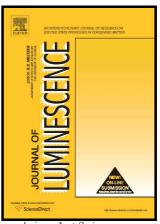
### Author's Accepted Manuscript

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#### **ACCEPTED MANUSCRIPT**

## Growth, spectroscopy and laser operation of Ho:KY(WO<sub>4</sub>)<sub>2</sub>

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**Abstract** Monoclinic Ho:KY(WO<sub>4</sub>)<sub>2</sub> crystals doped with up to 7.5 at.% Ho are grown by the Top Seeded Solution Growth-Slow Cooling method. The evolution of their unit cell parameters in dependence on the Ho doping and temperature is studied. The polarized low-temperature (6 K) optical absorption of the Ho<sup>3+</sup> ion is investigated in detail to determine the energy of the Stark sub-levels. Room-temperature absorption, stimulated-emission and gain cross-section spectra of Ho:KY(WO<sub>4</sub>)<sub>2</sub> crystals are derived for polarizations parallel to the principal optical axes,  $E \parallel N_{\rm p}$ ,  $N_{\rm m}$  and  $N_{\rm g}$ . The maximum absorption cross-section for the  $^5I_8 \rightarrow ^5I_7$  transition is  $1.60 \times 10^{-20}$  cm<sup>2</sup> at 1961.0 nm and the maximum stimulated-emission cross-section for the  $^5I_7 \rightarrow ^5I_8$  transition is  $2.65 \times 10^{-20}$  cm<sup>2</sup> at 2056.3 nm (for  $E \parallel N_{\rm m}$ ). The radiative lifetime of the upper laser level of the Ho<sup>3+</sup> ion ( $^5I_7$ ) amounts to 4.8 ms. Continuous-wave Ho<sup>3+</sup> laser operation is achieved under in-band pumping by a Tm laser at 1946 nm. In the microchip configuration, the maximum output power reached 205 mW at 2105 nm with a slope efficiency as high as 85%.

Keywords: Double tungstates, holmium, absorption, stimulated-emission, laser

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