CORRELATIVE 3D IMAGING OF SINGLE CELLS USING SUPER-RESOLUTION AND SCANNING ION-CONDUCTANCE MICROSCOPY

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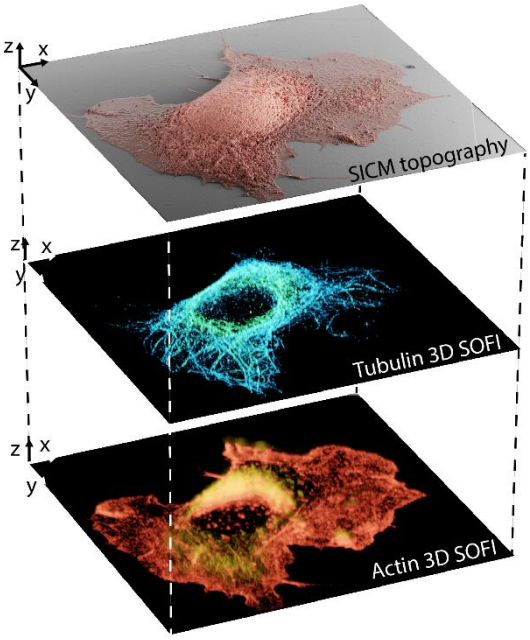
Abstract

Modern super-resolution fluorescence microscopy methods are increasingly combined with complementary, label-free techniques such as scanning probe or electron microscopy to put the fluorescence information into the cellular context. Here we present scanning ion-conductance microscopy (SICM) as an alternative approach for topographical imaging of soft biological samples, preserving high axial resolution on cells. SICM is complemented with super-resolution optical fluctuation imaging (SOFI). To demonstrate the capabilities of our method we show correlative 3D cellular maps with SOFI implementation in both 2D and 3D with self-blinking dyes for two-color high-order SOFI imaging. Finally, we employ correlative SICM/SOFI microscopy for visualizing actin dynamics in live COS-7 cells with subdiffractional resolution. We believe that the combination of the multimodal SICM and flexible SOFI approach has the potential to become a routine live-cell imaging modality capable of tackling challenging biological problems.



Schematics of correlative SICM and two-color 3D SOFI imaging.