

Diploma thesis abstract

«Continuous-wave subterahertz reflectometer based on near-infrared diode laser sources for bio-medical applications»

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The work is devoted to the development of a method for hydration control of biological objects using frequency-domain terahertz reflectometry. For this purpose the method of terahertz photomixing on a photoconductive antenna was used.

To implement the method, a compact sub-terahertz reflectometer with a tunable wavelength was created. Two tunable diode lasers with a wavelength of 1550 nm as a source and two semiconductor photoconductive antennas from gallium-indium arsenide was used in the design of device.

In this work, the dielectric properties of water in the subterahertz range were studied, an absorption model was constructed, and a comparison with the experimental results was made.

The cornea of the human eye was chosen as the biological object of the study. The rate of dehydration of the tear film is an important indicator for the diagnosis of a number of pathologies of the lacrimal apparatus and the cornea. We created method of non-invasive control of the rate of corneal dehydration was developed, and a measuring device. Using created device, we made measurements on test samples and a control group of patients, a method for processing experimental data was developed.