



Microfabrication and manipulation of functional lipid-based particles for bio-analytical microdevices.

Keywords:

Lipid-based particles, Biosensors, Microfluidics, Soft Matter

Project Description

A PhD studentship is available at the Department of Chemical Engineering of Loughborough University to design, manufacture and characterise lipid-based nano- and micro-particles to be used as smart biosensors in novel microfluidic devices for bio-analytical and healthcare applications.

Lipid-based particles are ubiquitous in a broad range of industrial applications, including drug delivery, medical diagnostics/therapeutics, pharmaceuticals and food. In this context, microfluidics has proven to be a valuable tool for the synthesis, manipulation and characterisation of those particles, including stimuli-responsive liposomes, lipid-coated solid and hydrogel particles. The combination of particle-based and microfluidic technologies can hence lead to a new generation of bio-analytical and diagnostic microdevices with the potential to overcome many limitations of traditional laboratory technologies.

The objectives of this project are i) to engineer bespoke bio-sensing particles by means of droplet-based microfluidics technologies, ii) to develop proof-of-principle bio-analytical microfluidic devices for the rapid and ultrasensitive detection of target analytes based on the micromanipulation of the bio-sensing particles. The successful candidate will design and fabricate microfluidic systems by photo-/soft-lithography procedures and 3D printing techniques. He/she will microfluidically generate bespoke particles and characterise their properties and functionalities by a wide number of experimental techniques, including optical and electron microscopy, fluorescence spectroscopy, DSC, ATR-FTIR and XRD. He/she will also undertake proof-of-concept studies to identify prospective applications of the developed microfluidic devices - especially for drug delivery and point-of-care diagnostics.

This PhD project is aligned with the EPSRC research grant "*FAST for bio-analysis in microfluidic devices*" and the successful candidate is expected to engage in collaborations with the internal and external members of the research team.

Entry requirements:

Applicants should have, or expect to achieve, at least a 2:1 Honours degree (or equivalent) in Chemical Engineering, Chemistry or a related subject. A relevant Master's degree and/or experience will be an advantage.

Supervisors:

Primary supervisor: Dr Guido Bolognesi

Secondary supervisor: Dr Goran Vladislavjevic