

## Low temperature sensitivity of upconversion emission in $\text{Y}_2\text{O}_3:\text{Yb,Tm}$ and $\text{Y}_2\text{O}_3:\text{Yb,Ho}$ powders

Vesna Lojpur<sup>1</sup>, Marko Nikolić<sup>2</sup>, Mina Medić<sup>2</sup>, Lidija Mančić<sup>1</sup>,

Olivera Milošević<sup>1</sup>, Miroslav D. Dramićanin<sup>2</sup>

<sup>1</sup>Institute of Technical Sciences of SASA, Belgrade, Serbia

<sup>2</sup>Vinca Institute of Nuclear Sciences, University of Belgrade, Belgrade, Serbia

In recent years trivalent rare earth doped materials have received significant attention for optical temperature sensors. In these materials ratio of fluorescence emissions from different energy levels exhibit strong temperature dependence. Synthesized  $\text{Y}_2\text{O}_3:\text{Yb,Tm}$  and  $\text{Y}_2\text{O}_3:\text{Yb,Ho}$  powders were obtained *via* spray pyrolysis at 900 °C using 0.1 M nitrate precursor. Using laser excitation at 978 nm we investigated upconversion emission of these powders and recorded characteristic transitions:  $^1\text{D}_2 \rightarrow ^3\text{F}_4$ ,  $^1\text{G}_4 \rightarrow ^3\text{H}_6$ ,  $^1\text{G}_4 \rightarrow ^3\text{F}_4$ ,  $^3\text{F}_{2,3} \rightarrow ^3\text{H}_6$ ,  $^1\text{D}_2 \rightarrow ^3\text{F}_3$ ,  $^1\text{G}_4 \rightarrow ^3\text{H}_6$ ,  $^3\text{H}_4 \rightarrow ^3\text{H}_6$  for  $\text{Tm}^{3+}$  and  $^5\text{F}_4$ ,  $^5\text{S}_2 \rightarrow ^5\text{I}_8$ ,  $^5\text{F}_5 \rightarrow ^5\text{I}_8$ ,  $^5\text{F}_4$ ,  $^5\text{S}_2 \rightarrow ^5\text{I}_7$  for  $\text{Ho}^{3+}$ . Further we analyzed temperature dependence of fluorescence intensity ratios of different Stark components in the range from 10K to 300K. Several of these ratios exhibit significant temperature sensitivity, with the largest value of  $0.08 \text{ K}^{-1}$ .

## ***2nd International Conference on Optical, Electronic and Electrical Materials***

5-7 August 2012, Shanghai, China