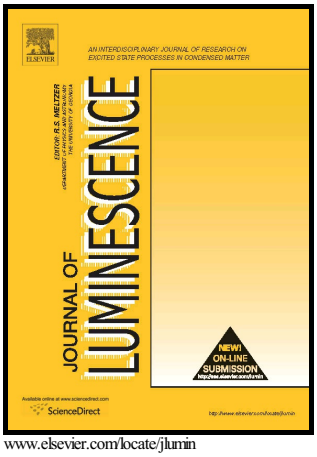

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PII: S0022-2313(17)31244-9
DOI: https://doi.org/10.1016/j.jlumin.2018.02.016
Reference: LUMIN15363

To appear in: *Journal of Luminescence*

Received date: 20 July 2017
Revised date: 28 December 2017
Accepted date: 5 February 2018

Cite this article as: Guozhu Sui, Baojiu Chen, Jinsu Zhang, Xiangping Li, Sai Xu, Jiashi Sun, Yanqiu Zhang, Lili Tong, Xixian Luo and Haiping Xia, Examination of Judd-Ofelt calculation and temperature self-reading for Tm^{3+} and Tm^{3+}/Yb^{3+} doped $LiYF_4$ single crystals, *Journal of Luminescence,* https://doi.org/10.1016/j.jlumin.2018.02.016

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ABSTRACT

To validate the reliability of Judd-Ofelt results and the influence of involving absorption transition number, the Judd-Ofelt calculations, in which various transitions were adopted, were carried out for Tm^{3+} doped $LiYF_4$ single crystal. It was found that introducing more transitions into the calculation procedure might get more reliable results. In order to clarify the feasibility of temperature self-reading in Tm^{3+}/Yb^{3+} doped $LiYF_4$ single crystal during laser operation, the temperature sensing properties of the single crystal were studied. It was found that the fluorescence intensity ratio of $^3F_2+^3F_3\rightarrow{}^3H_6$ to $^3H_4\rightarrow{}^3H_6$ can be used for achieving better temperature detection, and the temperature sensitivity was found much better than that in other materials.

Keywords: Judd-Ofelt theory; Temperature sensing; Up-conversion luminescence; $LiYF_4$:Tm^{3+}/Yb^{3+} single crystal