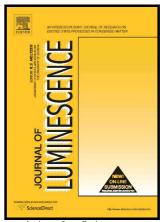
# Author's Accepted Manuscript

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## **ACCEPTED MANUSCRIPT**

Preliminary evaluation of the up-conversion emission of Y<sub>2</sub>O<sub>3</sub>:Er-Yb thin films prepared by a solid state photochemical deposition method

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#### **Abstract**

 $Y_2O_3$  thin films doped with different concentrations of erbium ions and co-doped with 10 mol % of ytterbium were synthesized by a solid state photochemical deposition method followed by a subsequent calcination process. The photo-reactivity of the thin films was monitored by Fourier transform infrared (FT-IR) spectroscopy. X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), UV-vis spectroscopy and photo-luminescence (PL) were employed to characterize the samples. The results reveal that  $Y_2O_3$ :Er films under 980 nm irradiation exhibit characteristic up-conversion emissions that are focused in the green region of the spectrum; these emissions are assigned to the  $(^2H_{11/2}, ^4S_{3/2}) \rightarrow ^4I_{15/2}$  transitions of the Er<sup>3+</sup> ions. These emissions greatly increase in intensity with the addition of Yb<sup>3+</sup> ions in the preparation of the co-doped films. This phenomenon is explained based on the efficient Yb<sup>3+</sup>  $\rightarrow$  Er<sup>3+</sup> energy transfer processes.

**Keywords:** Thin films, photochemical deposition, up-conversion emission, energy transfer.

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