A continuous-wave (cw) high-resolution mid-infrared spectrometer has been developed based on difference-frequency generation (DFG) by mixing two cw autoscaned Ti: Sapphire lasers in GaSe crystal. The DFG spectrometer is continuously tunable in the wide spectral region of 8-20 μm without any "mode hop", with a linewidth of ∼ 1 MHz.

DFG spectra of various volatile organic compounds, such as acetylene, ethylene, benzene, and toluene are investigated over the wavelength range from 10 to 15 μm with a resolution of ∼ 10⁻³ cm⁻¹.

The present work is aimed at study of line parameters and its application to quantitative analysis of heavy molecules in the gas phase by vibrational absorption spectroscopy.