



## Candidate Information

<b>Position:</b>	Research Fellow
<b>School/Department:</b>	Ctre for Nanostructured Media
<b>Reference:</b>	19/107838
<b>Closing Date:</b>	Monday 14 October 2019
<b>Salary:</b>	£33,797 to £40,322 per annum (pro rata)
<b>Anticipated Interview Date:</b>	Wednesday 30 October 2019
<b>Duration:</b>	36 months

### JOB PURPOSE:

To act as a post-doctoral researcher on the US-Ireland R&D Partnership "EDTOQ".

This post is available for 36 months to act as a post-doctoral researcher on a collaborative partnership between Notre Dame University (USA), Tyndall National Institute (Cork, Ireland) and Queen's University Belfast. The US-Ireland R&D Partnership programme "Engineering deterministic electron correlations and topological states in site-controlled III-V quantum droplets (EDTOQ)" aims to achieve deterministic quantum electron droplets (QED) designs suitable to support "large scale" development of reproducible Majorana zero modes (MZM) by fabricating highly controlled QEDs using selective area epitaxy (SAE) in the In(Ga)P/GaN systems. The research position will support the experimental part of the project, mainly characterization by transmission electron microscopy (TEM) techniques; requiring ample experience in sample preparation by focused ion beam (FIB) and data analysis (diffraction, chemical and strain techniques). The research fellow will also be required to actively engage and collaborate with the research fellow working on the growth aspect of the project.

### MAJOR DUTIES:

1. Experimental work on material characterisation of multi-layered In(Ga)P/GaN systems Quantum dot structures. This will involve liaising closely with our project partners, especially with the Tyndall National Institute/Cork Institute of Technology (RoI) who are responsible for the growth.
2. Structural characterisation using mainly electron microscopy techniques (TEM & STEM).
  - o In addition, apply other standard characterisation techniques such as XRD and AFM if considered necessary.
3. Carry out significant sample preparation by FIB.
4. Preparation and presentation of results in video conferencing with project partners and at national/international conferences and workshops as required or as opportunity arises.
5. Contribute to writing of papers for publication and of reports as necessary.
6. Identify further funding opportunities to consolidate the group's research and prepare outline proposals.
7. Assist with project-related outreach and teaching activities as required.

### Planning and Organising:

1. Ability to undertake day-to-day responsibility in running dedicated laboratory facilities, including own day-to day activity within framework of the agreed research programme.
2. Plan the use and scheduling of research resources, laboratories and workshops where appropriate with particular emphasis on forward planning ability in relation to technical support.
3. Plan detail of research programme, particularly in relation to design and provision of samples in the partnership.
4. Ability to plan and organise in order to meet reporting/dissemination deadlines.

### Resource Management Responsibilities:

1. Make good use of research input time in lab., particularly in relation to direction of PhD and MSci projects to further the ends of the project.
2. Manage consumables budget within project, including regular interaction with/briefing of QUB project leader.

**Internal and External Relationships:**

1. Interact on regular basis with partner labs. and build good working relationships.
2. Plan detail of research programme, particularly in relation to advance design and provision of samples in the partnership.
3. Assist with supervision of and liaise with PhD students and MSci project students in lab. as required.
4. Establish good working relationship with technical and other support staff.

**ESSENTIAL CRITERIA:**

1. Hold or about to obtain a relevant PhD in electron microscopy (Thesis should currently be submitted and must be in an area highly relevant to project)
2. At least 3 years relevant research experience:
  - 1) Expertise in electron microscopy techniques (TEM & STEM): Diffraction and imaging techniques including HRTEM, Z-contrast, DF and BF.
  - 2) Experience in sample preparation by FIB.
  - 2) Experience in spectroscopy techniques: EDX & EELS.
  - 3) Experience with strain analysis techniques and corresponding data analysis: GPA, PPA or similar.
  - 4) Publication record appropriate to research experience.
3. Ability to develop scientific contacts.
4. Ability to make oral presentations.
5. Effective report writing.
6. Good intellectual ability.
7. Ability to devise inventive or creative solutions to problems.
8. Ability and willingness to collaborate in satellite projects.

**DESIRABLE CRITERIA:**

1. PhD thesis topic on In,Ga,P or other III-V systems and/or analysing quantum dots.
2. Experience characterising quantum dots.
3. Experience characterising GaInP systems or similar.
4. Experience with simulation packages such as Dr. Probe,
5. Materials Studio, Crystal Maker, Multislice, etc.
6. Experience in advanced techniques such as NBED, DPC and in-situ TEM.
7. Ability to communicate with those in discipline(s) other than Physics.