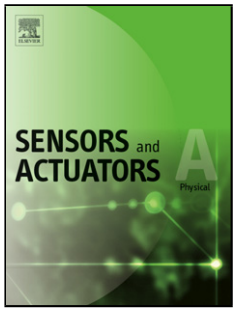

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Author: L. Labrador-Páez C. Pérez-Rodríguez S. Ríos D. Alonso J.M. Cáceres I.R. Martín

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

L. Labrador-Páez[a], C. Pérez-Rodríguez[a,b], S. Ríos[a], D. Alonso[a,c], J. M. Cáceres[d] and I. R. Martín[a,b]

[a] Departamento de Física. Universidad de La Laguna. 38206 San Cristóbal de La Laguna, Santa Cruz de Tenerife, Spain.

[b] MALTA Consolider Team and Instituto de Materiales y Nanotecnología (IMN). Universidad de La Laguna. 38200 San Cristóbal de La Laguna, Santa Cruz de Tenerife, Spain.

[c] Instituto Universitario de Estudios Avanzados (IUdEA). Universidad de La Laguna. 38200 San Cristóbal de La Laguna, Santa Cruz de Tenerife, Spain.

[d] Departamento de Ingenieria Industrial, Univ. La Laguna. 38200 La Laguna, Santa Cruz de Tenerife, Spain.

Highlights

- An Er^{3+}-Yb^{3+} 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^{-1}
- 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^{3+} and Yb^{3+} 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.