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Optical spectroscopy of the adducts of europium tris(dipivaloylmethanate) with derivatives of 1,10-phenanthroline.

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Spectroscopic investigations of the mutual influence of inequivalent ligands were undertaken using complex adducts of europium tris(dipyvaloylmethanate) with derivatives of 1,10-phenanthroline, $Eu(DPM)_3 \cdot Ph$. The choice of a series of related $Eu(DPM)_3 \cdot Ph$ compounds provided the opportunity to study the dependence of the spectroscopic characteristics on the value of the effective charges at the atoms in the nearest surroundings of Eu^{3+} which, in turn, depends on steric factors and the donor–acceptor properties of the ligands. It was shown that steric factors are as significant as donor–acceptor properties of the ligands in the creation of the complexes. The changes in the strength and symmetry of the crystal field were evaluated from the Stark splittings of the Eu^{3+} transitions in luminescence spectra. Crystal field parameters were calculated. Two subgroups of compounds with similar spectra were distinguished. The relative efficiency of the excitation of Eu^{3+} luminescence through the ligand absorption bands and the relative luminance of the compounds were investigated. Changes of the ligand vibration frequencies and the strength of the electron–phonon interaction with various ligands were studied by IR and vibronic spectra.

Słowa kluczowe

Crystal and ligand fields, Electron–phonon interaction, Luminescence

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