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Automated scanner for multispectral cell analysis

Centre for Nanoscale BioPhotonics

Project description

Identification of cell types and analysis of the effects of treatment procedures on those cells without relying on tagging molecules presents a significant challenge within the field of medical/biological research. A potential method to solve this issue is to use multiple lasers to excite fluorescence from the cells and analyse those signals across different conditions.

At the Centre for Nanoscale BioPhotonics we have been developing such a laser system for cell analysis. Early results are promising, however there is however no automation of hardware control and signal analysis.

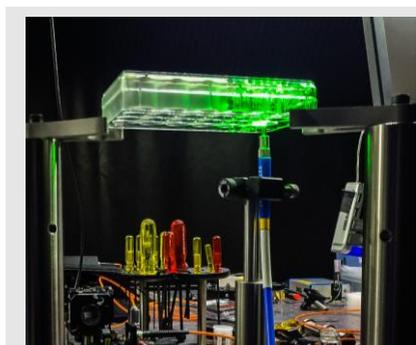
The next phase involves improving the current measurement hardware by utilising an automated system to increase the throughput of the scanner. This will involve both software and hardware development to create a 3D optical scanner and integrate it with existing lasers.

This project will create a new diagnostic system for living cells based on photonics engineering for molecular pharmacology.

Primary aims

Develop software for sequential multi-laser optical measurements of cell samples and recording of data using existing prototype measurement hardware (LabView-based). Testing of the hardware on cell samples to achieve consistent observations of spectral differences based on existing cell lines.

Implementation of novel hardware to combine lasers and detectors with an Arduino-based 3D motion controller, plus analysis of the system's performance and comparison against a commercial plate-reader system.



An early version of a multispectral cell analysis system using manual controls.

Secondary aims

Data analysis routines – implementation of statistical analysis methods to produce real-time information as data is collected. Statistical linear modelling and correlations will enhance existing signal analysis and will be compared against established spectral analysis software.

Student attributes

Interest in transdisciplinary research, from engineering to biophotonics. Programming of measurement hardware, simple device automation. Familiarity with basic signal analysis. LabView experience would be desirable.

For further enquiries

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