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Ultra-deep two-photon fluorescence excitation in turbid media

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Abstract

An important application of two-photon excited fluorescence (TPEF) microscopy is to provide high-resolution images from deep within scattering media. We investigate strategies to further improve TPEF penetration depth by considering the effects of scattering on fluorescence generation and collection separately. In particular, we demonstrate that the redistribution of laser power into higher energy pulses by means of a regenerative amplifier improves the TPEF depth penetration by two to three excitation scattering mean free paths.

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