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[Image PDF (1860K)] [References]

Realtime Nonlinear-Optical Microscopy for Observing Biological Cells

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Abstract: The recent development of ultrashort pulse lasers emitting light in the near infrared region has enabled us to induce nonlinear optical effects in living biological cells. The use of nonlinear optical effects in microscopy provides high spatial resolution in three dimensions and low phototoxicity. In this paper, we describe two microscopes, for two-photon fluorescence (TPF) and second-harmonic generation (SHG), that are expected to be useful tools for observing biological cell activities. We also present the use of multifocus illumination in both TPF and SHG microscopes where scanning speed of a specimen can be as high as 3ms/frame. The optical setup and experimental results of observing living HeLa cells and rat cardiomyocytes are shown.

Key Words: Nonlinear optical effect, Two-photon fluorescence, Second-harmonic generation, Laser-scanning microscopy, Live cell imaging

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