delay physiological ageing via neuroprotective activities. The research work involves product formulation development, process optimisation, and unravelling functional mechanisms.

ii. Research and development of functional food products for reproductive health
Reproduction is the most basic function of an organism. When a living body completes its reproductive cycle, the ageing process commences. Delaying loss of reproductive function is a fundamental way to delay ageing and age-related conditions. This research aims to develop functional food products to meet the needs of human reproductive health. Based on ancient medicine and cutting-edge modern biotechnology that maintain reproductive function, the research will screen biochemical profiles and develop active ingredients from bioresources of both terrestrial and marine environments. This will benefit the development of reproductive cells and delay reproductive ageing. The research will also examine underpinning mechanisms of activity, focussing on product development to improve reproductive functions via antioxidant and anti-inflammatory effects, and assess feasibility and functional tests for pre-clinical assessment of efficacies.

Preferred Project Criteria

i. Knowledge in the fields of biotechnology, biochemistry, chemical analysis, food science and technology, processing technologies, product and process development.

ii. Ability to work independently or collaborate with other researchers using different technologies for extraction, purification, characterisation, and statistical analysis.

iii. Theoretical knowledge and/or research experience in ancient medicine or food science & nutrition.

SUPERVISOR TEAM

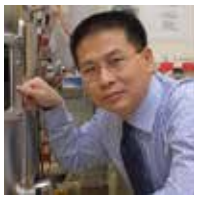
Successful candidates will work under the collaborative supervision of several leading professors who are recognised worldwide for their cutting edge research acitivities in the outlined ressearch areas and teaching expertise in bioprocess engineering and marine bioproducts development, green chemistry and technology, natural products discovery and development, applied biotechnology for microalgal production, food, pharmaceuticals, and biomedicine.

All supervisors have a large network of domestic and international collaborations and extended professional affiliations which are conducive to enhanced career development and success.

These collaborations aim to share knowledge and resources, improve efficiency by working together to deliver quality outcomes.

Successful candidates will receive professional co-supervision, consultations, and support from the reseach team at CMBD, comprising several experts in process intensification (development of green extraction technologies) and product development, human nutrition and gut microbiomes, biodegradible and biomedical material development, tissue engineering, and medical biotechnology.

For more information on the supervisory team and CMBD research themes, please follow the links:



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DR. MICHAEL CONLON

www.research.csiro.au/nutritionandhealth/research-groups/nutrition-and-health-substantiation/our-team/

CMBD RESEARCH TEAM (Academia and Professional)
www.flinders.edu.au/centre-marine-bioproducts-development/who-we-are

CMBD RESEARCH THEMES
www.flinders.edu.au/centre-marine-bioproducts-development

ELIGIBILITY

MASTERS DEGREE BY RESEARCH

To be accepted for enrolment, an applicant must:

i. have a Bachelor degree with Honours from an Australian university (in a project related field), or the equivalent qualification as approved by the relevant authorised delegate;

ii. meet the English language requirements specified by the University; and

iii. satisfy the University that they are reasonably likely to be able to successfully complete the requirements of the award within the maximum duration.

If you hold specific international qualifications and you require advice about whether they meet the academic entry requirements, please email intladmissions@flinders.edu.au

Pathway to Masters by Research Study. Direct entry into a PhD is dependent on the strength of your research background. Applicants may be offered enrolment into a Master by Research with an opportunity to transfer to a PhD if appropriate progress is demonstrated.

HOW TO APPLY FOR A RESEARCH PROJECT

i. A one-page cover letter of motivation outlining why the applicant should be considered for this position.

ii. A detailed CV –This should include details such as education, work experience, skills, dissertations, research interests, career objectives, names and contact details of two referees (at last one academic) who are willing to be contacted about your potential suitability for the position, and/or list of publications if any.

iii. A transcript of the studies' grades (including the overall grade) if available.

iv. Proof of English language proficiency e.g. English language certificates for non-native speakers.

v. At least one recommendation letter, preferably by the Master's thesis supervisor (PhD position only).

Email applications to CMBD HDR Advisor - AProf Kirsten Heimann
Email address: kirsten.heimann@flinders.edu.au

DOCTOR OF PHILOSOPHY

To be accepted for enrolment, an applicant must:

i. have at least one of the following Australian qualifications (in a project related field), or the equivalent qualification as approved by the relevant authorised delegate:

- a Bachelors degree with Honours class 1 or 2A
- a Doctor of Medicine with minimum Credit average
- a Graduate Diploma or Masters degree by coursework with a research component of at least 18 units, with an average grade of Distinction or better in the research component
- a Masters by Research degree;

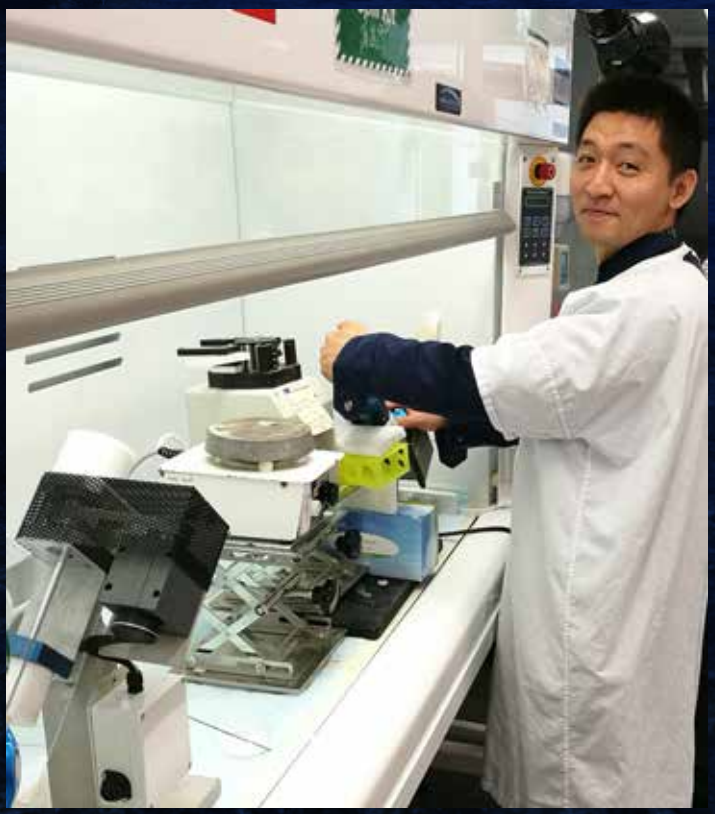
ii. meet the English language requirements specified by the University; and

iii. satisfy the University that they are reasonably likely to be able to complete the requirements of the award within the maximum duration.

(Above) Maher Jedi Memorial Prize for research excellence in biotechnology 2021. PhD candidate Bunu Tamang, Associate Prof Kirsten Heimann

(Left) Vice-Chancellor's Prize for Doctoral Thesis Excellence 2018. Prof Wei Zhang, Dr Qi Yang, Dr Suvimol Charoensiddhi, Prof Chris Franco

(Below) PhD candidate Miansong Zhang



(Below) CMBD laboratory facilities

(Left)PhD candidate Adele Mastroyannis.

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CRICOS No: 00114A