FIRST APPLICATION OF InAsSb/InAsSbP AND LEADCHALKOGENIDE INFRARED DIODE LASERS FOR PHOTOACOUSTIC DETECTION IN THE 3.2 AND 5 μm REGION.

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A new type of semi-conductor lasers with composition InAsSb/InAsSbP are described. The lasers, working in the range of temperatures (17,5 - 80 K), are tested as a tool of the high resolution absorption spectroscopy of atmospherically important species[a]. The spectral charachteristics and tunability of the lasers are probed by means of the vibration-rotation lines of the gaseous molecules C_2H_2, NH_3, OCS, CO, CH_3Cl and H_2O. Experimentaly estimated spectral emission linewidths vary in the range 10 - 30 MHz in dependence on the current passing and laser type [b]. Potential applications of the lasers are in the area of analytical chemistry, atmospheric research and kinetics of reactive species.

Photoacoustic spectroscopy (PAS) with the InAsSb/InAsSbP and leadchalkogenide tunable infrared diode lasers represents a very promising tool for trace gas monitoring. In this study we present and discuss some results obtained using the 3.2 - 3.6 and 5 μm diode lasers. The results have been obtained with a small and very simple glass photoacoustic cell. The cell consists of a hearing aid microphone (Brűel & Kjær type 4144/Sennheiser type K6P) and an infrared diode laser. The laser is modulated by means of the amplitude/wavelength modulation at three different resonance frequencies of the cell. The PAS measurements of the dependence of the $2f$ signal on the gas mixture pressures yield information on the detection limits and influence of the total pressure in the cell on the amplitude of the photoacoustic signal for different mixtures of the studied gases with air.

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[a] S CIVIS et al., *Spectrochimica Acta* **56**, 2125-2130, 2000.

[b] A. N. IMENKOV et al., *Review of Scientific Instruments* **72**, 1988-1992, 2001.