MEASUREMENTS OF GROUND STATE OXYGEN, WATER VAPOR AND TEMPERATURE IN CHEMICAL OXYGEN-IODINE LASER BY TI:SAPPHIRE LASER-BASED INTRACAVITY LASER SPECTROSCOPY

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The ground state oxygen and water vapor are important species in chemical oxygen-iodine laser. The detectivity required in the chemical oxygen-iodine laser device is about 0.03 Torr for both H_2O and $O_2(X)$. We have shown that these parameters and the temperature of chemical oxygen-iodine laser medium can be measured by intracavity laser spectroscopy based on simple standing wave Ti:sapphire laser. Using 120-μs laser generation time, we have demonstrated the detection sensitivities to be $6 \cdot 10^14$ and $3 \cdot 10^14$ cm^{-3} for H_2O and $O_2(X)$, respectively. The oxygen concentration measurement error does not exceed 5% in the range $2 \cdot 10^15$–10^16 cm^{-3}. The temperature measurement error does not exceed 25K in the range 200-500K.

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