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Abstract and Proceeding Book

ABSTRACT AND PROCEEDING BOOK

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Tm^{3+}:KY $(WO_4)_2$ single crystals prepared by the modified Czochralski method: growth and optical properties

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Laser sources emitting in the 1.9–2 μm spectral range are of high interest for a variety of practical applications in medicine, remote sensing, optical and other materials. The present study is focused on the growth and optical characterization of Tm doped KYW crystals used for lasers working in near IR range.

Growth of the KYW crystals has been carried out at temperatures below the point of the phase transition (900÷985 ℃) using the oriented crystal seed which gradually pull up upon slow cooling of the solution-melt. Stoichiometric composition of crystal forming components was fused with a total mass of solution-melt of about 1600-1800 g. Growth temperature was in the range 900-985°C. During the growth process an overcooling parameter was about 1.5-2.2°C; crystal pulling speed was about 3.3-3.5mm/d; the weight of the grown crystals was about 600g.

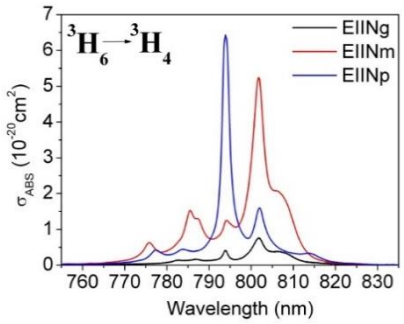


Figure 1. Polarized absorption cross-section spectra of Tm:KYW crystal at near 800 nm.

The room-temperature polarized absorption cross-section spectra of the Tm:KYW crystal in the spectral range of 750–850 nm ($^3H_6 \rightarrow ^3H_4$ transition) are shown in Fig. 1. The crystal belongs to monoclinic crystallographic system and consequently, it is bi-axial optical system. The clearly visible maxima can be seen on the polarized absorption spectra. Anisotropy of analyzed Tm^{3+} absorption in KYW crystal is substantial and it can be perceived that the $^3H_6 \rightarrow ^3H_4$ absorption spectrum recorded for $E//N_g$ is not intense and structureless. On the other hand, the prominent components can be found for polarized absorption spectra measured for $E//N_m$ and $E//N_p$. The A maximum absorption cross-section of 6.4×10^{-20} cm^2 was determined at 794 nm with a bandwidth (FWHM) of 2.2 nm for light polarization $E//N_p$ axis. Based on the aforementioned results, it can be concluded that geometry of Tm:KYW crystal and the adequate configuration of optical pumping source are crucial for effective near-infrared Tm^{3+} laser operation.

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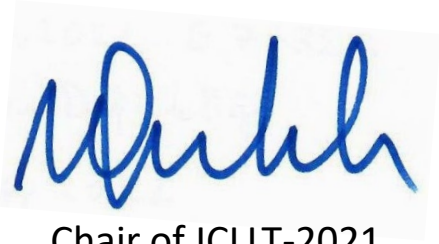
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Organized by the Photonics Application & Research Center and the Photonics Department of Gazi University, Ankara, Turkey

CERTIFICATE of ATTENDANCE

Yunus Özen

We would like to thank you for your invaluable contribution as a **Participant** at the 2nd ICLLT, held virtually on 26-28 May 2021.



Chair of ICLLT-2021

Prof. Dr. Süleyman ÖZÇELİK