

Synthesis, crystal structure and Photoluminescence of Eu^{3+} or Tb^{3+} doped solid solutions $(\text{Y}_{1-x}\text{RE}_x)_4\text{S}_3(\text{Si}_2\text{O}_7)$

Maria S. Tarasenko, Alexey S. Berezin, Alexander S. Kiryakov, Dmitry A. Piryazev, Irina Yu. Filatova, Nikolay G. Naumov



PII: S0022-4596(18)30200-7
DOI: <https://doi.org/10.1016/j.jssc.2018.05.016>
Reference: YJSSC20222

To appear in: *Journal of Solid State Chemistry*

Received date: 21 February 2018
Revised date: 10 May 2018
Accepted date: 12 May 2018

Cite this article as: Maria S. Tarasenko, Alexey S. Berezin, Alexander S. Kiryakov, Dmitry A. Piryazev, Irina Yu. Filatova and Nikolay G. Naumov, Synthesis, crystal structure and Photoluminescence of Eu^{3+} or Tb^{3+} doped solid solutions $(\text{Y}_{1-x}\text{RE}_x)_4\text{S}_3(\text{Si}_2\text{O}_7)$, *Journal of Solid State Chemistry*, <https://doi.org/10.1016/j.jssc.2018.05.016>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Synthesis, crystal structure and Photoluminescence of Eu^{3+} or Tb^{3+} doped solid solutions $(\text{Y}_{1-x}\text{RE}_x)_4\text{S}_3(\text{Si}_2\text{O}_7)$

Maria S. Tarasenko^{1*}, Alexey S. Berezin¹, Alexander S. Kiryakov^{1,2}, Dmitry A. Piryazev¹, Irina Yu. Filatova¹, Nikolay G. Naumov^{1,2}.

¹Nikolaev Institute of Inorganic Chemistry Siberian Branch of Russian Academy of Sciences 3 Akad. Lavrentiev Ave, 630090 Novosibirsk (Russian Federation)

²Novosibirsk State University 2 Pirogova Str., 630090 Novosibirsk (Russian Federation)

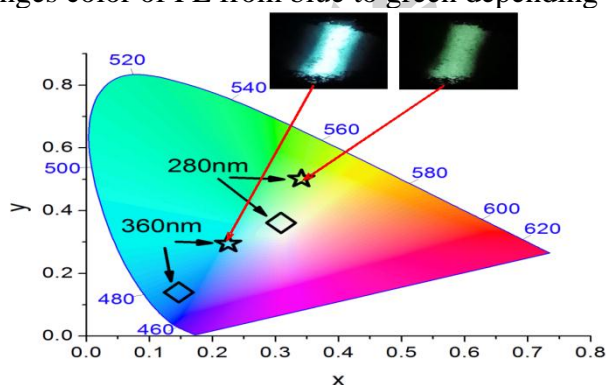
* tarasen@niic.nsc.ru

Abstract.

$\text{Y}_4\text{S}_3(\text{Si}_2\text{O}_7)$ and its solid solutions $(\text{Y}_{1-x}\text{RE}_x)_4\text{S}_3\text{Si}_2\text{O}_7$ ($\text{RE}=\text{Eu}$ $x=0.010$ - 0.085 , $\text{RE}=\text{Tb}$ $x=0.010$ - 0.500) were quantitatively prepared by reaction of starting compounds in molten CsCl . Single crystal X-Ray analysis revealed the difference in preference Eu^{3+} occupancy for two independent RE-sites coming from volume difference of these sites. This effect is negligible for the Tb-containing solid solution due to smaller difference in radii Tb^{3+} and Y^{3+} ions. Tb^{3+} -containing samples are luminescent with typical emission of Tb^{3+} , while Eu^{3+} -containing samples are not luminescent. The 1% Tb^{3+} -containing sample emits in blue or in green color depending on the excitation wavelength. Measured melting points are $1545 \pm 15^\circ\text{C}$ for all investigated samples $(\text{Y}_{1-x}\text{RE}_x)_4\text{S}_3\text{Si}_2\text{O}_7$.

Graphical abstract

Due to two kinds of luminescence: matrix and Tb^{3+} -ions, the sample $\text{Y}_4\text{S}_3(\text{Si}_2\text{O}_7):1\%\text{Tb}^{3+}$ changes color of FL from blue to green depending on the excitation wave.



Keywords: rare earth elements, silicate, chalcogenide, crystal structure, luminescence.

Introduction

Download English Version:

<https://daneshyari.com/en/article/7757633>

Download Persian Version:

<https://daneshyari.com/article/7757633>

[Daneshyari.com](https://daneshyari.com)