HIGH-RESOLUTION MID-INFRARED SPECTROSCOPY OF VOLATILE ORGANIC COMPOUNDS USING LASER DIFFERENCE-FREQUENCY SPECTROMETER

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A continuous-wave (cw) high-resolution mid-infrared spectrometer has been developed based on difference-frequency generation (DFG) by mixing two cw autoscanned 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 $\sim$ 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 $\sim 10^{-3}$ 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.