Design and Implement of Yb-doped Linear-cavity fiber lasers

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Ytterbium doped fiber (YDF) lasers @1064 nm band, may have applications in laser cutting, medical cosmetology, instrument testing, frequency doubling and so on. Ytterbium doped fiber (YDF) lasers have merits of high slope efficiency and strong pump absorption.

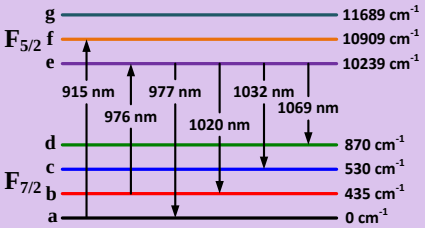
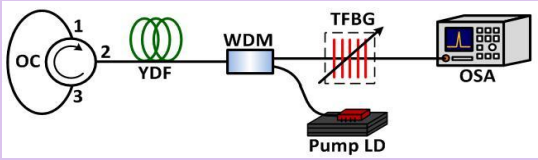


Fig. 1 shows the energy level diagram of Ytterbium ion. The absorption lines at 915 nm and 975 nm, and emission lines at 977 nm, 1020 nm, 1032 nm and 1069 nm.



Figs. 2 Schematic structures of Yb doped fiber laser in (a) backward and (b) forward pumping schemes.

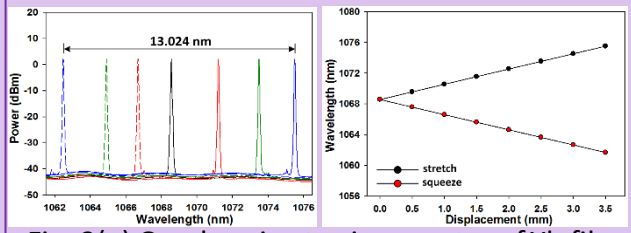
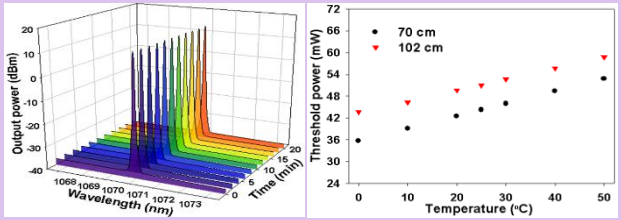


Fig. 3(a) Overlapping tuning spectra of Yb fiber laser, and (b) The screw displacement against wavelength shift by stretch or squeeze.



Figs. 4(a) 3-D lasing power and wavelength stability in 20 minutes observation, and (b) temperature verse threshold power with different lengths of Yb fiber.

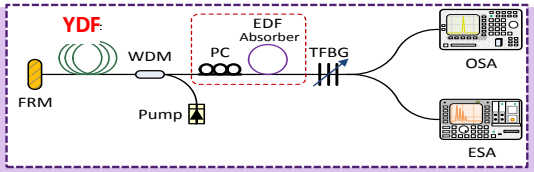
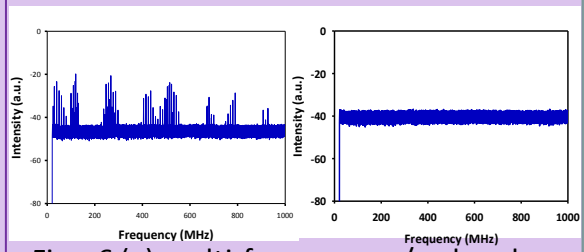


Fig. 5 Single frequency Yb-doped laser using pumped absorber methodology.



Figs. 6 (a) multi-frequency w/o absorber and (b) single-frequency w/ absorber.

Summary The proposed YDF laser has high pump slope efficiency and a tunable range of 50% and 13 nm, respectively. Within the whole tuning range, the fiber laser still maintains in single frequency operation.