

Spectral and energetic transformation of femtosecond light impulses in the Eu^{3+} complex with dehydroacetic acid.

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Streszczenie

A solid state Eu^{3+} complex with dehydroacetic acid (DHA) has been synthesized and characterized by elemental analysis, UV-visible, FT-IR, FT-Raman, powder and single-crystal X-ray diffraction and optical spectroscopy studies. The complex has formula $[\text{Eu}(\text{DHA})_2(\text{H}_2\text{O})_5]\text{NO}_3$ with $\text{DHA} = \text{C}_8\text{H}_7\text{O}_4^-$, where the europium ions is in monocapped distorted square antiprism environment with coordination number nine. Its photophysical properties have been analyzed in terms of its molecular structure and DFT calculations performed for the representative crystal fragment including Eu^{3+} and two DHA ligands. The luminescence and dynamics of the excited states depopulation have been studied using femtosecond laser excitation. The energy transfer mechanism between the ligand and Eu^{3+} electronic energy levels has been proposed. The obtained results have been compared to those of Gd^{3+} dehydroacetic derivative.

Słowa kluczowe

Eu^{3+} complex, Gd^{3+} derivative, Dehydroacetic acid, synthesis, FT-IR and FT-Raman, density functional theory, Time dependent density functional theory, Electronic absorption and emission spectra, Femtosecond laser excitation

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