

Continuous-Wave lasing of $\text{Tm}^{3+}:\text{KGd}(\text{WO}_4)_2$ in the $2\ \mu\text{m}$ spectral range at room temperature.

F. Güell, J. Massons, Jna. Gavaldà, R. Solé, M. Aguiló, F. Díaz, V. Petrov¹ and
U. Griebner¹

Dept. Química Física i Inorgánica, Física i Cristal·lografia de Materials (FiCMA), Universitat Rovira i Virgili (URV), C/ Marcel·lí Domingo, s/n, E-43007 Tarragona, Catalunya (Spain)

¹Max-Born-Institute, 2A Max-Born-Str., D-12489 Berlin (Germany)

frank.guell@urv.net

Tm^{3+} -doped laser materials are emerging as very interesting active media for the $2\ \mu\text{m}$ spectral region due to the possibility for diode pumping near $800\ \text{nm}$ and their broad tunability. Potential applications lie in the fields of medicine, laser radar and atmosphere monitoring. Recently, the successful growth of $\text{Tm}^{3+}:\text{KGd}(\text{WO}_4)_2$ ($\text{Tm}^{3+}:\text{KGW}$) was demonstrated and the spectroscopic properties relevant to laser operation were studied [1]. Here we study the CW laser characteristics of $5\% \text{Tm}^{3+}:\text{KGW}$ at room temperature using a tunable Ti:sapphire laser in order to compare both polarizations $E//N_m$ and $E//N_p$. The laser threshold for $E//N_m$ was $P_{\text{abs}}=70\ \text{mW}$ ($T_{\text{OC}}=1.5\%$) and $P_{\text{abs}}=130\ \text{mW}$ ($T_{\text{OC}}=10\%$), see Fig. 1. The maximum output power ($400\ \text{mW}$) for $E//N_m$ and $P_{\text{abs}}=1\ \text{W}$ was obtained with $T_{\text{OC}}=3\%$ (Fig.2) and the corresponding pump efficiency amounts to 40% . The output powers for $E//N_p$ were in general lower but for this polarization lower pump power can be used at $794\ \text{nm}$ as compared to $801\ \text{nm}$ to achieve the same slope efficiencies. We achieved an overall tunability from 1790 to $2042\ \text{nm}$, see Fig. 2. The FWHM of $162\ \text{nm}$ obtained for the tunability curve for $T_{\text{OC}}=1.5\%$ (see Fig.2) is in principle capable of supporting sub-50-fs pulses near $1950\ \text{nm}$ if this laser could be mode-locked.

Figure 1

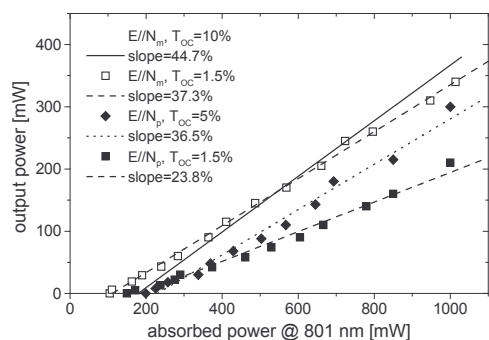
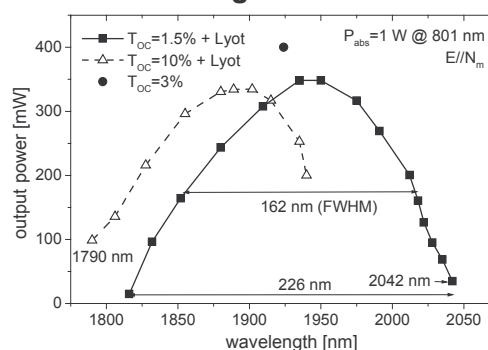


Figure 2



References:

[1] F. Güell; Jna. Gavaldà; R. Solé; M. Aguiló; F. Díaz; M. Galán; J. Massons, *J. Appl. Phys.* **2004**, 95, 919 – 923.