



Research Centre	I-Form
Post title	Postdoctoral Researcher in Multi-Material Printing: Ink Production, Printing and Sintering Control
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.iform.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.

Inkjet printing performance is characterised by ink flow inside the printhead, jet formation and droplet interaction with the substrate material. The quality of the feedstock ink is critical to achieving high-quality printed structures. Current commercial techniques for the AM of printed electronics use high volumes of expensive silver, at a time when the metal is approaching the critical limit of its economic viability. The promising alternative inks will be produced and used to print the battery elements. In-line monitoring of the ink parameters (nano-particle size and concentration) will be implemented using autonomous machine learning and control for enhanced production rates and quality. The objective of this project is to develop an additivemanufactured metal seed layer for plating of copper electrodes and employ it to make reliable interconnects with low resistive and shadowing losses. The inks, ink-jetting, and sintering processes have to be optimised. Inkjet printing performance is characterised by ink flow inside the printhead, jet formation and droplet interaction with the substrate material. The quality of the feedstock ink is critical to achieving high-quality printed structures. Conventional chemical methods for producing nanoparticle inks rely on hazardous chemicals with negative environmental impact. The process parameters required for new ink development via Pulsed Laser Ablation in Liquid (PLAL), a more environmentally friendly process, will be examined via a detailed set of Design of Experiments. The promising alternatives of MXene, copper and carbonbased inks will be produced and used to print battery elements. In-line monitoring of the ink parameters (nano-particle size and concentration) will be implemented using autonomous machine learning and control for enhanced production rates and quality.

Principle Duties and Responsibilities

Reporting to his/her Principal Investigator the Researcher will:

- A primary focus of this role is to conduct research in the area(s) relevant to the project.
- Provide assistance/advice within the group on the automation and testing topics.
- Assist the Principal Investigator and the research group in the design and development of the specific research programme.
- Produce top quality reports, in collaboration with the PIs.
- Support the development of proposals for research funding.
- Participate in Centre activities, including industry showcases, annual reviews and industry and agency visits to the labs.
- Experience with and/or a background in Machine Learning is required.
- Carry out administrative work associated with the programme of research as necessary
- Other tasks relevant to successfully implementing the assigned research programme.

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.

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>

