Applications of Novel Cellular Diagnostics

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Abstract

The National Biophotonics Imaging Platform of Ireland provides a research and training framework applied to the field of advance imaging within the life sciences. Two independent research streams at Dublin City University focus on the development of novel fluorescent based sensors for cellular diagnostics. Divergent applications range from complex 3D cell-cell interactions, pattern recognition, nanoparticle based detection, to cell organelle recognition, advanced photophysical characterisation and subcellular environmental sensing.

Here we present two examples of our work. Firstly, the use of highly fluorescent silica nanoparticles as detection agents for platelet cell membrane receptors responsible for maintaining haemostasis. Secondly, we detail the use of custom synthesised environmentally sensitive fluorescent probes for subcellular labelling within a number of established cell lines (SP2, CHO and Hela cells). Each example presents specific challenges in resolving key features in order to establish protocols for automatic image analysis. The combination of customised probes, tailored imaging platforms and automatic analysis protocols will be applied to the development of new diagnostics device.

Keywords

Nanoparticle, intracellular sensing, diagnostics, automated analysis