Annotation of diploma

"Fiber-based visualization of biomarkers by Raman scattering and optical harmonic generation"

The use of multicore fiber-optic probes for different methods of high spatial and temporal resolution visualization is shown. A multicore fiber-optic setup was developed and applied for delivering the pump radiation and Raman signal, that allowed us to visualize the spatial distribution of Raman active resonances of matter. Visualization of the distribution of diamond nanoparticles and the structure of polystyrene plate demonstrated the efficiency of this fiber-optic method.

The possibility of markerless visualization of brain structures using a third-harmonic generation method was investigated. A setup for third-harmonic generation microscopy of biological specimens was developed and used to visualize the morphology of different brain structures of mice. A mathematical model of the brain nerve tissue was proposed and numerical modeling of third-harmonic generation in the approximation of strong focusing was performed based on it. The experimental data and theoretical calculations are in a good agreement. The use of fiber-optic interface for third-harmonic generation microscopy was shown.

Diploma by

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