DIODE LASER PHOTOACOUSTIC DETECTION IN THE INFRARED AND NEAR INFRARED

VERONIKA HORKA, S. CIVIS, *J. Heyrovsky Institute of Physical Chemistry, Academy of Sciences of the Czech Republic, Dolejskova 3, 18223 Prague 8, Czech Republic*; LI-HONG XU, R.M. LEES , *Canadian Institute for Photonic Innovations (CIPI) and Centre for Laser, Atomic and Molecular Sciences (CLAMS), Department of Physical Sciences, University of New Brunswick, Saint John, NB, Canada E2L 4L5*.

Development of a diode-laser-based technique for high-resolution photoacoustic detection is reported. This method has been tested and compared using identical photoacoustic instrumentation (cell and microphone) in three different spectral regions with a variety of absorbing gases. These studies were: infrared range near 2100 cm^{-1} - CO and OCS fundamental band transitions; range near 4200 and 4350 cm^{-1} - CH_4 and NH_3 overtone and combination band transitions; near-infrared range near 6500 cm^{-1} - CO, CO_2 and NH_3 overtone transitions. Several types of diode laser operating at room temperature or at liquid nitrogen temperature were employed and compared. The optimum gas pressures for maximum sensitivity of the photoacoustic signals were determined, and detection limits were estimated for all of the gases studied. The best sensitivity was achieved for NH_3 at 100 ppbv. The sensitivity of the system was also tested for trace detection of NH_3 and CO_2 in automobile exhaust for different cars and different fuel types.