Contribution of energy transfer from the singlet state to the sensitization of Eu^{3+} and Tb^{3+} luminescence by sulfonylamidophosphates.

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Streszczenie

A series of stable lanthanide complexes $Na[Ln(L)_4]$ ($Ln=La^{3+}$,Eu^{3+},Gd^{3+},Tb^{3+},with L=dimethyl(4-methylphe-nylsulfonyl)amidophosphate and dimethyl-2-naphthylsulfo-nylamidophosphate)were synthesized.The compounds were characterized by single-crystalX-raydiffraction, IR, ab-sorption,and emission spectroscopyat 293 and 77 K. In con-trastto the usual and well-known dominant role of the ligand triplet state in intramolecular energy transfer process-es in Ln complexes,in this particular new class of Ln com-pounds with sulphonylamidophosphate ligands, strongex-perimental and detailed theoretical evidence suggest a domi-nantrole is played by the ligand first excited singlet state.The importance of the role played by the $^7F_5$ levelin the caseof the Tb^{3+}compound in this processis shown.Thetheoretical approach for the energy transfer rates was suc-cessfully applied to the rationalization of the experimental data.The higher-lying excited levels of Eu (^5D_J,^5L_J,^5G_J) and Tb (^5D_J,^5G_J,^5L_J,^5H_J,^5F_J,^5I_J)were includedin the calculations for the first time.Both the multipolar and exchange mechanisms were taken into account. The experimental intensity parameters (Wl), emission lifetimes(t), radiative (A_{rad})and non-radiative(A_{rad})decay rates, and quantum yields(theo-retical and experimental)were determined and are discussed in detail.

Słowa kluczowe

energy transfer, lanthanides, luminescence, sulphonylamidophosphates

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