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A CHEMICAL OXYGEN-IODINE LASER WITH A HIGH WATER VAPOR CONTENT

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Abstract

To check whether it is possible to make the construction of an oxygen-iodine laser less complicated and to give up in the future a cold water trap, we investigated the possibility for COIL operation at a high content of the water vapor in the active medium.

With the oxygen pressure increase between 0.5 ... 2.5 Torr and the water vapor content between 0.3 ... 1.0 Torr at the constant iodine concentration ~ 10 mTorr, the generation power increased from 1.0 to 4.5 kW, saturation of the radiation power dependence on the oxygen pressure was not observed. The output power as a function of water vapor pressure remained nearly constant till $P_{H_2O} \sim 1$ Torr and then rapidly decreased.

The lasing region was 0.5 ... 3.5 cm downstream of the iodine injector. We observed molecular iodine to dissociate almost immediately ($\tau_{dis} < 50 \mu s$) after injection into singlet oxygen flow in contradiction with kinetic model.

The active medium gain varied with time non-monotonically in the experiment where the injected molecular iodine concentration monotonically decreased.