Title	**Fourier-transform spectroscopy combined with a 5-fs broadband pulse for multispectral nonlinear microscopy**
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Abstract	We propose a technique for distinguishing the origin of a four-wave mixing (FWM) signal. This technique is based on nonlinear Fourier-transform spectroscopy (FTS) combined with the use of a broadband pulse. We theoretically analyze FWM-FTS and show that the response function in FWM is obtained from the FWM power spectrum calculated by the Fourier transform of an interferometric autocorrelation signal. When a broadband pulse is employed as an excitation light source, the FWM power spectrum shows not only Raman resonance but also two-photon electronic resonance. By comparing the FWM power spectrum of a resonant sample with that of a nonresonant reference sample, the origin of FWM is identified. By employing theoretical analysis, we experimentally demonstrate FWM-FTS using a 5-fs broadband pulse. By combining the use of a 5-fs pulse with nonlinear FTS based on two-photon excited fluorescence, we also successfully measured a two-photon excitation spectrum with a bandwidth of 300 nm.
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