

Distribution of Eu^{3+} Dopant Ions in C_{3i} and C_2 Sites of the Nanocrystalline $\text{Sc}_2\text{O}_3\text{:Eu}$ Phosphor

Giorgio Concas^a, Giorgio Spano^a, Marco Bettinelli^b, and Adolfo Speghini^b

^a Dipartimento di Fisica, Università di Cagliari and CNISM, S. P. Monserrato-Sestu km 0.700, I-09042 Monserrato (CA), Italy

^b Dipartimento Scientifico e Tecnologico, Università di Verona and INSTM, UdR Verona, Ca' Vignal, Strada le Grazie 15, I-37134 Verona, Italy

Reprint requests to Prof. G. C.: Fax: +39070510171; E-mail: giorgio.concas@dsf.unica.it

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The actual occupancy of the two available cation sites by luminescent Eu^{3+} ions, in the cubic bixbyite-type structure of nanocrystalline sesquioxides, has been investigated by ^{151}Eu Mössbauer spectroscopy and magnetic susceptibility measurements. It was found that one fourth of the europium ions is in the more symmetric site C_{3i} and three fourths in the less symmetric site C_2 ; the distribution is random. In the series of the Eu-doped sesquioxides Sc_2O_3 , Lu_2O_3 , Y_2O_3 and Eu_2O_3 , the covalency of the Eu-O bond and the Eu site distortion increase with the difference in ionic radii between europium and the cation of the host compound. The magnetic susceptibility has been analyzed as sum of the contributions of the free Eu^{3+} ion, of the crystal-field effect and of the exchange interaction between europium ions.

Key words: Europium; Oxides; Nanocrystals; Mössbauer Spectroscopy; Structural Properties.