

Spectroscopic investigation of the Europium(3+) ions in a new $\text{ZnY}_4\text{W}_3\text{O}_{16}$ matrix.

Autorzy

Elżbieta Tomaszewicz

Małgorzata Guzik

Joanna Cybińska

Janina Legendziewicz

Rok wydania

2009

Czasopismo

Helvetica Chimica Acta

Numer woluminu

92

Strony

2274-2290

DOI

10.1002/hlca.200900151

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

A new Zn and Eu tungstate was characterized by spectroscopic techniques. This tungstate, of the formula $\text{ZnEu}_4\text{W}_3\text{O}_{16}$, crystallized in the orthorhombic system and was synthesized by a solid-state reaction. It melts incongruently at 1330° . The luminescent properties, including excitation and emission processes, luminescent dynamics, and local environments of the Eu^{3+} ions in $\text{ZnEu}_4\text{W}_3\text{O}_{16}$ and $\text{ZnY}_4\text{W}_3\text{O}_{16}:\text{Eu}^{3+}$ diluted phases (1, 5, and 10 mol-% of Eu^{3+} ion) were studied basing on the f^6 -intraconfigurational transitions in the 250–720 nm spectral range. The excitation spectra of this system (λ_{em} 615 and 470 nm) show broad bands with maxima at 265 and 315 nm related to the ligand-to-metal charge-transfer (LMCT) states. The emission spectra under excitation at the $\text{O} \rightarrow \text{W}$ (265 nm) and $\text{O} \rightarrow \text{Eu}^{3+}$ (315 nm) LMCT states present the blue-green emission bands. The emission of tungstate groups mainly originate from the charge-transfer state of excited 2p orbitals of O^{2-} to the empty orbitals of the central W^{6+} ions. On the other hand, in the emission of the Eu^{3+} ions, both the charge transfer from O^{2-} to Eu^{3+} and the energy transfer from W^{6+} ions to Eu^{3+} are involved. The emission spectra under excitation at the ${}^7\text{F}_0 \rightarrow {}^5\text{L}_6$ transition of the Eu^{3+} ion (394 nm) of $\text{ZnY}_4\text{W}_3\text{O}_{16}:\text{Eu}^{3+}$ diluted samples show narrow emission lines from the ${}^5\text{D}_3$, ${}^5\text{D}_2$, and ${}^5\text{D}_1$ emitting states. The effect of the active-ion (Eu^{3+}) concentration on the colorimetric characteristic of the emissions of the compound under investigation are presented.

Adres publiczny

<https://doi.org/10.1002/hlca.200900151>

Strona internetowa wydawcy

onlinelibrary.wiley.com