

Stable multiwavelength thulium fiber laser assisted by four wave mixing effect

ABSTRACT

In this work, stable multiwavelength thulium laser (TDFL) using interleaving filter and assisted by four wave mixing (FWM) effect in 0.5 km long highly nonlinear fiber (HNLF) is experimentally demonstrated. The impacts of altering the thulium pump power and wavelength on several laser characteristics such as threshold, laser count, output power and optical signal to noise ratio are investigated. Up to 19 output wavelengths within a 10 dB bandwidth with optical signal-to-noise ratio of more than 35 dB were generated from 1875 nm to 1897 nm. The laser has a threshold pump power of 0.3 W and a maximum peak power and wavelength fluctuations within 60 min of 1 dB and 0.2 nm respectively, which indicates the good stability of the proposed fiber laser. The laser performance without HNLF emphasizes the significant role of FWM in the performance of TDFL in terms of stability and number of wavelengths.

Keyword: Fiber lasers; Thulium-doped fiber; Four-wave mixing; Multiwavelength