

TUNABLE INFRARED LASERS FOR BIOMEDICAL AND ENVIRONMENTAL APPLICATIONS

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Nowadays, an urgent task is the development of tunable infrared lasers. This type of laser can be used to study biological tissues both in vivo and in vitro. Also widely used is the analysis of human exhaled air, as well as blood, urine for the presence of biomarkers corresponding to a number of diseases. This paper presents the design and description of the operation of an external cavity quantum cascade laser built on the Littrow scheme. The laser emits in the range of 9.6 - 12.5 microns tuning step of one 1/cm and an average output optical power of 10 mW (5% duty cycle). The description of the experimental setup built on the basis of the described laser, two MCT photodetectors with 24-bit ADC and a 76-meter Herriot gas cell 0.3 m length and 238 re-reflections of the infrared beam is given [1]. Described experimental setup can be used for exhaled breath analysis and air quality analysis for environmental applications [2].

The design and operating principle of a Cr²⁺: ZnSe tunable laser with a MgF₂ Lyot filter is described. The laser emits in the range of 2.1-2.6 microns, with an output optical power of up to 1 W and a spectral line FWHM width about 0.075 nm. The laser is used both for the analysis of biological tissues (collagen, protein) and for gas analysis [3].

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