TUS
Technological University of the Shannon
Midlands Midwest
Ollscoil Teicneolaíochta na Sionainne:
Lár Tíre Iarthar Láir

POSTGRADUATE RESEARCH OPPORTUNITY

Project Title: From Crack to Compliance: Engineering Halogen-Free Polyisocyanurate (PIR) Sandwich Panels Against Cold-Weather Tension Cracking

Short Project Description:

Rigid polyisocyanurate (PIR) insulated sandwich panels are widely used in energy-efficient building envelopes because of their excellent thermal performance, structural properties and durability. However, changes in formulation, manufacturing conditions and low-temperature environments can influence the mechanical behaviour and dimensional stability of rigid PIR foam systems.

This Innovate for Ireland iScholar PhD, delivered in partnership with Kingspan, will investigate the relationships between blowing-agent chemistry, polymer-network architecture, cellular morphology and the low-temperature mechanical performance of PIR sandwich panels.

The research will support the development of next-generation halogen-free PIR technologies with improved low-temperature robustness, while maintaining the thermal, fire and structural performance required for high-performance building-envelope applications.

The project will integrate three principal areas of investigation:

- **PIR formulation and blowing-agent chemistry:** investigation of how formulation and blowing-agent selection influence foam structure, thermal behaviour and low-temperature performance;
- **Polymer-network structure and mechanical behaviour:** understanding the relationships between network architecture, curing chemistry, thermal transitions and fracture behaviour;
- **Cellular morphology and modelling:** investigation of how foam-cell structure and morphology influence mechanical response, supported by advanced characterisation, image analysis and computational modelling.

The successful candidate will synthesise and formulate PIR foams at laboratory scale at the PRISM Research Institute, Technological University of the Shannon (TUS), Athlone Campus, and will use a range of advanced polymer and materials characterisation techniques.

The candidate will also undertake structured short-term placements at the Kingspan IKON Innovation Centre, Kingscourt, Co. Cavan, totalling approximately eight weeks across the four-year project, gaining direct experience of industrial R&D, pilot-scale manufacturing and industrial-scale testing and validation.

The iScholar will participate in the Innovate for Ireland Entrepreneurial, Leadership and Innovation (ELI) training programme, alongside the TUS Structured Doctoral Programme, and will disseminate research findings through peer-reviewed publications, international conferences and engagement with the industrial partner.

Type of Degree Offered:

Doctor of Philosophy (PhD)

Duration of Project:

48 months (4 years), full-time.

Funding Agency:

Research Ireland – Innovate for Ireland Programme (Industry Partnership Stream), co-funded with Kingspan.

The Scholarship Provides:

- **Stipend:** €31,000 per annum for 48 months;
- **Fees contribution:** €5,500 per annum towards PhD registration fees;
- **Research support:** laptop, research consumables, access to TUS PRISM analytical facilities, open-access publication costs, international conference travel and structured placements at Kingspan IKON.

Minimum Qualifications/Experience Necessary/Any Other Requirements:

Applicants must have a primary degree in a field related to:

- Polymer Science / Polymer Engineering;
- Materials Science / Materials Engineering;
- Chemistry; or
- a closely related discipline.

A relevant Master's degree is desirable.

Candidates should have a strong background in polymer chemistry and demonstrate knowledge of thermoset polymer systems, such as polyurethanes, polyisocyanurates, epoxies, phenolics or unsaturated polyesters, including aspects of their synthesis or formulation, curing chemistry and structure–property relationships.

Minimum academic classification: *2.1 honours degree or equivalent.*

IELTS [International English Testing System] Applicants must have a minimum of 6.5 with no component score less than 6.5.

Desirable Skills and Experience:

The successful candidate would ideally demonstrate some of the following:

- Hands-on experience in the formulation or processing of thermoset systems such as foams, coatings, adhesives or composites;
- Experience with polymer and materials characterisation techniques such as FTIR, DSC, DMA, TGA, SEM, mechanical testing or fracture testing;
- An interest in, or experience of, finite-element modelling, design of experiments, statistical data analysis or image analysis;
- Strong interest in sustainable manufacturing, advanced polymer materials, low-carbon construction materials and industry-facing research;
- Good written and oral communication skills;
- Ability to work both independently and as part of a multidisciplinary academic–industry research team;
- Evidence of, or potential for, innovative thinking, leadership and entrepreneurial development.

Familiarity with rigid polyurethane/polyisocyanurate foams, cellular polymer materials or building-envelope materials would be advantageous.

Candidates should be willing to travel for short research placements at the Kingspan IKON Innovation Centre, Kingscourt, Co. Cavan.

Project Lead Supervisor:

Dr Pavan Paraskar
PRISM Research Institute
Technological University of the Shannon

Co-Supervisors:

Dr Ian Major – PRISM Research Institute, TUS
Pamela Roycroft – IKON Innovation Centre, Kingspan

For further information about the project, please contact: Dr Pavan Paraskar – pavan.paraskar@tus.ie

TUS is committed to equality, diversity and inclusion and welcomes applications from groups under-represented in engineering and the physical sciences.

Closing date for receipt of completed application from is 5 pm 27th November 2026 Interviews will take place within the subsequent weeks.

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Download TUS Scholarship application form below, put project title in the subject line and email pro@tus.ie:

Further information and the application form are available at: https://tus.ie/rdi/research/office/funded-research/