

Projects at the EPFL Center of MicroNanoTechnology

OPTICAL CHANNEL WAVEGUIDES IN YTTERBIUM-DOPED $KY(WO_4)_2$ EPILAYERS

C. Borca, Y. Romanyuk, F. Gardillou, M. Pollnau, P. Hoffmann (STI-IOA-NOW)
C. Hibert (STI-CMI)

Project objective :

Fabrication of optically passive and active channel waveguide structures is highly desirable in order to meet the requirements of compactness and low pump threshold. Confinement of the pump and signal radiation in both vertical and horizontal directions results in improved overlap between the two beams, as well as higher pump intensity and potentially leads to lower lasing thresholds and higher slope efficiencies. We fabricated, for the first time to our knowledge, active channel waveguides in epitaxial thin films of Yb-doped $KY(WO_4)_2$, using reactive ion etching. These are first efforts in the direction of laser miniaturization and integrated optics.

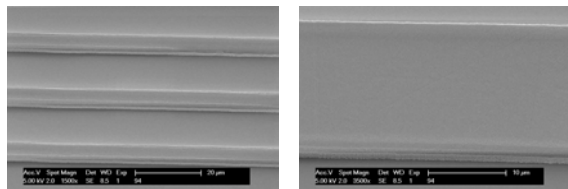


Fig. 1 : SEM pictures (30° tilt) of a sequence of channel waveguides with different widths..

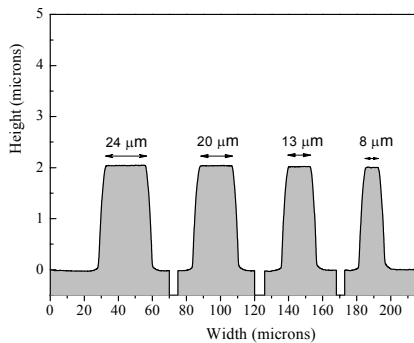


Fig. 2 : Profilometer scans of 2 μm-high ribs with different widths.

Techniques employed :

IOA-NOW: Fimwave simulation, polishing, optical characterization.
CMI: photolithography, RIE.

Publications :

- [1] C. Borca et al., "Optical channel waveguides in $KY(WO_4)_2$: Yb^{3+} ", CLEO/QELS, Long Beach CA, U.S.A., May 21-26 2006.
- [2] Y. Romanyuk et al., "Yb-doped $KY(WO_4)_2$ waveguide laser", Opt. Lett. 31, pp. 1-3, 2006.

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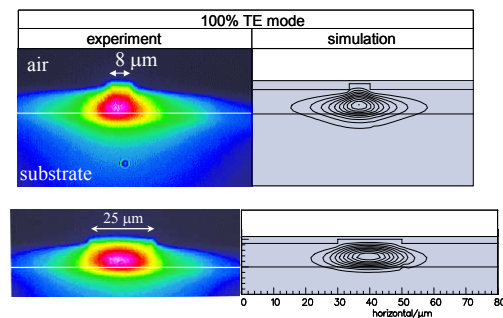
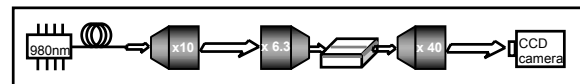


Fig. 4: Experimentally recorded channel-waveguides beam profiles (left panels) and Simulated (Fimwave) fundamental-modes intensity profiles (right panels).