



## **PhD Scholarship (Manufacturing Lightweight Rocket Fuel Tanks to Make Space Affordable)**

**Centre for Future Materials, University of Southern Queensland**

### **About us**

The University of Southern Queensland (USQ) is a dynamic regional University committed to developing research solutions that deliver a global impact. With a vision to be a leading discovery partner in priority research areas, USQ aligns its research with regional and global agendas in agriculture and natural resource management, regional development, regional health and wellbeing, engineering, education and digital literacy.

The Centre for Future Materials (CFM) delivers world class research in the design and development of innovative materials for diverse engineering applications. With a strong focus on polymer and concrete composites, CFM drives the development of low cost, sustainable, automated production technologies, servicing the aerospace, space, defence, marine, wind energy and civil sectors. The Centre has a significant portfolio of research activity and funds from the ARC, CRC and Industry and hosts researchers who have contributed to USQ's recent Excellence in Research for Australia 2018 rating of well above world class for Materials Engineering.

### **PhD Scholarship**

USQ is looking for two PhD student researchers, to develop composite rocket fuel tanks for low cost space transport. The project will demonstrate the critical technologies in manufacturing linerless, filament wound composite tanks for liquid oxygen. The project will manufacture cryogenic linerless composite fuel tanks up to two meters in diameter and trial them in rocket flights. The project outcomes will achieve up to 30% weight savings and 25% cost savings for Gilmour commercial rocket launch services.

PhD Topic A – Cryogenic composite materials

- A1. Optimise manufacturing temperature profile for winding and curing for increased performance
- A2. Understand cryogenic mechanical properties of cured composite coupons and hybrid joints

A3. Improve cryogenic mechanical properties by graphene additives

PhD Topic B – Robotic filament winding process

- B1. Process design of liner-less tank manufacturing
- B2. Filament winding robotic simulation and visualization
- B3. In-process defect monitoring
- B4. Optimise the control over eight degrees of freedom of the filament winding

### **Candidate Selection Criteria**

Your energy and initiative, combined with your interest regarding composite materials and manufacturing will be vital to your success in this role. In addition, you will have:

1. a Bachelor's degree with First Class Honours or Second Class Honours (Division A) at an Australian University or equivalent in materials engineering, mechanical engineering, mechatronic engineering, computer engineering or
2. a Master's degree at an Australian University or equivalent (containing a significant research component) with a GPA of at least 5 on a 7-point scale
3. nationality requirement subject to Australian Defence security clearance

### **The location**

As a PhD student of USQ, you will experience rewarding campus life and community. You will also join a diverse, highly motivated and collaborative team of researchers - all while enjoying the relaxed lifestyle and family-friendly atmosphere afforded by living in Toowoomba.

USQ Toowoomba is located on the beautiful Darling Downs in Queensland. Situated on the edge of the picturesque Great Dividing Range, just one and a half hours west of Brisbane and only two hours from both the Gold and Sunshine Coasts, Toowoomba offers all the benefits of urban living without any of the big-city pressures. With a population of approximately 160,000 residents, Toowoomba has an enviable reputation for quality of lifestyle and world-class education. Escape the pressures of big city life while still pursuing your career goals and enjoy all that this thriving regional community has to offer.

**Remuneration:** 3-year scholarship, with university tuition fee waiver and annual stipend AU\$30,000 tax-free.

**If you want to pursue a PhD study in these research areas, we invite you to submit your resume/CV. You can send your resume/CV to Dr Xuesen Zeng (email: [Xuesen.zeng@usq.edu.au](mailto:Xuesen.zeng@usq.edu.au)).**