The fluorescence of the LGAT:Eu was excited using a ScienceTech Xe-Hg 350-W lamp with suitable filters, on the transition $^7F_0 \rightarrow {}^5L_6$. The fluorescence spectra of the $^5D_0 \rightarrow {}^7F_J$ (J = 1,2,3,4) transitions were measured at room temperature using a Horiba Jobin-Yvon 1000M monochromator, an S-20 photomultiplier and a SR830 lock-in amplifier from Stanford Research Systems. The kinetics of the $^5D_0$ level was excited with the second harmonic of the Nd:YAG laser. We obtained a value of the asymmetry factor ≈ 6 and a lifetime $\tau(^5D_0)$ = 1 ms, close to the values measured for Europium doped LGT [1].

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Zone melting of $LiLu_{1-x}Gd_xF_4$ solid solutions

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Recently, in some works have been reported the crystal growth and spectroscopic properties of $LiLnF_4$ (Ln = Lanthanides, Y) mixed crystals [i,ii,iii]. The main interest in these solid solutions is the development of laser hosts with better optical and structural properties that are suitable for doping with light rare earth ions. The zone melting (ZM) technique is well recognized due to its applications to achieve ultrapure materials and it is a relatively cheap and fast method for the crystal growth[iv]. The present work reports the growth of $LiLu_{1-x}Gd_xF_4$ crystals using the ZM technique. Some charges of $LiLu_{1-x}Gd_xF_4$ ($25 \leq x \leq 50$) were initially synthesized under a hydrogen fluoride and Argon atmosphere, using commercially available fluorides. Afterwards the ingots were submitted to one zone melting cycle under the same reactive atmosphere. Initially, it was determined the best conditions to grow the crystals, and the next experiments were settled with translation rates of 4.0 mm/h and the charge mass with 85 g. The zone melted bars were characterized by scanning electron microscopy, energy dispersive spectrometry and X-ray powder diffraction analysis. It was observed that the $LiLu_{1-x}Gd_xF_4$ phase enhanced proportionally to the increasing of the Lu concentration in the matrix. Thus the best compositions to obtain large amount of transparent crystals were established for the Lu-rich compositions ($x \leq 35$). The phases formed throughout the bars were identified and a study to determine the elements concentration in these phases was carried out. It was measured an accentuated Gd segregation along the $LiLu_{1-x}Gd_xF_4$ phase, which was related to the gap between solidus and liquidus lines, and due to the difference of Gd^{3+}/Lu^{3+} ionic radii.

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