Scalable Chemical Oxygen-Iodine Laser

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COIL designed around the generally accepted layout is shown to be scalable on the condition of the velocity in its reaction zone being no less than 50–70 m/s. The twisted-aerosol singlet oxygen generator (TA SOG) meeting this requirement is described.

The energy performance of COIL driven by TA SOG and operating on supersonic mixing of iodine with singlet oxygen is performed. The power output and chemical efficiency of COIL are given against the chlorine pressure and flowrate. The efficiency determined under the optimal experimental conditions was about 30 %. When the chlorine flowrate was 680 mmol/s, the tested TA SOG model allows the laser power output to rise up to 7.5 kW corresponding to 240 W/cm^2 of specific power.

Using the proposed scaling method, a supersonic COIL with a maximal lasing power of 90 kW and chemical efficiency above 35% has been built.

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