NEW DEVELOPMENTS IN RAMAN IMAGING OF LIVING CELLS

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ABSTRACT: Spontaneous Raman microscopy is a powerful method to image the chemical state of living cells. The strength of spontaneous Raman microscopy resides in the intense broad-band scattering containing all the spectral components informative of the chemical nature of the material under investigation. We are following a number of novel approaches to improve Raman microscopy in our aim to further understanding of cellular systems at a high spatial resolution. We will discuss the following approaches and their applications in human blood cells: a) Time Lapse Raman Imaging (TLRI), b) resonance Raman Imaging (RRI), c) integrated Raman-fluorescence microscopy with molecules and quantum dots.
TLRI aims at repetitive Raman imaging of single cells with the purpose to either follow the changes in the cell state over time or to measure 3D Raman images of cells. RRI adds a high molecular selectivity to Raman imaging. Excited state properties of molecules become important and may provide limiting cases for this approach. Although often thought as mutually incompatible, fluorescence microscopy and Raman microscopy can be integrated when a careful separation of both types of signals can be achieved. We will show frequency domain strategies to integrated Raman-fluorescence microscopy either involving molecules or quantum dots.

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