Diploma thesis abstract.

«Waveguide system for optical detection of neuron activity»

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We have demonstrated the possibility of tailoring dispersion and optical nonlinearity in microstructured fibers for realization of an effective source for biomedical applications. This source operating in the regime of generating of tunable ultrashort soliton pulses in broad spectral range was used for an effective two-photon fluorescence biomarking for visualization the mammalian nervous system. Another source based on microstructured fibers with specially designed structure was applied for supercontinuum generation and simultaneous excitation of various biomarkers. The spatial resolution and efficiency of fluorescence signal collection of microstructured fiber based detectors were discussed and evaluated in context of optimization of existing fibers probes. We have experimentally realized all-fiber optical schemes for transportation of pump radiation and collecting the fluorescent signal from neuron tissues marked by organic dyes or brains of transgenic mice in vitro and in vivo.