

Hello every one my project is High-energy all-PM Yb-doped fiber laser with a nonlinear optical loop mirror

Today we will talk about :

- Recap of Yb-doped fiber laser
- Mode-locked fiber lasers
- Idea of such laser and Experimental setup of it
- Results

First of all

_____YB

For instance it works with pair Ytterbium and erbium

Ytterbium atom absorbs infrared photon and pass energy to erbium. After several times of such accumulations erbium emits green visible light. So, the main idea of the scheme Ytterbium absorbs energy pass to another element witch form from this energy new wave.

_____MODE

Mode locking is a technique in optics by which a laser can be made to produce pulses of light of extremely short duration, on the order of picoseconds (10⁻¹² s) or femtoseconds (10⁻¹⁵ s). The basis of the technique is to induce a fixed phase relationship between the modes of the laser's resonant cavity. Constructive interference between these modes can cause the laser light to be produced as a train of pulses. The laser is then said to be "phase-locked" or "mode-locked".

_____ Experimental setup _____

One of the main goals of fiber lasers development is generation of the ultrashort pulses with high output pulse energy which is required for initializing a nonlinear processes and high precision micromachining of transparent materials

I omit the values of the scheme, just only idea.

You can see the resonant loop.

The main part of the laser contains a pump signal combiner. The active fiber is pumped by a multi-mode semiconductor laser diode (LD). The isolator enforces unidirectional propagation of light in amplifying loop. nonlinear optical fiber loop mirror it is fiber coupler as a simple representation of the mirror. A bandpass filter (BPF) make signal stable.

_____Results

The output pulses are compressed by compressor

The high-energy Yb-doped mode-locked fiber laser was presented. The energy in the laser output pulses reached 5.9 nJ at a repetition rate of 9.45 MHz. According to our knowledge it is the maximum output energy from the all-PM Yb-doped fiber mode-locked laser.