Abstract Submitted
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Selective two-photon excitation of fluorescent biomarkers by coherent control and pulse shaping[1] MILAN POUDEL, ALEXANDRE KOLOMENSKII, Department of Physics, Texas A&M University, College Station, TX-77843, ALVIN T. YEH, Department of Biomedical Engineering, Texas A&M University, College Station, TX-77843, HANS SCHUESSLER, Department of Physics, Texas A&M University, College Station, TX-77843 — Two-photon fluorescence of organic dyes and biomarkers was successfully optimized by using a feedback control femtosecond pulse shaping technique. For optimization we implemented a liquid crystal pulse shaper in a folded 4f set-up with an evolutionary algorithm. The optimization procedure that started with a near transform-limited pulse noticeably improved the two-photon fluorescence. Several signal ratios involving two-photon fluorescence, second harmonic generation and the incident laser power were successfully optimized. Theoretical calculations were done and optimal parameters were found for the best results. Experiment on selective excitation of individual dyes within a mixture of common biomarkers namely Texas Red, Indo-1 and FITC are under way. For this research amplified spectrally broad 7 femtosecond pulses appropriately shaped with an acoustic optical programmable filter (Dazzler) are used. Such a selective excitation of specific biomarkers is of great importance for two-photon microscopy and understanding the roles of different biomolecules in vital processes.

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