

SPECTRALLY RESOLVED MULTIFOCAL MULTIPHOTON MICROSCOPY

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Abstract: We present a spectrally resolved multifocal multiphoton microscopy that is capable of performing fast 2-dimensional (2-D) spectral measurements of fluorescent samples with optical sectioning. One galvanometer mirror is used to scan the array of excitation foci across the sample along one direction (x) for two-photon excitation. Fluorescence emission from the excited lines on the sample is spectrally fanned with a prism along y direction, and a CCD array is used to acquire the spectrally resolved image. Another galvanometer mirror scans the excitation foci lines along y direction step by step to obtain 3-dimensional (3-D) spectral data cube of the sample. A proof-of-principle experiment is performed with fluorescent microspheres of different colors. Spectrally resolved images of 512×512 pixels can be obtained by acquiring only 128 raw images when a 4×4 excitation foci array is used.

Keys: multifocal , multiphoton , microscopy , spectrally resolved