



Applications are invited from suitably qualified candidates for the following position:

Research Centre	I-Form
Post title	Postdoctoral Researcher In Combination of In- Situ Sensors for Enhanced Monitoring of Porosity of AM Produced Metal AM Printed Components
Level on Framework	Level 1
Post duration	3 Year Fixed Term Contract

# **Dublin City University**

Dublin City University (DCU) is a leading innovative European University. It is proud to be one of the world's leading Young Universities and is among the world's top 2% globally. DCU is known as Ireland's University of Impact, with a mission to 'transform lives and societies' and focuses on addressing global challenges in collaboration with key national and international partners and stakeholders.

DCU has over 20,000 students in five faculties spread across three academic campuses in the Glasnevin-Drumcondra area of North Dublin. Thanks to its innovative approach to teaching and learning, the University offers a 'transformative student experience' that helps to develop highly sought-after graduates. DCU is currently No. 1 in Ireland for Graduate Employment Rate, and for graduate income (CSO).

DCU is a research-intensive University and is home to a number of SFI-funded Research Centres. The University participates in a range of European and international research partnerships. DCU is also the leading Irish university in the area of technology transfer as reflected by licensing of intellectual property.

As a 'People First' institution, DCU is committed to Equality, Diversity and Inclusion - a University that helps staff and students to thrive. The University is a leader in terms of its work to increase access to education and is placed in the world's Top 10 for reducing inequalities in the Times Higher Education Impact Rankings.

## **Background & Role**

The I-Form Advanced Manufacturing Research Centre has been established by Science Foundation Ireland (SFI) to deliver high-impact, innovative science and engineering research. I-Form has particular focus on additive manufacturing ('3D printing') combined with advanced digital technologies applied in a precision manufacturing environment, see https://www.i-form.ie/. The Centre brings together a multi-disciplinary team of over 100 researchers in manufacturing engineering, materials and data science, in a cross-disciplinary and translational research environment. I-Form operates in close collaboration with a global network of companies and collaborators.

# The Project

From our research over the last few years, we have shown that the signals from IR sensors can be used to detect porosity defects during laser processing. The sensor data when combined with data measured from the produced part (e.g. porosity from micro-CT), has been successfully used to develop ML algorithms which can detect porosity, with a view to developing a process digital twin. Due to in-process monitoring sensor limitations, however, there is poor detection of porosity with sizes below 20 µm, even though a significant level of gas porosity in particular can occur at this scale. In this project, new sensors will be integrated within the metal AM process in order to detect smaller scale defects at higher levels of sensing and prediction accuracy. In this project, multiple sensor signals (such as image, optical emission and pyrometer) will be combined as hyperspectral signals with a view to enabling a significantly more accurate prediction of material porosity. The recorded sensor signals will be examined with a view to provide an exemplar parts (in stainless steel, Inconel and NiTi) with improved properties (increased actuation displacement control, shape recovery and fatigue life). The stress-strain response of the actuator will be monitored for several million cycles, this data will be correlated with its microstructure. The product and production digital twins will be linked to provide a performance digital twin of the actuator.

# **Principle Duties and Responsibilities**

Please see attached job description for principal duties and responsibilities of the role.

# Qualifications, Skills and Experience Required

The candidate must have a PhD in Materials and Manufacturing Engineering. The team is seeking high performance, aspiring applicants with a desire to discover new knowledge and to drive forward advanced materials and manufacturing technologies.

In addition, it is desirable that the candidate has a subset of the following skills:

- Demonstrated ability in conveying their research nationally and internationally (for example by publishing in high quality peer reviewed journals of international standing, presentation at conference and through interaction with industrial partners).
- Experience in assisting with the supervision of postgraduate students would also be desirable as would financial management of a research project.
- A demonstrated ability of good communication skills will be sought.

As part of this role the researcher will be required to participate in the DCU Research Career Framework. This framework is designed to provide significant professional development opportunities to Researchers and offer the best opportunities in terms of a wider career path.

## Candidates will be assessed on the following competencies:

**Discipline knowledge and Research skills** – Demonstrates knowledge of a research discipline and the ability to conduct a specific programme of research within that discipline

**Understanding the Research Environment** – Demonstrates an awareness of the research environment (for example funding bodies) and the ability to contribute to grant applications

**Communicating Research** – Demonstrates the ability to communicate their research with their peers and the wider research community (for example presenting at conferences and publishing research in relevant journals) and the potential to teach and tutor students

**Managing & Leadership skills** - Demonstrates the potential to manage a research project including the supervision of undergraduate students

## **Essential Training**

The postholder will be required to undertake the following essential compliance training: Orientation, Health & Safety, Data Protection (GDPR) and all Cyber Security Awareness Training. Other training may need to be undertaken when required.

**Salary Scale:** IUA Postdoctoral Researcher Salary Scale - € 42,783 - €54,965 Please refer to <u>DCU Pay scales</u> for the applicable pay scale.

\*Appointment will be commensurate with qualifications and experience will be made on the appropriate point of the salary scale, in line with current Government pay policy.

**Closing date**: Friday, 10<sup>th</sup> November 2023

### For more information on DCU and benefits, please visit Why work at DCU?

### Informal Enquiries in relation to this role should be directed to:

Professor Dermot Brabazon, Director of I-Form/ School of Mechanical & Manufacturing Engineering, Faculty of Engineering and Computing, Dublin City University. Email: dermot.brabazon@dcu.ie

### Application Procedure:

Application forms are available from the DCU Current Vacancies website at <u>https://www.dcu.ie/hr/vacancies-current-vacancies-external-applicants</u>

Applications should be submitted by e-mail with your completed application form to <u>hr.applications@dcu.ie</u>

**Please clearly state the role that you are applying for in your application and email subject line:** Job Ref: RF1930 Postdoctoral Researcher In Combination of In-Situ Sensors for Enhanced Monitoring of Porosity of AM Produced Metal AM Printed Components

Dublin City University is an equal opportunities employer.

In line with the Employment Equality Acts 1998 – 2015, the University is committed to equality of treatment for all those who engage with its recruitment, selection and appointment processes.

The University's Athena SWAN Bronze Award signifies the University's commitment to promoting gender equality and addressing any gender pay gaps. Information on a range of university policies aimed at creating a supportive and flexible work environment are available in the <u>DCU Policy Starter Packs</u>

