



TUS

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

POSTGRADUATE RESEARCH OPPORTUNITY

Project Title: Droplet formation through an alternative cost-effective material for an active vibrating mesh of a nebulizer (ALTNeB).

Short Project Description: Palladium (Pd) constitutes the main material of the active vibrating mesh as part of a medical nebulizer that aerosolize medication to treat lung diseases. This material needs to be replaced due to a constant depletion in the Pd global supply and a steady increase in the Pd price. Replacing Pd with a cost-efficient material will overcome this problem and more importantly will contribute to a significant decrease in the market price of the nebulizer making it affordable globally.

Good nebulizer performance is characterised by a low droplet size and high flow rate. These characteristics are desired for an efficient medication deposition inside the lower region of the lungs and a faster treatment time for the patient.

Currently, the mechanism of droplet formation through the Vibrating mesh nebulizer (VMN) is not fully understood and often, development of new nebulizers implies a costly trial-and-error approach.

The research will imply using a combination of Literature review findings, Numerical predictive simulation models and Optimization techniques using dedicated software packages, Experimental testing, Analytical models, and Cost benefit analysis to develop a new cost-efficient nebulizer using an alternative material.

The expected outcomes include a novel predictive Computational Fluid Dynamics (CFD) droplet formation model that will replace the traditional trial-and-error methods, and which will be validated through a suite of dedicated experimental testing in collaboration with the enterprise partner.

Duration of Project: 48 months

Funding Agency: TUS RISE Scholarship comprises of a monthly stipend, materials budget and postgraduate fee for the duration of the award only.

Type of Degree Offered: PhD

Minimum Qualifications/Experience Necessary/Any Other Requirements:

Candidates with primary degrees in Mechanical and Manufacturing Engineering.

Minimum classification of 2.1 honours or equivalent relevant Industrial experience.

Knowledge of using CAE (Computer Aided Engineering), Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) software is highly desirable.

IELTS [International English Testing System] Applicants must have a minimum of 6.0 with no component score less than 6.0.

Research Supervisors: Dr. Daniela Butan, Dr. Sean Cunningham, Dr. Lisa Henihan, Dr. Emma Kelly

For further information, please contact: Dr. Daniela Butan, daniela.butan@tus.ie



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AN tÚDARÁS um ARD-OIDEACHAS
HIGHER EDUCATION AUTHORITY

TU RISE is co-financed by the Government of Ireland and the European Union through the ERDF Southern, Eastern & Midland Regional Programme 2021-27 and the Northern & Western Regional Programme 2021-27



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Closing date for receipt of completed application form is 5pm on Tuesday, 4th June. Interviews will take place within subsequent weeks.

Download TUS RISE application form here:

<https://tus.ie/rdi/research/office/funded-research/>



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