

Research Centre: I-Form, Advanced Manufacturing Research Centre
Post title: Research Fellow - Radio Frequency Modelling & Analysis of Plasma Systems
Level on Framework: Level 2
Post duration: 2 Year Fixed-Term Contract

Background

Dublin City University www.dcu.ie is a research intensive, globally engaged, dynamic institution which has established internationally recognized centres of excellence that have substantive collaborative links with leading universities and industrial partners. DCU is distinguished both by the quality and impact of its graduates and by its focus on the translation of knowledge into societal and economic benefit. Through its mission to transform lives and societies through education, research and innovation DCU acts as an agent of social, cultural and economic progress. DCU is Ireland's fastest growing university and now hosts more than 17,000 students across its three academic campuses: DCU Glasnevin Campus, DCU St Patrick's Campus and CU All Hallows Campus. DCU has a strong track record in attracting both Irish and European Union research funding under Horizon 2020 (and all previous Framework Programmes), Marie Curie Actions and Erasmus. We offer a dynamic and internationally-focused environment in which to advance your academic career.

Research Career Framework

As part of this role you will be required to participate in the DCU Research Career Framework (<http://dcu.ie/hr/ResearchersFramework/index.shtml>). This framework is designed to provide significant professional development opportunities to Researchers and offer the best opportunities in terms of a wider career path.

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I-Form Advanced Manufacturing Research Centre: 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 <http://www.i-form.ie/>. The Centre brings together a multi-disciplinary team of over 80 PhD and Post-Doc 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.

DCU's Advanced Processing Technology Research Centre (APT) focuses on state-of-the-art research activities in the areas of Production Technology, Product Design & Sustainability, Micro- and Nano Systems Technology, Advanced Materials Engineering and Bio-Systems. The APT is a leading international research centre which as a primary goal strives to provide significant translational

benefit to the wider community. Research projects undertaken within APT are conducted to a world class level and support local and internationally based enterprises. The APT research group has established a strong infrastructure of equipment and people in the area of processing technologies at DCU. APT's education and outreach events include seminars and courses which enable the transfer of processing technologies knowledge to the broader community.

Project and Role Background

Radio Frequency Modelling and Experimental Analysis of Plasma Systems

Researchers in APT have been developing world-leading non-contact, non-destructive *in situ* sensors to monitor Plasma Based Processing of materials for semiconductor manufacturing. Arising from recent industrial collaborations the following Postdoctoral research position is now available in Dublin City University (DCU). DCU has pioneered the development of radio frequency (RF) probing of low pressure industrial plasmas for manufacturing.

- This is an industrially-focused project, funded by industry, and the technology developed within DCU will remain proprietary to DCU.
- The candidate will explore the capabilities of novel RF probe designs, including necessary modifications and upgrades, to be followed by *in situ* testing on low pressure RF plasma systems.
- The captured data will be modelled and analysed to correlate the temporal and spectral content with variations in the process plasma process parameters, and their impact on the outcomes of those processes.
- This will require someone who possesses expertise in RF plasma modelling combined with radiofrequency electromagnetic component/circuit design and familiarity with the operation of low pressure RF plasma systems, particularly for semiconductor process applications.

Duties and Responsibilities

Reporting to the Principal Investigator the Postdoctoral Researcher will perform research principally based in DCU on a project funded by a major multinational industrial company. The main duties and responsibilities include:

- Conducting a specified programme of research under the supervision and direction of the Principal Investigator
- Engaging with internal and external stakeholders, especially in this instance the funding industrial entity
- Development of frequency and time-based models of the underlying RF plasma physics based on the capture of DCU-proprietary RF probe systems, especially, though not exclusively, for semiconductor plasma processing
- Development and test of new models, based e.g. on conduction and displacement current terms, pre-sheath effects, the bulk plasma on the impact of radio frequency emission from these plasmas.
- Application of control engineering techniques to feedback real-time temporal and spectral data within a process control system.
- Working with DCU's research and industry team, including design, upgrade and assessment of improvements to RF probes.
- Assiduous recording and management of data in strict alignment with DCU Intellectual Property guidelines
- Carrying out administrative work associated with the programme as necessary
- Documenting all experimental data, analyses and protocols
- Reporting/presenting regularly at DCU team meetings and regular meetings with industrial partners

- Attending relevant meetings, seminars, training and conferences
- Undertaking standard laboratory management tasks
- Monitoring and reporting on project budget expenditure
- Assisting in identifying and developing future research and funding initiatives
- Undertaking other tasks as defined by the PI.

Candidate Requirements

The team is looking for applications from high performing, aspiring candidates with a desire to discover new knowledge and to drive forward advanced manufacturing technologies.

The successful candidate will demonstrate the following:

Essential Criteria:

- PhD and/or significant industrial experience in applied or experimental physics, electronic engineering, or a cognate discipline.
- Previous experience in plasma physics modelling and/or RF engineering, semiconductor plasma processing and RF probe applications.
- Experience in SPICE, and/or Matlab + Simulink

The ideal candidate will also have:

- Proven ability in communicating 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).
- Demonstrated ability of good communication skills.
- A high level of interpersonal and team working skills

Candidates will be assessed on the following competencies:

Discipline knowledge and Research skills– Demonstrates the ability to design and implement part of a programme of research (for example by using critical thinking and the application of relevant research methodologies).

Understanding the Research Environment– Demonstrates a thorough comprehension of the research environment both nationally and internationally and the ability to contribute substantially to grant applications.

Communicating Research– Demonstrates the ability to communicate their research effectively to the research community and wider society (for example by publishing their research in high quality peer reviewed journals) and the ability to teach and tutor students.

Managing & Leadership skills- Successfully manages research projects including the management and supervision of postgraduates and/or junior research staff.

Mandatory Training

Post holders will be required to undertake the following mandatory training: Orientation, Intellectual Property Procedures, GDPR, and Compliance. Other training may need to be undertaken when required.