**Correlated fluorescence and multi-isotope high-resolution imaging**

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Multi-isotope imaging mass spectrometry (MIMS) has been introduced recently as a tool to measure the turnover and long-term metabolism of cellular elements. In a typical MIMS experiment, living cells or organisms are allowed to incorporate stable isotopes such as 15N and 13C for a determined period, before fixation and embedding in a suitable resin. The positions of the isotopes are then measured with precisions down to ~30-50 nm in the lateral plane and ~10 nm along the vertical axis. To obtain molecule- and organelle-specific information, it is important to combine MIMS with fluorescence imaging of specific targets. However, the applicability of this approach is hindered by the resolution of conventional diffraction-limited optical microscopy (~200 nm). We solve this problem here by demonstrating that super-resolution stimulation depletion microscopy (STED) is compatible with MIMS. We present a simple protocol that allows obtaining high-resolution correlated fluorescence and multi-isotope images. This procedure will enhance the field of applications for both MIMS and super-resolution optical microscopy, and should furthermore allow the combination of these two techniques with scanning electron microscopy.