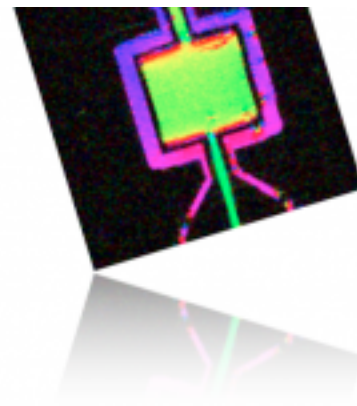


## PhD Position: NMR Metabolomics of Cells

Microfluidic lab-on-a-chip devices can be used to create a highly customized and controlled environment for the cultivation of cell populations. The goal of this research project is to combine microfluidic cell culture with nuclear magnetic resonance spectroscopy. This work builds on our recent demonstration of contactless NMR spectroscopy on a chip (Anal. Chem. 2012, **84**, 3696).



NMR spectroscopy is ideally suited to analyze complex mixtures containing hundreds of different compounds. This makes it possible to characterise living organisms (bacterial and eukaryotic cells, in the present context) in terms of their metabolome, i.e., the multitude of molecular compounds as they are produced and consumed by life processes. Metabolomics, along with Genomics and Proteomics, is a key tool of systems biology.

In chip-based cell cultures, it is possible to expose the cells to variations in their growth conditions, and observe the resulting changes in the metabolome. This provides invaluable insight into the reaction of live cells to exposure to drugs, changes in temperature, oxygen levels, biological signals, and other stimuli.

Cell cultures are increasingly being considered in the development of new drugs as an alternative to animal testing. Apart from avoiding the ethical concerns associated with animal testing, cell cultures allow much more direct observation of the modulation of life processes by the drug. Microfluidic cell cultures have made it possible to mimic quite accurately the spatial environment of living organs by co-culturing different cell types. Functioning models of liver, kidney, and other tissues have been demonstrated in this way.

The aim of the present project is to demonstrate the principle of cell culture metabolomics using a microfluidic lab-on-a-chip device that integrates the cell culture life support functionality with high-resolution NMR spectroscopy.

We are looking for a highly motivated postgraduate student with a strong interest in biological systems, as well as spectroscopy. The position will provide a stimulating work environment among a dynamic group of researchers both in NMR spectroscopy and in the life sciences. The multidisciplinary nature of the project will provide the candidate with a multitude of opportunities to make significant scientific contributions, as well as broad training in highly marketable skills. The student will have access to the NMR facilities within the School of Chemistry, as well as the infrastructure of the Institute for Life Science (<http://www.southampton.ac.uk/ifls/>), and the Southampton Nanofabrication Centre (<http://www.southampton-nanofab.com/>).

For further information, please contact Dr. Marcel Utz (marcel.utz@gmail.com).