Reviewer B:

The author reports 5.5 mJ pulse energy in 11 ns at a repetition rate of 20

Hz in quasi-contineous-wave (QCW) pumping mode with a duty cycle of 10% from a Tm:YLF laser crystal. These results are new and worthwhile to publish in PHOTONICS LETTERS OF POLAND. However, the literature on Tm:YLF lasers is not properly cited and the technical content of the manuscript is too low and has to be improved considerably. I cannot accept the manuscript in its present form and I recommend mandatory changes of the manuscript.

There are some comments with respect to details in the manuscript:

1) The introduction should give a state of the art of Tm:YLF lasers: cw

operation, mode locking, passively Q-switching, active Q-switching with highrepetition rate... The present manuscript is on low repetition rate actively Q-switching, which is new.

2) page 1, paragraph 3: the cut of the Tm:YLF crystal must be included.

3) Fig 1: Tm:YLF is a uniaxial crystal with different absorption spectra

with respect to sigma and pi polarization. The absorption spectrum shown in

Fig. 1 should be explained with regard to the polarization.

4) If the 22 mm lens is used to collimate the pump beam, both lenses give a

magnification of 1.5. Is 0.3 mm the radius or diameter of the pump beam

inside the Tm:YLF crystal.

5) The TEM00 mode radius inside the Tm:YLF crystal should be given for the

resonator configuration used.

6) Fig. 3 shows two different setups. Which of them was used for the

measurements.

7) The absorption behaviour in Fig. 4 should be discussed. Is the decrease

due to a shift of the pump wavelength or due to pump beam saturation? In the conclusion it is stated that the pump intensity is 5 times the saturation intensity. The value should be given.

8) Make and model of the Q-switch should be given.

9) Figure 5: the laser is operated in QCW mode. Therefore, an average output power is measured as a function of average pump power. Despite the 5 ms pump pulse has a rectangular shape in time, the free running laser pulses show relaxation oscillations with strong variation of output power during the pulse! Therefore the presentation of the results in the present form makes no sense.

10) A commercial Quartz AOM has a deflection angle of 13.7 mrad when driven

with 40.7 MHz. I cannot believe, that with only 20 W of RF power a

diffraction efficiency of 80% could be obtained at 2 ?m. Was that measured?

11) "Our first step was to determine... ". I cannot understand this

sentence. Shortly before it was stated that laser generation was diminished

by the AOM when the RF power was on.

12) The laser was sigma polarized? Why? Emission cross-section of pi

polarization is considerable higher than on sigma polarization. It seems

that there was no polarization selecting element inside the resonator.

13) In Q-switch mode 5.5 mJ is obtained with a pump energy of 95 mJ. In free running operation a pulse energy of ~ 17.5 mJ was obtained with a pump

energy of 105 mJ. Therefore Q-switched-to-normal-mode operation is approximately only 31%. What is the reason for this low efficiency?

14) From Fig. 8 a beam waist w0 of ~ 480 ?m is shown. Applying the relation

theta X w0 = lambda / pi x M2: theta should read 1.45 mrad.

Ad. 1:

I did not give the state of the art of Tm:YLF lasers in the introduction because of following reasons:

Three-page-format of the article limits amount of information included in manuscript.

In this article I would like to present Tm:YLF laser in regard of pumping source for mid-ir lasers (like i.e. Cr:ZnSe), rather than one of plenty Tm:YLF lasers presented untill today in scientific journals.

Ad. 2:

Corrected.

Ad. 3:

Corrected.

Ad. 4:

Corrected.

Ad. 5:

Corrected.

Ad. 6:

Corrected.

Ad. 7:

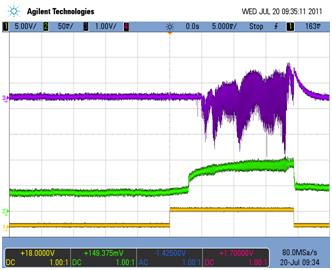
Corrected. Absorption spectrum of Tm:YLF is quite broad. Moreover, absorption efficiency measurements were conducted for 10% duty factor. That fact makes influence of the laser diode current negligible.

Ad. 8:

I agree with the Reviewer that adding Q switch model would improve scientific value of the manuscript. However, it is impossible to fit comprehensive model of the Q-switch in the 3-page format of the journal.

Ad. 9:

As you can see on the oscillogram (green line) variations of the output power during the pulse are not very strong and they can be omitted.



Ad. 10:

It was not measured. It was information from manufacturer. A have deleted it from article.

Ad. 11:

AO modulator was unable to stop generation for 10ms pumping time (which I had more output power for). I have to shorten pumping pulse width to avoid diminishing population inversion in q-switch regime. I have rewritten this paragraph. Hopefully, it is more clear now.

Ad. 12:

There were no polarization selecting element in resonator, but maximum of pi-polarized emission cross-section is at the wavelength about 1880 nm. Resonator mirrors I have used provide significantly higher resonator losses for this spectral range ( sharp edge just below 1900nm). That is the reason why the laser generating sigma polarized output.

Ad. 13:

Lower efficiency in q-switch regime is because of second order relaxation mechanisms like energy transfer up-conversion. These mechanisms are negligible in QCW regime because upper laser level in this case are less populated than in q-switch regime. In Q-switched operation, the loss in the resonator is kept high. During this time, the population inversion is adversely affected by up conversion and other radiative and non-radiative mechanisms.

Ad. 14:

It was in the fact. Divergence angle after the lens (f=300mm) was 1.43 mrad. However, in article I presented beam parameters of the laser itself: 3.5 mrad divergence and 0.192 mm beam radius. They were calculated from the parameters measured after the lens.