



Ysgoloriaethau Sgiliau Economi Gwybodaeth
Knowledge Economy Skills Scholarships



Micro-scale electrical characterization of adipose tissue for a microwave-based liposuction device

Applications are invited for a one-year MSc by Research studentship in bioelectronics and microwave technology at the School of Electronic Engineering, Bangor University, UK. The studentship is funded by the Knowledge Economy Skills Scholarships (KESS) (<http://www.higherskillswales.co.uk/kess/>) in collaboration with the commercial partner Creo Medical Limited (<http://creomedical.com>). It will cover tuition fees and an annual tax-free stipend at the standard RCUK rate (around £11,300 per year), as well as a travel budget for training and workshop attendance. The studentship is available from 25th January 2016 or as soon as possible thereafter.

Applicants should hold a first or upper second-class honours degree (or equivalent) in electronics, or microwave engineering, or a related degree. Please submit a CV (max 2 pages) together with a covering letter to Dr Cristiano Palego at c.palego@bangor.ac.uk and Patrick Burn at Patrick.Burn@creomedical.com by 17:00 on 11th December 2015.

Detailed project outline:

Obesity is deemed a national health emergency and costs UK taxpayers more than the police, prisons and fire service combined. In Wales 58% of adults were classified as overweight including 22% obese, with an estimated cost to the nation of £73m a year. A recent KESS-funded initiative has shown promise for a microwave-assisted liposuction device comparing favourably to existing approaches and for situations that cannot be solely addressed by diet and exercising. Nevertheless, commercial exploitation of the novel technology is currently hindered by incomplete or approximate characterization of the white adipose tissue (WAT) dielectric and thermal properties.

In this research a unique high-frequency measurement setup will be used to investigate the biophysics properties of white adipose tissue (WAT) hence enabling the next generation of Creo Medical devices to achieve optimum and safe application of microwave energy to WAT. This technology will be able to gently heat WAT and reliably remove melted tissue while rapidly coagulating blood vessels with lower invasiveness and complication risks than in current techniques. The objectives of this studentship are therefore to:

- Design, model and test micro-scale fixtures consisting of planar electrodes and microfluidic reservoirs to enable dielectric spectroscopy of adipose tissue.
- Run bioelectric experiments using measurement equipment such as a microwave probe station and a network analyser for text fixture and cell response characterization under microwave energy application.
- Capture in equivalent circuit models the dielectric and thermal properties variation induced by microwave energy application on both adipocytes cultures and excised WAT micro-layers.
- Optimize circuitry for microwave power control (e.g. frequency and waveform) and automatic tissue discrimination (e.g. WAT versus blood vessels) to be integrated into novel endoscopic probes in collaboration with Creo Medical Ltd.

Training in microelectronics fabrication and microwave measurements will be provided in the School of Electronic Engineering during the first 4 months. The MSc Researcher will optimize WAT microsample deposition and adipocyte culturing on chip through synergy with a bioengineer from a concurrent Sêr Cymru National Research Network-funded initiative.

Background to the schools:

The School of Electronic Engineering achieved the UK's fourth highest score for Electronic Engineering research output in the 2014 Research Excellence Framework, acknowledging its world leading research activities in the areas of photonics, organic/green electronics and microwave medical devices. The project will build on a number of relevant existing and forthcoming projects at Bangor on microwave biosensing and self-sustainable wireless sensor networks. We have state-of-the-art facilities for lab-based experiments including a class 1000 Clean Room for in house microelectronics/microfluidics fabrication and an on-wafer probe station for DC-to-millimetre-wave dielectric spectroscopy. Additionally, we routinely sponsor research exchanges with the Massachusetts Institute of Technology (USA) and Lehigh University (USA) in concurrent and related programmes.

Knowledge Economy Skills Scholarships (KESS) is a pan-Wales higher level skills initiative led by Bangor University on behalf of the HE sector in Wales. It is part funded by the Welsh Government's European Social Fund (ESF) convergence programme for West Wales and the Valleys.