TWO-PHOTON FLUORESCENCE IMAGING WITH LOW COST 30 FS LASER SYSTEM TUNABLE AROUND 1 MICRON

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Yb-doped lasers [1] offer ultrashort pulses with high power and direct diode pumping. Their limited tunability can be addressed with nonlinear fiber broadening [2] and pulse compression. Laser wavelengths around 1 µm produce less absorption and scattering in biomedical tissue and it is near the two-photon excited fluorescent peak of GFP [3].

![Diagram of tunable laser system layout](image)

The tunable laser system layout and parameters are depicted in Fig. 1. The oscillator spectrum was broadened to cover 800 to 1200 nm (black curve in Fig. 2a). Subsequently, the broadened spectrum was sliced to 100 nm (blue curve in Fig. 2a) and compressed by a prism compressor to typically 30 fs pulse duration with ~50 mW average output power (Fig. 2b).

![Graphs a, b, and c](image)

Fig. 2a) Oscillator spectrum broadened and sliced b) output pulse c) mouse intestine section

A spectral slice centered at 970 nm having 50 mW average output power, was used to obtain two-photon fluorescence images of a mouse intestine section. The acquired image (10 frames), shown in Fig. 2c presents a high signal to noise ratio, due to the system compressor ability to adjust for high peak power at the sample plane of the microscope.

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