

OPTICALLY SECTIONED COMBINED EXCITATION- AND EMISSION-SPECTRAL IMAGING

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A novel double-pass Fourier Transform Imaging Spectroscopy (FTIS) system capable of obtaining an excitation as well as an emission spectrum of a fluorescent sample with only a single sweep of the interferometer will be presented. The device is a modification of an existing FTIS system (kindly provided by Applied Spectral Imaging, Haifa, Israel), in which the excitation source is placed before the interferometer so as to spectrally modulate the excitation together with the detection [1]. Analysis of the acquired signal allows for the reconstruction of the excitation as well as the emission spectrum of each fluorophore, assuming an independence of the two spectra for each fluorophore. Due to the patterned excitation generated by the Sagnac interferometer, a substantial degree of optical sectioning is achieved at excitation wavelengths. Further analysis of the acquired data enables the generation of optically sectioned emission images. A theoretical analysis is presented and experimental data of fluorescent beads and of biological samples is shown.

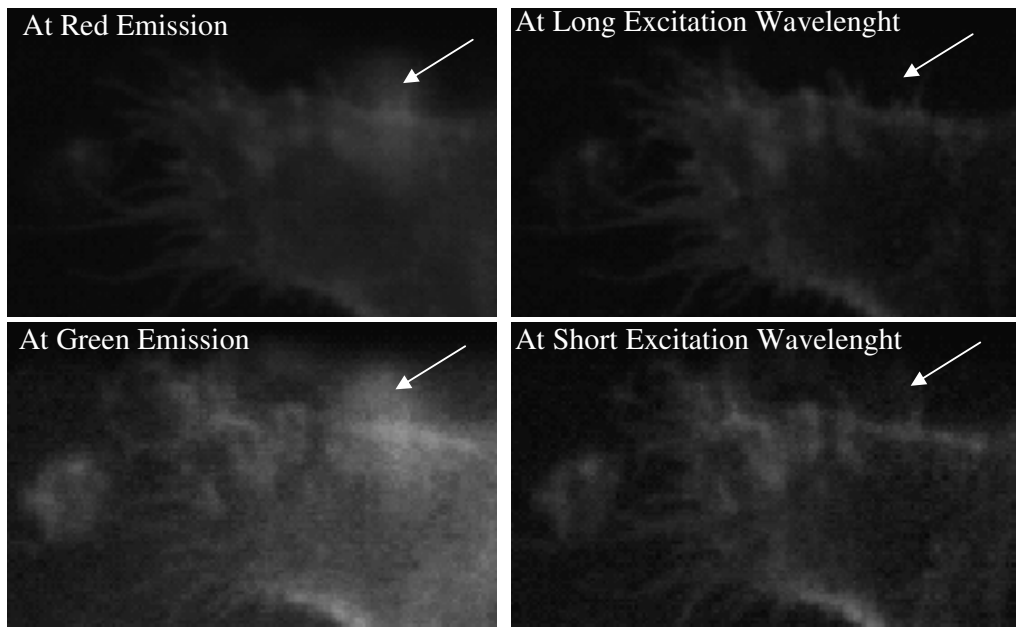


Figure 1: Effect of inherent optical sectioning in the excitation spectral images of a cell.

[1] R. Heintzmann., K. A. Lidke, and T. M. Jovin. "Double-pass Fourier transform imaging spectroscopy," *Optics Express*, **12**, 753-763 (2004)