TIME LAPSE RAMAN IMAGING OF LIVING CELLS

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ABSTRACT

We will present a new approach in label-free chemical imaging through non-electronic resonant, spontaneous Raman microspectroscopy. A confocal hyper spectral Raman microscope, based on home-built spectral detection technology, makes it possible to perform Time Lapse Raman Imaging (TLRI) of live cells. We performed the TLRI of single live peripheral blood lymphocyte (PBL) cells obtained from the whole blood of healthy donors [1]. We were able to successively acquire hyper spectral data cubes of individual live cells multiple times. Subsequent analysis of the vast data sets was performed by hierarchical cluster analysis. We will discuss the observations and the fidelity of the chemical information from the cell. TLRI enables high speed chemical imaging not only in the intense high frequency, ~ 3000 cm^{-1} region, but particularly in the informative fingerprint region between 300 and 1800 cm^{-1}. The TLRI approach we propose enables faster imaging (less than 2 mins per image with a spatial resolution leading to a voxel size of less than 1 femtoliter) of the PBL cells. A full series of images from TLRI typically resulted in more than 15 million data points per cell. We will discuss TLRI and its potential for cell biology. Particularly attention will be paid to procedures to analyze the data sets.

REFERENCES

[1] N. Uzunbajakawa; A. Lenferink; Y. Kraan; B. Willikens; G. Vresen; J. Greve, and C. Otto, "Nonresonant Raman imaging of protein distribution in single human cells," *Biopolymers*, **72**, 1-9 (2003).

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