

Physical design, fabrication and output power optimization of a 2.5 thz CH₃OH laser

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A continuous and stable THz source is an important guarantee for plasma electron density and current density measurements by a polarimeter/interferometer. An 11-channel polarimeter/interferometer at 0.69THz has been operating on east for nearly a decade. A CW optically pumped high power 2.5THz CH₃OH laser has been developed for future fusion plasma diagnostics. Its weaker refraction effect, smaller spot size and larger output power provide more possibilities for the arrangement of detection channels. Routine testing and optimization of the laser was done (including the gas pressure and flow rate, the wall temperature and the rate of buffer gas). In particular, the output coupling is optimized in detail to seek a balance between output power and beam quality. Qualified terahertz output was obtained, and this source will have applications in the immediately following countertop test of interferometer and polarimeter.

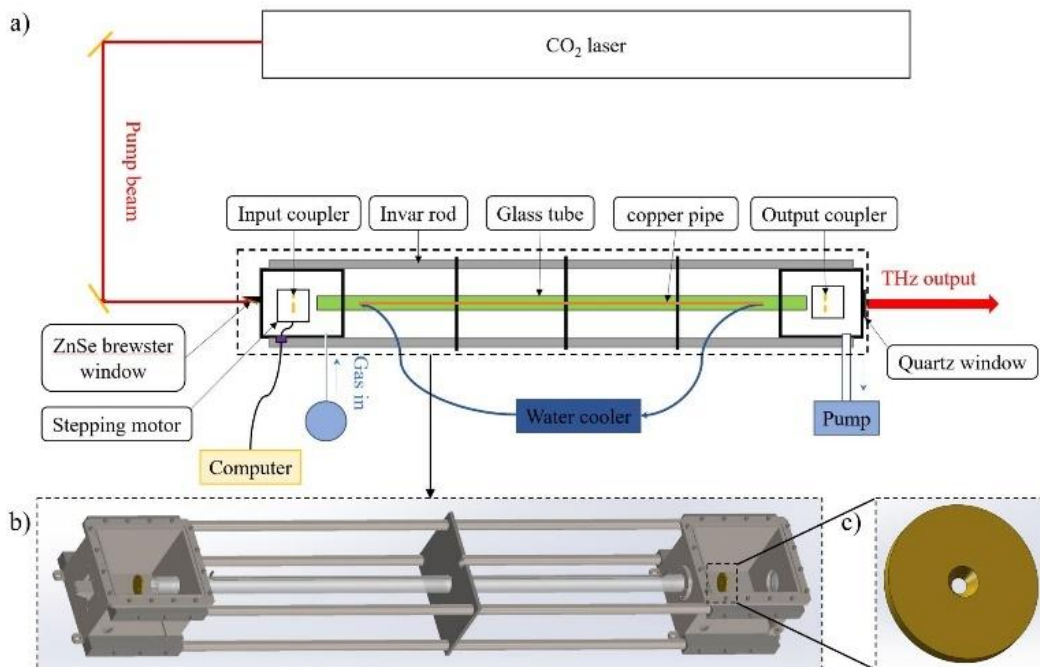


Figure 1. a) Diagram of CO₂ laser pumped methanol gas laser. b) Terahertz laser resonant cavity. c) Centric-hole gilded copper mirror.