



HR EXCELLENCE IN RESEARCH

Research Fellow - Electroporation High-Voltage Pulse Generator Development
Electrical & Electronic Engineering, College of Science and Engineering, NUI Galway
Ref. No. NUIG RES 007-22

Applications are invited from suitably qualified candidates for a full-time fixed term position as a Research Fellow in Electroporation High-Voltage Pulse Generator Development with Electrical & Electronic Engineering at the National University of Ireland, Galway. The position is available from 1st March 2022 until 31st October 2024.

This position is funded by the Disruptive Technologies Innovation Fund (DTIF) Programme under the ENACT project (ENdoscopic outpAtient Cancer Treatment platform). The ENACT consortium, led by Mirai Medical and comprising of Advanced Energy, National University of Ireland Galway (NUIG) and Trinity College Dublin (TCD) will bring to market a novel platform that delivers electrical pulses to tumours, displacing traditional therapies, dramatically improving outcomes for cancer patients whilst addressing 10 of the 17 United Nations sustainable development goals (SDG's) by 2030.

Existing electroporation generators designed for use in the treatment of cancer are large, expensive and have limited configurability for electrode designs. This project aims to address a gap in the market for an electroporation generator which can deliver high frequency reversible (RE) and irreversible (IRE) electroporation pulses for a wide range of electrode designs to accommodate different cancer indications. Power technologies and delivery systems will be researched and developed to achieve the extremely challenging rise times, switching frequencies and high voltages into a resistive tumour tissue impedance. Further complexity will be added by the target specification of variable voltage, variable pulse rate, variable pulse width and pulse repeatability, which is desired in order to enable a broad range of applications and treatments from the same modular power solution.

The post-holder will lead the development of new power electronics solutions to achieve required electroporation pulse generator specifications. They will collaborate closely with industry partners on the industrial design, including design for manufacture and test, while ensuring adherence to relevant standards and regulations. They will also collaborate with clinical partners in supporting protocol development and pre-clinical testing. Finally, they will be involved in project management, communication and dissemination activities associated with the technical tasks.

The post-holder will be based in the Power Electronics Research Centre in Electrical & Electronic Engineering at NUI Galway. The Power Electronics Research Centre is based in a 60 m² facility in the Alice Perry Engineering Building at NUI Galway. The aim of the Centre is to foster links with industry by transferring technology from a strong research base in the University to the wider community.

Job Description:

The successful candidate will lead the development of new power electronics solutions to achieve required electroporation pulse generator specifications, including evaluating suitable new semiconductor and circuit topologies based on detailed circuit simulations; prototype components design, build and bench test; and system level bench testing to produce basic functionality data for the new electroporation generator and electrodes. They will collaborate closely with an industry partner on the generator industrial design (including PCB design and BOM), pre-certification of

EMC/EMI (60601-1-2) and electrical safety (60601-1) to mitigate risk. They will also collaborate with clinical partners in supporting protocol development and pre-clinical testing. Finally, the post-holder will also take responsibility for project management, meeting appropriate milestones, timelines and deliverables, and for dissemination activities associated with the technical tasks. S/he will also support a team of postgraduate researchers working on a range of different projects in power electronics, with different technical requirements, and will be expected to contribute to the development of the host laboratory's ongoing research programme.

Duties:

- Lead the development of new power electronics solutions to achieve required electroporation pulse generator specifications, This includes the design, build and testing of new power circuit topologies based on emerging semiconductor and controller components;
- Prototype components design, build and bench test to verify circuit simulation results;
- System level bench testing of power electronics to produce basic pulsed generator functionality data;
- Liaise with the consortium industry and university partners on industrial product design and pre-clinical testing, respectively;
- Apply project management skills to complete all project deliverables (reports, prototypes, testing, etc.) within the required time-frame;
- Actively participate in consortium meetings, dissemination events and international conferences as required;
- Contribute to the further development and evolution of the host laboratory's research programme by identifying new and innovative research opportunities in electrotherapies;
- Publish in high-impact journals as appropriate;
- Provide support and mentoring to post-graduate research students in the host research group;
- Engage in appropriate continuing professional development activities to support their own career development plans.

Qualifications/Skills required:

Essential Requirements:

- PhD degree or equivalent in Power Electronics, focussed on high-voltage (kV) and/or high-frequency applications;
- 5 years postdoctoral research experience in developing high-voltage/high-frequency power electronics solutions for biomedical applications or equivalent;
- Demonstrated expertise in high-voltage/high-frequency power electronics design, simulation (SPICE or equivalent), build and test;
- Experience of power electronics product development (to ISO/IEC standards or equivalent);
- Experience of working in a collaborative research environment;
- Leadership and project management experience;
- Excellent written and spoken English communication and dissemination skills;
- Evidence of primary/senior authorship of peer-reviewed conference/journal publications in relevant areas, or other equivalent output;
- A strong track record in securing external funding.

Desirable Requirements:

- Experience of biomedical product development to required standards/regulations (including IEC 60601 or equivalent)
- Experience of liaising with industry on research projects
- Experience of mentoring students at graduate level (e.g. teaching/instruction, project supervision etc.)
- Capability to develop independent research activity.

Salary: €56,369 - €58,004 per annum (public sector pay policy rules pertaining to new entrants will apply).

Start date: Position is available from 1st March 2022

Continuing Professional Development/Training:

Further information on research and working at NUI Galway is available on [Research at NUI Galway](#) Researchers at NUI Galway are encouraged to avail of a range of training and development opportunities designed to support their personal career development plans. NUI Galway provides continuing professional development supports for all researchers seeking to build their own career pathways either within or beyond academia. Researchers are encouraged to engage with our Researcher Development Centre (RDC) upon commencing employment - see www.nuigalway.ie/rdc for further information.

For information on moving to Ireland please see www.euraxess.ie

Further information about the Power Electronics Research Centre is available at www.perc.nuigalway.ie

Informal enquiries concerning the post may be made to Dr. Maeve Duffy, email: maeve.duffy@nuigalway.ie

To Apply:

Applications to include a covering letter, CV, and the contact details of three referees should be sent, via e-mail (in word or PDF only) to Maeve Duffy: [e-mail maeve.duffy@nuigalway.ie](mailto:maeve.duffy@nuigalway.ie) Please put reference number **NUIG RES 007-22** in the subject line of the e-mail application.

Closing date for receipt of applications is 5.00 pm 2nd February 2022

We reserve the right to re-advertise or extend the closing date for this post.

National University of Ireland, Galway is an equal opportunities employer.

All positions are recruited in line with Open, Transparent, Merit (OTM) and Competency based recruitment

