

RF Discharge Slab Carbon Monoxide Laser: Overtone Lasing (2.5 – 4.0 micron) and Fundamental Band Tuning (5.0 – 6.5 micron)

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Overtone lasing within the spectral range ~2.5 - 4.0 micron on ~80 spectral lines and fundamental band tuning over the spectral range ~5.0 – 6.5 micron on ~100 spectral lines was for the first time obtained in a slab carbon monoxide laser. Average output power of the compact repetitively pulsed RF discharge slab overtone CO laser came up to 0.3 W.

Overtone lasing and fundamental band tuning was for the first time obtained in a slab carbon monoxide laser. The compact slab CO laser with active volume $3 \times 30 \times 250 \text{ mm}^3$ was excited by repetitively pulsed capacitive RF discharge (81.36 MHz) with pulse repetition rate 100 – 500 Hz. The laser electrodes were cooled down to 120 K. Gas mixture CO:air:He at gas pressure 15 Torr was used. The optical scheme “frequency selective master oscillator - laser amplifier” was applied for getting fundamental band tuning. Single line lasing with average power up to several tens of mW was observed on ~100 rotational-vibrational transitions of CO molecule within the spectral range ~5.0 – 6.5 micron. Multiline overtone lasing was observed on ~80 spectral lines within the spectral range ~2.5 -4.0 micron, maximum single line average output power being 12 mW. The total output power of the slab overtone CO laser came up to 0.3 W, laser efficiency being 0.5%. The results of parametric studies of the overtone CO laser including complicated time behavior for laser pulses on different overtone rotational-vibrational transitions are presented.

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