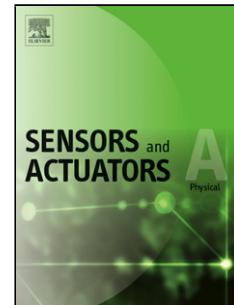


## Accepted Manuscript

Title: Temperature dependence of the whispering gallery modes obtained in a glass microsphere codoped with  $\text{Er}^{3+}$ - $\text{Yb}^{3+}$  ions

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PII: S0924-4247(15)30089-3  
DOI: <http://dx.doi.org/doi:10.1016/j.sna.2015.07.036>  
Reference: SNA 9268

To appear in: *Sensors and Actuators A*

Received date: 17-11-2014  
Revised date: 22-5-2015  
Accepted date: 29-7-2015

Please cite this article as: L.Labrador-Páez, C.Pérez-Rodríguez, S.Ríos, D.Alonso, J.M.Cáceres, I.R.Martín, Temperature dependence of the whispering gallery modes obtained in a glass microsphere codoped with  $\text{Er}^{3+}$ -  $\text{Yb}^{3+}$  ions, *Sensors and Actuators: A Physical* <http://dx.doi.org/10.1016/j.sna.2015.07.036>

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# Temperature dependence of the whispering gallery modes obtained in a glass microsphere codoped with Er<sup>3+</sup>- Yb<sup>3+</sup> ions

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## Highlights

- An Er<sup>3+</sup>-Yb<sup>3+</sup> codoped microsphere has been optically heated by laser pumping at 532 nm
- Whispering gallery resonances appear overlapped to the emission bands from 700 to 1100 nm
- Temperature affects the microsphere spectra allowing a calibration based on FIR method
- Temperature increment induces on whispering gallery modes a mean shift of 9 pmK<sup>-1</sup>
- Resonance shifts scope a 0.01 K temperature resolution limit, 100 times lower than FIR

## Abstract

A microsphere made from a Strontium Barium Niobate glass codoped with Er<sup>3+</sup> and Yb<sup>3+</sup> ions is proposed in order to be employed as optical temperature sensor. By means of the Fluorescence Intensity Ratio technique, the effect of temperature changes in the emission bands of the erbium thermalized levels is characterized. At the same time, the position in wavelength of the whispering gallery modes is altered as a consequence of temperature shifts. The analysis of temperature shifts enables to estimate that the temperature could be obtained with a resolution limit of about 0.01 K.

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