

Author's Accepted Manuscript

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PII: S0022-2313(17)31777-5
DOI: <https://doi.org/10.1016/j.jlumin.2018.02.042>
Reference: LUMIN15389

To appear in: *Journal of Luminescence*

Received date: 19 October 2017
Revised date: 25 January 2018
Accepted date: 12 February 2018

Cite this article as: Homa Homayoni, Sunil Sahi, Lun Ma, Junying Zhang, Jeotikanta Mohapatra, Ping Liu, Adriana P. Sotelo, Robin T. Macaluso, Thomas Davis and Wei Chen, X-ray Excited Luminescence and Persistent Luminescence of $\text{Sr}_2\text{MgSi}_2\text{O}_7:\text{Eu}^{2+}$, Dy^{3+} and Their Associations with Synthesis Conditions, *Journal of Luminescence*, <https://doi.org/10.1016/j.jlumin.2018.02.042>

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X-ray Excited Luminescence and Persistent Luminescence of $\text{Sr}_2\text{MgSi}_2\text{O}_7:\text{Eu}^{2+}$, Dy^{3+} and Their Associations with Synthesis Conditions

Homa Homayoni,¹ Sunil Sahi¹, Lun Ma,¹ Junying Zhang,² Jeetikanta Mohapatra¹, Ping Liu¹, Adriana P. Sotelo³, Robin T. Macaluso³, Thomas Davis¹ and Wei Chen^{1*}

¹*Department of Physics, University of Texas at Arlington, Arlington, Texas 76019, USA*

²*Department of Physics, Beihang University, Beijing 100191, China*

³*Department of Chemistry and Biochemistry, University of Texas at Arlington, Arlington, Texas 76019, USA*

*corresponding Author: weichen@uta.edu

Abstract: For the first time, X-ray excited luminescence of $\text{Sr}_2\text{MgSi}_2\text{O}_7:\text{Eu}^{2+}$, Dy^{3+} , an efficient persistent phosphor with good potential for lighting, biological imaging and photodynamic activation, is reported in this paper. A modified Sol-Gel method is used to synthesize $\text{Sr}_2\text{MgSi}_2\text{O}_7:\text{Eu}^{2+}$, Dy^{3+} phosphors and their luminescence properties are highly associated with the synthesis conditions. The dependences of the X-ray excited optical luminescence and persistent luminescence of $\text{Sr}_2\text{MgSi}_2\text{O}_7:\text{Eu}^{2+}$, Dy^{3+} on the reaction pH, temperature, ratio of Eu/Dy, and the calcination duration time are investigated and the association of the luminescence behaviors with the synthesis conditions is explored as a good strategy to optimize the phosphors for practical applications.

Keywords

Afterglow nanoparticle, X-ray excited luminescence, silicate, persistent luminescence

1. Introduction

Persistent luminescent or afterglow materials have become a topical area as they have many applications such as emergency lighting, imaging, security and photodynamic activation for cancer treatment [1-10].

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