Double Clad Fiber Laser with Frequency Selecting by Double Clad Fiber Bragg Grating

T. Wu[1] and Z.-D. Xue[2]

[1]LongYan University, China
[2]Fuzhou University, China

It is always using F-P linearity cavity in double clad fiber lasers. The cavity is composed of one dichroic mirror and fiber end Fresnel reflector (reflectivity nearly 4%). This is a defect and unstable cavity. It cannot exactly select frequency, and the line width of the laser is extensive. In some applications requiring wavelength strictly, this kind of laser is limited. As a rule Bragg gratings that compose a laser cavity are fabricated in a high germanosilicate host fiber and then spliced with an Yb3+−doped active fiber. Difference of parameters of the two kinds of fibers leads to dditional losses of both pump and signal. A double-clad fiber Bragg grating which was fabricated in the core of Yb3+−doped double-clad fiber using the phase-mask method is reported. This kind of grating is used as the output mirror of the D-shape inner cladding Yb3+−doped double-clad fiber laser. The fiber length is 10 m and 20 m respectively. The laser operating near 1058 nm with stable and narrow FWHM (3 dB bandwidth is 0.329 nm) is realized. The maximum output power laser is 570 mW. Finally, these experimental results are analyzed theoretically. A double clad fiber Bragg grating remarkably greatly improves the Spectrum properties of laser, and the anticipative wavelength of laser can be achieved. For the splice loss in cavity of the DCFL is very little, the bulk of the DCFL is reduced. It is also shown that wavelength-definite, narrow linewidth, high-efficiency, high-beam-quality laser performances can be achieved, which are of great interest for many important applications.