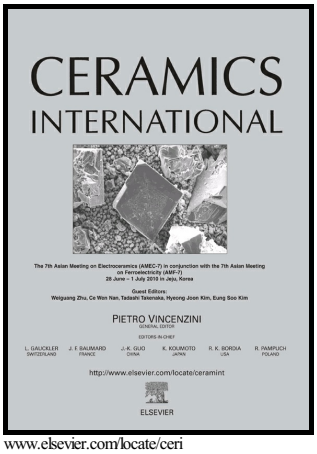

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PII: S0272-8842(18)30555-8
DOI: https://doi.org/10.1016/j.ceramint.2018.03.006
Reference: CERI17643

To appear in: *Ceramics International*

Received date: 20 January 2018
Revised date: 28 February 2018
Accepted date: 1 March 2018

Cite this article as: Mehrdad Zahedi, S.A. Hassanzadeh-Tabrizi and A. Saffar-Teluri, Sol-gel synthesis and luminescence properties of $Ba_2SiO_4:Sm^{3+}$ nanostructured phosphors, *Ceramics International,* https://doi.org/10.1016/j.ceramint.2018.03.006

Sol-gel synthesis and luminescence properties of $Ba_2SiO_4:Sm^{3+}$ nanostructured phosphors

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Abstract

$Ba_2SiO_4:Sm^{3+}$ nanostructure phosphors have been synthesized by a simple sol-gel method. Phase evaluation, structural characteristics and photoluminescence properties of the synthesized $Ba_2SiO_4:Sm^{3+}$ powders were studied using field emission scanning electron microscopy (FESEM), X-ray diffraction (XRD), thermogravimetric and differential thermal analysis (TG-DTA), Fourier transform infrared spectroscopy (FTIR), and photoluminescence spectroscopy (PL). X-ray diffraction results showed that all synthesized samples were single-phase barium silicate (Ba_2SiO_4) and samarium (Sm) ions were incorporated into the lattice of Ba_2SiO_4. Adding samarium to barium silicate changed the microstructure from vermicular to spherical structures. The Photoluminescence spectrum of $Ba_2SiO_4:Sm^{3+}$ phosphors exhibited characteristic emission peaks at 562 nm which is due to the $^4G_{5/2} \rightarrow {}^6H_{7/2}$ transition of samarium ions and corresponds to the orange region. The results showed that the barium silicate activated with 0.08 mol samarium exhibited the highest PL intensity.

Keywords: Barium silicate; Sol-gel synthesis; Samarium; Luminescence.

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