

Crystal Field Splitting of 5d States and
Luminescence Mechanism in $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}$
Phosphor

M. Nazarov, M.G. Brik, D. Spassky, B. Tsukerblat



PII: S0022-2313(16)30279-4
DOI: <http://dx.doi.org/10.1016/j.jlumin.2016.10.015>
Reference: LUMIN14307

To appear in: *Journal of Luminescence*

Received date: 1 March 2016

Accepted date: 10 October 2016

Cite this article as: M. Nazarov, M.G. Brik, D. Spassky and B. Tsukerblat
Crystal Field Splitting of 5d States and Luminescence Mechanism in
 $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}$ Phosphor, *Journal of Luminescence*
<http://dx.doi.org/10.1016/j.jlumin.2016.10.015>

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.

Crystal Field Splitting of 5d States and Luminescence Mechanism in $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}$ Phosphor

M. Nazarov ^{a*}, M.G. Brik ^{b,c,d}, D. Spassky ^{c,e}, B. Tsukerblat ^f

^a *Institute of Applied Physics, Academiei Street 5, Chisinau MD-2028, Moldova*

^b *College of Sciences, Chongqing University of Posts and Telecommunications, Chongqing 400065, China*

^c *Institute of Physics, University of Tartu, W. Ostwald Str. 1, Tartu 50411, Estonia*

^d *Institute of Physics, Jan Dlugosz University, Armii Krajowej 13/15, PL-42200 Czestochowa, Poland*

^e *Skobeltsyn Institute of Nuclear Physics, Lomonosov Moscow State University, 119991, Moscow, Russia*

^f *Department of Chemistry, Ben-Gurion University of the Negev, Beer-Sheva, 84105 Israel*

* *Corresponding author: mvnazarov@mail.ru*

Abstract

A stoichiometric $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}$ nanosized powder was synthesized by combustion method using urea at 500°C and calcinated at 1000°C. The measurements of the luminescent properties of $\text{SrAl}_2\text{O}_4:\text{Eu}^{2+}$ were carried out; additionally, theoretical study of the crystal field splitting of the Eu^{2+} 5d levels at two crystallographically different Sr positions in the SrAl_2O_4 lattice was performed. Two luminescence bands at 450 nm and near 520 nm were observed at lower temperatures. The luminescence mechanism and peculiar temperature dependence of bands intensities are discussed on the basis of the crystal field theory (within the exchange charge model) combined with the vibronic approach. The latter involves the electron vibrational interaction in two kinds of the Eu^{2+} centers as well as the interaction between these centers in the host lattice. A simplified single-mode model was adopted for each center and the section of the bi-dimensional adiabatic potential of the Eu^{2+} dimer along an effective

Download English Version:

<https://daneshyari.com/en/article/5397965>

Download Persian Version:

<https://daneshyari.com/article/5397965>

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