

Centre of Excellence in Advanced Food Enginomics

Postgraduate Research Scholarship in Advanced Food Enginomics

Project Descriptions

General Description:

The Centre of Excellence in Advanced Food Enginomics (CAFE) is offering a scholarship for several exceptional students with a background in Chemical and Biomolecular Engineering or relevant field to undertake a PhD as part of our reputed research team. The CAFE has been established at the University of Sydney in 2017. This centre aims to meet the food and health challenges of the 21st century creating and delivering nutritious and wholesome processed foods to improve human well-being. The CAFE comprises a cross-disciplinary cluster of high profile researchers. All research will be conducted using the state-of-art facilities and equipment located at the Faculty of Engineering, Charles Perkins Centre and Sydney Institute of Agriculture.

This will be a unique and exciting opportunity to:

- Work in a rich and multidisciplinary research environment
- Be mentored by reputable, world-leading researchers in the areas of engineering, agriculture, science, molecular biology and medicine
- Partake in translational research with substantive commercial impact
- Build entrepreneurship and innovation expertise in the Australian R&D sector
- Travel to top universities around the world and interface with internationally reputed specialists
- Work at the frontier of food enginomics and science
- Make a significant contribution to solving the food and health challenges of the 21st Century

General eligibility:

A preferred applicant must have:

- a strong honours degree in Chemical Engineering, Bioengineering, food chemistry or relevant field
- an ability to work both independently and collaboratively across different research disciplines and industry
- excellent communication and interpersonal skills with high level of competency in both written and spoken English.
- a proven record of exceptional academic and extracurricular performance

Project 1 – Study the effect of food structure and properties on digestion and health

There is increasing awareness of the role of food on human health. Current experimental techniques largely involve animal models and clinical trials both of which have some limitations. The aim of this project is to design the next generation of *in-vitro* gut model and use this model to examine the impact of food composition and engineering on microbiome and health. This is a truly interdisciplinary project that will be at the forefront of advanced technology to acquire fundamental knowledge for future food processing.

Project eligibility:

- Interest and experience in material development, electronics, design and the use of analytics system and equipment
- A demonstrated knowledge material/polymer engineering, mechanical engineering, process design, physics and chemistry

For further information contact:

Prof. Fariba Dehghani, Centre for Advanced Food Enginomics, School of Chemical and Biomolecular Engineering, The University of Sydney
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Project 2 – Stomach Simulation

The stomach plays a key role in digestion and also in satiety. A better understanding of the stomach is necessary in areas as diverse as food safety, pharmaceuticals and obesity. This project will focus on modelling the complex food rheological properties and their effects on digestion, through the use of Computational Fluid Dynamics.

Project eligibility:

- A degree in Applied Mathematics, Chemical Engineering or Mechanical Engineering.

For further information contact:

Professor David Fletcher, School of Chemical and Biomolecular Engineering, The University of Sydney,
david.fletcher@sydney.edu.au, Tel: 612 93514147

Project 3 – Future Food Engineering: Alternative Nutritional Protein Source

The global population is increasing rapidly and it is expected to increase 70% food production for this growth by 2050. In particular, protein is one of the main nutrients that will play a key role in our health. There will be issue to rely on livestock as the only protein sources due to shortage of land and water in future. Alternative protein sources and production methods are required to fulfil the demand of consumers and to meet predicted global protein requirements. Seaweed and microalgae are promising sources for protein as well as micronutrients and phytochemicals with health benefits. The aim of this project is to address the major challenges in production of algae to enhance the recovery and absorption of proteins and other nutritional compounds in digestion system. The project will examine the impact of enzymes and microbiota on release of active compounds and digestion of nutrients in algae.

Project eligibility:

- A degree in a related field of engineering (e.g. chemical or mechanical) or science (e.g. chemistry or microbiology).

For further information contact:

Dr John Kavanagh, School of Chemical and Biomolecular Engineering, The University of Sydney,
john.kavanagh@sydney.edu.au, Tel: 612 9036 9642

Project 4 – Future Food Processing: Pulse and Fibre

Pulses have emerged as a major Australian crop, however the vast majority of the pulse are exported without value adding. This project will investigate the fundamentals of pulse processing and impact on sensorial properties for developing palatable nutritional food products for aging populations.

Project eligibility:

- A degree in a related field of engineering (e.g. chemical or mechanical) or a degree in food science/chemistry.

For further information contact:

Professor Timothy Langrish, School of Chemical and Biomolecular Engineering, The University of Sydney, timothy.langrish@sydney.edu.au, Tel: 612 9351 4568

Project 5 – Sensor design for food safety, quality and traceability

Future food packaging will not be merely limited to containing a product, but rather will play a pivotal role in providing information about the authenticity, quality, and history of the packaged food. This interdisciplinary project aims to design sensors that are necessary for monitoring food quality incorporating sensors into packaging will offer new opportunities to reduce food waste, improve efficiency, and prevent food-related illnesses

Project eligibility:

- Interest in material processing, biosensor design and food safety
- A demonstrated knowledge of material engineering, electrochemistry, physics, chemistry and the use of analytics system and equipment

For further information contact:

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Project 6 – Sustainable packaging

There is an urgent need to develop sustainable packaging for food products to reduce the consumption of non-degradable-fossil based polymers in food packaging. This project will focus on utilising naturally derived polymers and biodegradable polymers for developing packaging materials for suitable physico-chemical properties.

Project eligibility:

- Interest and experience in polymer, biopolymer, packaging and food waste reduction
- Strong experience knowledge in polymer engineering, material Engineering and chemistry

For further information contact:

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Application guide:

For further information, please contact relevant supervisors.

For more information about the School of Chemical and Biomolecular Engineering please see: <http://sydney.edu.au/engineering/chemical>