

International Journal of Biomedical Imaging

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High-Speed Fluorescence Imaging and Intensity Profiling of Femtosecond-Induced Calcium Transients

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Abstract

We have demonstrated a combined imaging system, where the physiology of biological specimens can be imaged and profiled at 10–20 frames per second whilst undergoing femtosecond laser irradiation. Individual GH3 cells labeled with the calcium fluorophore Fluo-3 were stimulated using a counter-propagating focused femtosecond beam with respect to the imaging system. As a result of the stimulation, calcium waves can be generated in COS cells, and laser-induced calcium oscillations are initiated in the GH3 cells. Single-photon fluorescence images and intensity profiles of the targeted specimens are sampled in real-time using a modified PerkinElmer UltraView LCI microscope.