

WIDE-FIELD FLUORESCENCE SECTIONING MICROSCOPY USING DYNAMIC SPECKLE ILLUMINATION

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Abstract: We present a novel wide-field fluorescence sectioning microscopy in which speckle patterns are produced on the sample for illumination. The speckle pattern is dynamically changed and a sequence of fluorescence images of the sample is recorded with a CCD camera. Due to a large variation of fluorescence intensity of the in-focus light compared to that of the out-of-focus light, special processing algorithms can be used to reconstruct the sectioned fluorescence image. We calibrate the system and study the effect of the reconstruction algorithms on the system performance. Fluorescence sectioned images of a few biological samples, such as tissue and BPAE cell and plant leaves, are obtained. Our experiments show that this wide-field fluorescence sectioning microscopy can be used to optically section tissue and cell, and has potential applications in the clinics.

Keys: fluorescence, speckle illumination, fluorescence microscopy, sectioning