

## **Project Title**

Novel Bio-Chips for real-time detection of acidification in the tumour microenvironment

## **About This PhD Project**

Institute of Cancer Research

Supervised by Dr Pantelis Georgiou and Dr Chris Bakal

The student will be registered at Imperial College, leading to the award of a PhD from Imperial College, London

## **Project Description**

Cancers often return after a period of remission, and detection of these recurrences is key to begin follow-up treatments as early as possible. Detection methods must be both cost and time effective, in order to limit post-treatment patient visits. Biosensors are a potential tool that may make real-time monitoring of cancer recurrence both feasible and highly cost-effective. These biosensors could alert both patients and physicians to changes in tissue that are indicative of relapse. Clearly tumour progression, and the emergence of highly aggressive, invasive, immune-tolerant and drug-resistant tumour cell subpopulations is driven by acidification of the tumour microenvironment. Therefore, pH represents a simple, but cost-effective and easy to detect biomarkers which can signal the onset of relapse.

Over the past few years, the focus of the research conducted by the Georgiou group at the Centre for Bio-Inspired Technology (CBIT) has been the development of the next generation of Lab-on-Chip devices for diagnosis of human health, based on Complementary Metal-Oxide-Semiconductor (CMOS) microchip technology for low cost and portability. Novel CMOS Bio-Chips integrating several thousands of chemical sensors in a few mm<sup>2</sup> have been developed providing the foundations for the development of a novel handheld sample-to-result diagnostic device.

This research is a collaborative venture between the CBIT, and the Bakal laboratory at the Institute of Cancer Research (ICR), who are world-leaders in quantitative single cancer cell imaging. Working in both laboratories and as part of ICR-Imperial Convergence Centre, the student will investigate the use of state-of-the-art bio-chips for ex-vivo and real-time imaging of pH changes during tumour cell growth. The student will benefit from a multidisciplinary approach from both institutions to develop skills in molecular biology, microscopy imaging and biosensor characterisation. Ultimately, this work will lead to innovations in cancer diagnostics by demonstrating a model for ionic changes in tumour cells on-chip indicative of tumour cells proliferation and death.

## **Keywords /Subject Areas**

Cancer diagnostics  
Cell biology  
Quantitative imaging  
Cancer modelling  
Biosensor technology  
Lab-on-Chip

## **Candidate profile**

Candidates must have a first class or upper second class honours BSc Honours/MSc in Bioengineering, Biology, Biochemistry, Chemistry or a degree relevant to the post.

## **How to apply**

Full details about these studentship projects, and the online application form, are available on our website, at: [www.icr.ac.uk/phds](http://www.icr.ac.uk/phds) Applications for all projects should be made online <https://apply.icr.ac.uk/> . Please ensure that you read and follow the application instructions carefully.