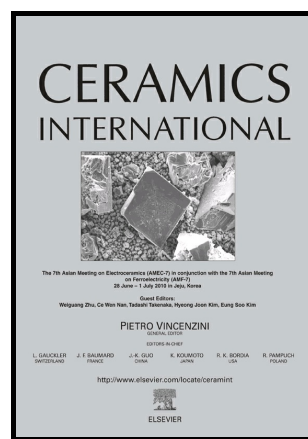


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PII: S0272-8842(17)32082-5
DOI: <http://dx.doi.org/10.1016/j.ceramint.2017.09.152>
Reference: CERI16323

To appear in: *Ceramics International*

Received date: 9 May 2017
Revised date: 18 September 2017
Accepted date: 19 September 2017

Cite this article as: G. Torres Jasso, E. Montes, J.C. Guzmán Olguín, D. Sánchez Guzmán, R.I. López Esquivel, I.R. Martín and J. Guzmán Mendoza, Upconversion emission of ZrO_2 nanoparticles doped with Erbium (Er^{3+}) and Ytterbium (Yb^{3+}), synthesized by hydrothermal route, *Ceramics International*, <http://dx.doi.org/10.1016/j.ceramint.2017.09.152>

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Upconversion emission of ZrO₂ nanoparticles doped with Erbium (Er³⁺) and Ytterbium (Yb³⁺), synthesized by hydrothermal route

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Abstract

This paper reports the luminescent response upconversion of zirconium oxide (ZrO₂) nanoparticles doped with erbium (Er³⁺) and ytterbium (Yb³⁺) ions, synthesized by hydrothermal route. X ray diffraction (DRX) showed that the synthesized material presents the face centered cubic (FCC) structure. High resolution transmission electron microscopy (HRTEM) showed the presence of crystals size smaller than 10 nm. The photoluminescent analysis allowed to observe an intense upconversion luminescence emission of the samples doped with both ions Er³⁺ and Yb³⁺, when these are excited with 910 nm laser source, showing the electronic transitions $^4F_{9/2} \rightarrow ^4I_{5/2}$; $^2H_{11/2} \rightarrow ^4I_{5/2}$; $^4S_{3/2} \rightarrow ^4I_{15/2}$ of Er³⁺. Two decay times were observed, whose behavior can be associated to the average distance between erbium ions within the nanocrystals.

Keywords: Upconversion, Zirconium oxide, Hydrothermal, Erbium, Ytterbium.

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