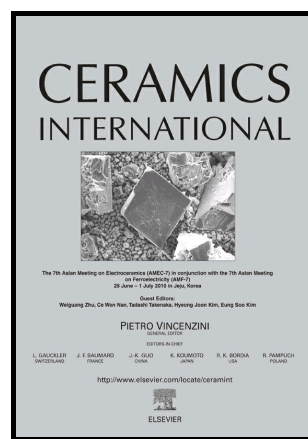


Multiplicity of photoluminescence in Raman spectroscopy and defect chemistry of $(\text{Ba}_{1-x}\text{R}_x)(\text{Ti}_{1-x}\text{Ho}_x)\text{O}_3$ ($R = \text{La}, \text{Pr}, \text{Nd}, \text{Sm}$) dielectric ceramics

Da-Yong Lu, Dong-Xue Guan, Hai-Bo Li



PII: S0272-8842(17)32246-0
DOI: <https://doi.org/10.1016/j.ceramint.2017.10.055>
Reference: CERI16474

To appear in: *Ceramics International*

Received date: 9 August 2017
Accepted date: 10 October 2017

Cite this article as: Da-Yong Lu, Dong-Xue Guan and Hai-Bo Li, Multiplicity of photoluminescence in Raman spectroscopy and defect chemistry of $(\text{Ba}_{1-x}\text{R}_x)(\text{Ti}_{1-x}\text{Ho}_x)\text{O}_3$ ($R = \text{La}, \text{Pr}, \text{Nd}, \text{Sm}$) dielectric ceramics, *Ceramics International*, <https://doi.org/10.1016/j.ceramint.2017.10.055>

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.

Multiplicity of photoluminescence in Raman spectroscopy and defect chemistry of $(\text{Ba}_{1-x}\text{R}_x)(\text{Ti}_{1-x}\text{Ho}_x)\text{O}_3$ ($R = \text{La, Pr, Nd, Sm}$) dielectric ceramics

Da-Yong Lu ^{a,b,*}, Dong-Xue Guan ^{a,c}, Hai-Bo Li ^d

^a Research Center for Materials Science and Engineering, Jilin Institute of Chemical Technology, Jilin 132022, China

^b Key Laboratory for Special Functional Materials in Jilin Provincial Universities, Jilin 132022, China

^c College of Chemistry and Pharmaceutical Engineering, Jilin Institute of Chemical Technology, Jilin 132022, China

^d Key Laboratory of Functional Materials Physics and Chemistry of the Ministry of Education, Jilin Normal University,

Changchun 130103, China

*Corresponding author. Tel: +86 432 62815308; fax: +86 432 3093625 E-mail address: cninjp11232000@yahoo.com or dylu@jilict.edu.cn (D.-Y. Lu)

ABSTRACT

$(\text{Ba}_{1-x}\text{R}_x)(\text{Ti}_{1-x}\text{Ho}_x)\text{O}_3$ ($R = \text{La, Pr, Nd, Sm}$; $x \geq 0.04$) (BRTH) ceramics were prepared using a mixed oxides method. The solubility limits in BRTH with $R = \text{La, Pr, Nd, Sm}$ were determined by XRD to be $x = 0.11, 0.12, 0.06$, and 0.14 , respectively. The ionic radius of R at Ti-site plays a decisive role in the solubility limit in BRTH. Only BRTH with $R = \text{La}$ satisfied Vegard's law. The multiplicity of photoluminescence (PL) signals of $\text{Nd}^{3+}/\text{Ho}^{3+}$ and $\text{Sm}^{3+}/\text{Ho}^{3+}$ in Raman scattering under 532-nm excitation laser and the high-permittivity abnormality for the denser BRTH with $R = \text{Sm}$ and at $x = 0.07$ were reported. The PL provided the evidence of a small number of Ho^{3+} at Ba-site in BRTH and it was determined that the number of Ba-site Ho^{3+} ions increased from 0.05 at.% at $R = \text{La}$ to 0.19 at.% at $R = \text{Sm}$ with increasing atomic number of light rare earth. BRTH exhibited a much broadened dielectric-temperature characteristics, marked by X5T, X6T, X7T, and X8S dielectric specifications for BRTH with $R = \text{La, Pr, Nd, Sm}$ and at $x = 0.06$, respectively, and they exhibited lower dielectric loss ($\tan \delta < 0.015$) at room temperature. The dielectric-peak temperature (T_m) of BRTH decreased linearly at a rate of less than $-21\text{ }^\circ\text{C}/\%(R/\text{Ho})$. The defect chemistry, solubility limit, lower dielectric loss, and dielectric abnormality are discussed.

Key-words: A. Powders: solid state reaction; B. Defects; B. Spectroscopy; C. Dielectric properties; D. BaTiO_3 and titanates

Download English Version:

<https://daneshyari.com/en/article/7888812>

Download Persian Version:

<https://daneshyari.com/article/7888812>

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