

§35. Development of 1.2W cw 57- μm CH₃OD Laser

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A high power 57- μm CH₃OD laser pumped by 9R(8) cw CO₂ laser has been developed for diagnostics of high-density and large-volume plasmas as in ITER for example.¹⁾

The pumping CO₂ laser is about 3 m in length, and the cavity is formed by a grating (150 lines/mm) and a ZnSe output mirror (55% reflection for 10.6 μm) attached on PZT. The output power for each line is shown in Fig.1. The maximum output power is over 250 W for the 10P(20) line.

The FIR laser is about 2.9 m in length, and the laser tube diameter is 25 mm. The laser cavity is formed by a plane metal mirror having off-axis input coupling hole (3 mm) and a Si hybrid mirror having an FIR output coupling hole of 14 mm in the center.

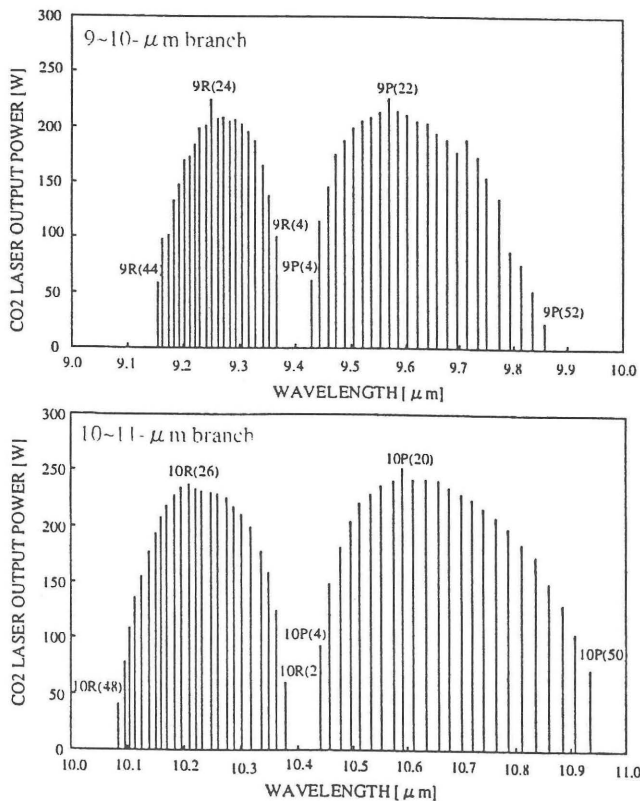


Fig.1. CO₂ laser output power.

An output window of the laser tube is polyethylene sheet of 1mm in thickness having 80% transmittance for 57 μm wavelength. On the CH₃OD laser pumped by 9R(8) CO₂ laser, 57- μm and 47- μm lines have been observed. But, the two laser lines can be selected easily by using an FIR polarizer, because the polarization of 57- μm laser is perpendicular and that of 47- μm laser is parallel to that of pumping CO₂ laser. Addition of He to CH₃OD and the cooling of the laser tube are effective for the 57- μm laser output (Fig.2). The maximum output power of 1.75W has been obtained for 57- and 47- μm by 150W CO₂ laser pumping (Fig.3). This power level is estimated 1.2W for 57- μm line, and 0.5W for 47- μm line.

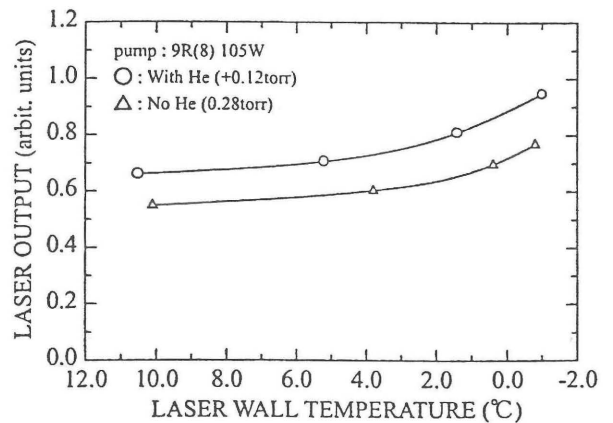


Fig.2. Cooling effect of laser tube for 57- μm CH₃OD laser output power.

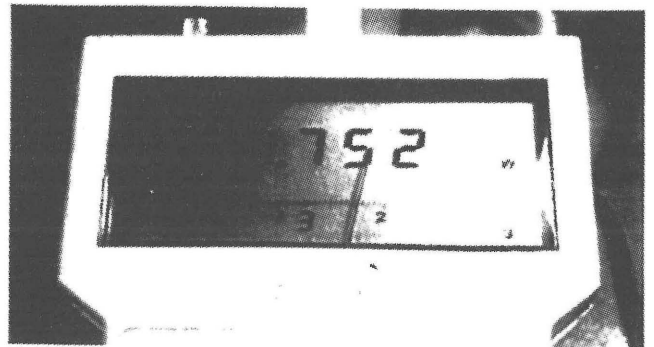


Fig.3. Total output power for 57- and 47- μm CH₃OD lasers.

Reference

1) Okajima, S., et al., Rev. Sci. Instrum., **72** (2001) 1094.