

**The 3rd International Conference on the Physics
of Optical Materials and Devices**

BOOK OF ABSTRACTS

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LOW TEMPERATURE EFFECTS ON UP-CONVERSION EMISSION OF Er³⁺/Yb³⁺ CO-DOPED Y₂O₃

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Over the past years, Rare Earth (RE³⁺) ions doped materials have been attracted a great deal of interest due to the potential application for optical temperature sensors. Luminescence properties of these materials are sensitive and changeable with temperature. Here, we have investigated yttrium oxide doped with Yb³⁺ and Er³⁺ that was synthesized through spray pyrolysis method at 900 °C and afterwards additionally thermally treated at 1100 °C for either 12, 24 or 48h. Structural and morphological characterizations were done through X-ray powder diffraction (XRPD) and scanning electron microscopy (SEM). The obtained particles were spherical in shape and crystallized in cubic bixbyte structure with space group *Ia-3*. Photoluminescent measurements (PL) were recorded using the 978 nm exciting wavelength as a function of temperature in the range from 10 K to 300 K. Emission spectra are assigned to the following trivalent erbium f-f electronic transitions: ²H_{9/2} → ⁴I_{15/2} (blue: 407-420 nm), (²H_{11/2}, ⁴S_{3/2}) → ⁴I_{15/2} (green: 510-590 nm), and ⁴F_{9/2} → ⁴I_{15/2} (red: 640-720 nm). The fluorescent intensity ratio of the blue, green and red areas under emission bands was also examined and showed significant temperature sensitivity, with the largest value of 2.7 K⁻¹.