

Compact terahertz spectrometer based on near-infrared tunable diode lasers

Mishchenko Mikhail

Terahertz range (from 100 GHz to 10 THz) occupies an intermediate position in the electromagnetic spectrum between infrared and microwave range. Most chemical compounds show very strong, specific frequency dependence of absorption in the THz range. That's why this range is very interesting for spectroscopy

There are two main methods of terahertz radiation generation. In the first method femtosecond laser pulse converting in a nonlinear crystal or a photoconductive antenna to a terahertz pulse. Another way - is to use the difference-frequency continuous wave of two diode lasers, and receipt antenna terahertz radiation by the photoconductive. Spectrometers using the second method, possess a number of advantages - compact size, low cost (in comparison with the pulse spectrometers), high spectral brightness, allows to study resonance effects.

The main purpose of work is the creation of a CW-spectrometer, built on two tunable diode lasers NIR - range. In this work two telecom tunable laser diodes are used, with the tune of the wavelength near 1.55 microns. This diodes characterized by a small line width and ultra - low noises. The signal at the difference frequency converted into terahertz radiation in photomixer - InGaAs photoconductive antenna. Similar antenna is used to register radiaton.

Another purpose is the creation of software to control lasers and data recording.