Project tittle and award details	Lay Abstract
Title: Enabling next generation integrated optoelectronics with free-form metamaterials based on graphene **Lead applicant:** Dr Ivan O'Connell **Co-applicants:** Dr Hamza Shakeel (NI) and Prof Berardi Sensale-Rodriguez (US) **Lead institution:** Tyndall National Institute **Value of award** €442,860 DfE funding ca. £300,000 NSF funding ca. $380,000 **Partner institutions:** Queen's University Belfast (NI) University of Utah (US)	The aim of this project is to explore and develop compact, energy-efficient, silicon-compatible, reconfigurable optical components for communication and sensing applications on the basis of integrating two-dimensional materials with nanophotonic structures designed through the recently proposed free-form metamaterials concept. The researchers will extend their previous work on passive components to active devices, with the goal of experimentally demonstrating monolithic integration of a series of graphene-based devices with improved performance. This work will enable next generation optical communication, extending the reach and capability of existing fibre optical communication networks. In addition, the development and integration of optical sensors and will enable a smart connected and informed society.
Title: Cold Plasma therapies for Orthopedic Infection **Lead applicant:** Prof Paula Bourke **Co-applicants:** Prof Brendan Gilmore (NI), Prof Theresa Freeman and Prof Noreen Hickok (US) **Lead institution:** University College Dublin **Value of award:** €817,953 (co-funded 50/50 with HRB) HSC R&D funding £500,000 NIH funding $3.4 million **Partner institutions:** Queen's University Belfast (NI) Jefferson University (US)	Infection following orthopaedic implant is a life threatening and devastating complication to the reconstructive surgeries that are routinely performed to restore mobility and functionality to a huge patient population. New therapies to combat antibiotic resistant microorganisms and stimulate the patient's own immune response to combat their infection are required. The aim of this project is to eradicate bone infection using cold plasma treatments tailored for high antimicrobial activity as well as stimulating immune responses.

Title: Targeting the compromised brain endothelial barrier function during cerebral malaria with AT2 receptor agonists **Lead applicant:** Prof Thomas Walther **Co-applicants:** Prof Alan Stitt (NI) and Prof Ana Rodriguez (US) **Lead institution:** University College Cork **Value of award:** €882,088 (co-funded 50/50 with HRB) HSC R&D funding ca. £500,000 NIH funding ca. $1.7 million **Partner institutions:** Queen's University Belfast (NI) New York University School of Medicine (US)	The proposed research aims to identify a lead compound which can stimulate specific intracellular signalling through the AT2 receptor to mediate essential protection of endothelial integrity during cerebral malaria to prevent this life-threatening pathology. Reinforcement of a functional cell barrier through the modulation of specific receptors may even prove to be a key target for prevention and treatment of other hemorrhagic diseases affecting other organs, such as viral hemorrhagic fevers (Ebola) or acute respiratory distress syndrome caused e.g. by the Covid-19.
Title: Treating Primary Aldosteronism-Induced Hypertension via Microwave Thermal Therapy **Lead applicant:** Dr. Michael Conall Dennedy **Co-applicants:** Prof Liam McDaid (NI) and Prof Punit Pakrash (US) **Lead institution:** National University of Ireland Galway **Value of award**: €906,219.6 (co-funded 50/50 with HRB) HSC R&D funding ca. £310,000	The commonest specifically treatable cause of high blood pressure is known as primary aldosteronism (PA). This is a condition of hormonal excess whereby the kidney retains salt and water to increase blood pressure. It is caused by small benign nodules on the adrenal gland called aldosterone producing adenomas (APA). Surgical removal of APAs can cure complicating high blood pressure. In this study, the team of researchers will develop new methodologies for diagnosing and treating aldosterone producing adenomas which avoid the need for surgery and improve patient outcomes and experience.

NIH funding ca. $1.4 million **Partner institutions:** Ulster University (NI) Kansas State University (US)	