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Synthesis and characterization of Pyrochlore ($A_2B_2O_7$) structure $Eu_{1.90}La_{0.10}Zr_2O_7$ phosphor

Erkul Karacaoglu and Esra Öztürk
Karamanoglu Mehmetbey University, Turkey

The pyrochlore ($A_2B_2O_7$) compound which is related to the fluorite structure and it is well known that many rare earth compounds have photo luminescent characteristics for various applications. So the $Eu_{1.90}La_{0.10}Zr_2O_7$ pyrochlore phosphor was synthesized through a solid state reaction method under open atmosphere. The thermal analysis (DTA/TG) was carried out to determine optimization of reaction conditions. The phase properties of the samples were characterized by X-ray powder diffraction and the effects of rare earth ion (La^{3+}) that is activator on the luminescence properties of the $Eu_{2-x}La_xZr_2O_7$ host were investigated by using a photoluminescence spectrometer (Figure 1.) under room temperature. In the photoluminescence investigations, under the excitation of 290 nm, Eu^{3+} ions showed different emissions in the yellowish-red region at this host lattice. The emission bands at 586, 604-623 and 707 nm belong to typical ${}^5D_0 \rightarrow {}^7F_1$, ${}^5D_0 \rightarrow {}^7F_2$, and ${}^5D_0 \rightarrow {}^7F_4$ transitions of the Eu^{3+} ions, respectively. Especially the most intense emissions between 580 and 610 nm are due to magnetic dipole transitions between the ${}^5D_0 \rightarrow {}^7F_1$ states.

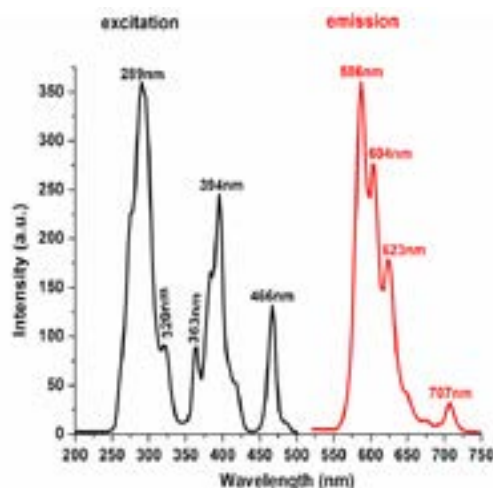


Figure 1. The excitation and emission spectrum of $Eu_{1.90}La_{0.10}Zr_2O_7$ phosphor

Biography

Erkul Karacaoglu is from Aksaray, Turkey and has completed his MSc from Anadolu University at Materials Science and Engineering and is pursuing his PhD studies at Selcuk University, department of Metallurgy and Materials Engineering. He is a Research Assistant at Karamanoglu Mehmetbey University, Faculty of Engineering, Department of Materials Science and Engineering. He has published papers more than 11 papers in reputed journals about inorganic based luminescence materials. The authors would like to thank TUBITAK (Science, Technology and Research Association of Turkiye) for the support to the project numbered 114Z438.

erkaracaoglu@gmail.com

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