Uniwersytet Wrocławski

Repozytorium

Plik pochodzi z repozytorium Wydziału Chemii Uniwersytetu Wrocławskiego

Structure, luminescence, and Raman spectroscopy of europium and terbium dipivaloylmethanates and other β-diketonates with 2,2'-bipyridine.

Autorzy

Vera I. Tsaryuk

Konstantin P. Zhuravlev

Roman Szostak

Anna V. Vologzhanina

Rok wydania

2020

Czasopismo

Journal of Structural Chemistry

Numer woluminu

61

Strony

1026-1037

DOI

10.1134/s0022476620070045

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

The study reveals the relationship between structural and spectroscopic characteristics of lanthanide dipivaloylmethanates with 2,2′-bipyridine derivatives [Ln(DPM)$_3$L] (Ln = Eu, Tb; L = 2,2′-bipyridine, 4,4′-dimethyl-2,2′-bipyridine, 4,4′-diphenyl-2,2′-bipyridine) and fluorinated β-diketonates [Ln(β)$_3$Bpy] (β = TTFA, TFAA, BTFA) with the CN (Ln^{3+}) = 8 and the LnN_2O_6 coordination polyhedron in the form of a square antiprism. We discuss structural regularities resulting from the difference between Eu–O and Eu–N bond lengths in β-diketonates due to the changes in donor-acceptor properties of substituents and the steric factor. The effect of the main distortion Δ = r(Eu–N) – r(Eu–O) of the Eu coordination polyhedron on the luminescence spectra and vibrational Raman spectra is considered. A qualitative correlation is demonstrated between the relative intensity of the $^5D_0$–$^7F_2$ (Eu^{3+}) electric dipole transition, which characterizes the degree of distortion of the nearest environment of the Eu^{3+} ion, and the lifetimes of excited electronic states $^5D_0$ (Eu^{3+}) and $^5D_4$ (Tb^{3+}). The contribution of nonradiative processes caused by high-frequency vibrations of ligands to the decay rate of $^5D_0$ (Eu^{3+}) and $^5D_4$ (Tb^{3+}) levels is discussed. The Raman spectra are analyzed in terms of studying the changes in vibrational frequencies of the Bpy molecule depending on the distortion Δ of the Eu coordination polyhedron.

Słowa kluczowe

Eu3+, Tb3+, dipivaloylmethanate, fluroinated, ß-diketonates, molecule, 2'-bipyridine, crystal structure, luminescence, Raman spectra

Adres publiczny

http://dx.doi.org/10.1134/S0022476620070045

Plik został wygenerowany dnia 2026-11-05 07:56:26

Adres w repozytorium https://old.chem.uni.wroc.pl/pl/repozytorium/HJBPIU4.