UDC 621.373.8

CONTINUOUS-WAVE $Tm:KY(WO_4)_2$ WAVEGUIDE LASER

PhD student Kifle E., Dr. Mateos X., Prof. Aguiló M., Prof. Díaz F.
University Rovira i Virgili, Tarragona, Spain
Dr. Loiko P.A., Prof. Yumashev K.V.
Belarusian National Technical University, Minsk, Belarus

Waveguide lasers may be used as sensing platforms with a high degree of sensitivity and selectivity of targeted atoms or molecules. Strong confinement, high overlap of the pump and laser modes, low laser threshold and on-chip integration are interesting advantages of waveguide laser systems.

In this work, as a waveguide laser, we studied a 5 mm long, 12 µm-thick, 3 at.% Tm doped epitaxial layer of monoclinic $KY(WO_4)_2$ (KYW) crystal grown on the (010) face of a pure KYW substrate. This layer was co-doped with Gd^{3+} and Lu^{3+} for optimum refractive index contrast and lattice matching between the active layer and the substrate. On the active layer, we additionally grew a 50 µm cladding of pure KYW to reduce the scattering losses.

The pump laser beam at 802 nm from a Ti:Sapphire laser propagated along the N_g principal optical axis with polarization parallel to the N_m axis.

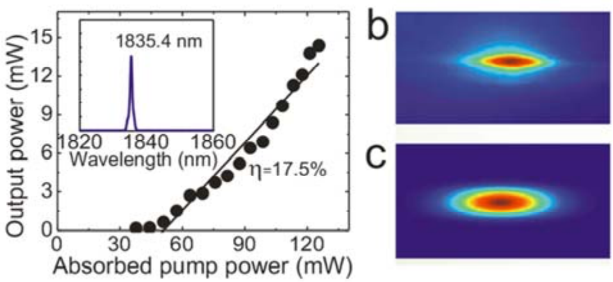

Figure 1 – Tm:KYW waveguide laser: output power versus absorbed pump power (a), measured laser beam profile (b) and calculated laser beam profile (c); *inset*: typical emission spectrum.

An absorbed pump power of 51 mW was needed to reach the laser threshold and a maximum of 14.4 mW at 1835.4 nm was achieved for an absorbed pump power of 126 mW leading to 17.5% slope efficiency, Fig. 1(a). A strong vertically confined laser mode was observed which was also confirmed by numerical simulation as shown in Fig. 1(b,c).

Further research with higher doping levels is ongoing to increase the output power as well as laser diode pumping is also planned to increase the compactness of the device.