

Functional Cell Sorting and Cellular Spectroscopy: New technologies for the study of cellular heterogeneity.

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Cellular heterogeneity is an important characteristic of biological systems that allows them to function. For analysing cellular heterogeneity, in medicine and biology, novel technologies that characterise cells at the structural and functional level are needed. Here we will present two new technologies that improve our capabilities for characterising the structure and the function of the cell. First, the functional phenotype flow cytometer (FPFC), can analyse and sort cells based on their intracellular function. In this purpose the FPFC performs a cascade of steps on a microfluidic platform: first the cells change their intracellular environment; second the cells are incubated in the new extracellular environment and thirds the cellular florescence is monitored all through this process. Finally, cells are sorted based on the magnitude of their fluorecence changes - linked to intracellular responses to stimuli. The validation of this device is performed with a human lymphoma cell line Ramos by separating cells based on their intracellular calcium changes upon an exposure to an antiBCR antibody.

The second technology presented here is a cavity enhanced absorption spectrometer that promises to deliver single cell absorption spectroscopy. In this purpose a novel concept that circulates the light multiple times through the environment of interest is proposed. The circulated light interacting with matter generates an enhanced spectral fingerprint characteristic for the analysed sample. Here we are proposing the use of this spectrometer for characterising the internalisation of drugs in living cells.

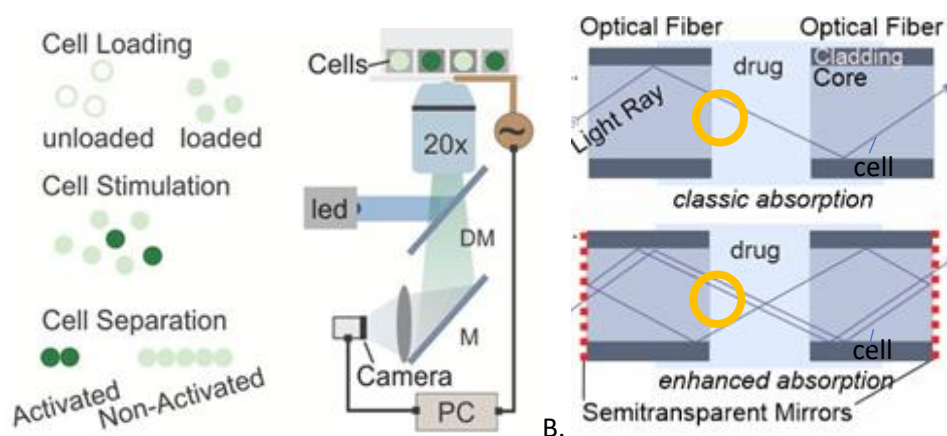


Figure 1. A. Functional Cell Sorting (1). B. Cellular Spectroscopy

Bibliography: 1. P. Nikiforov et al., Functional Phenotype Flow Cytometry: On Chip Sorting of Individual Cells According to Responses to Stimuli. *Advanced Biology* 2021, 5, 2100220.