Synthesis, structure, thermal and spectroscopic properties of two new series of cationic Ln(III) complexes of the type $[Ln(L)_2(bpy)_2]BPh_4$

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Streszczenie

Two new series of cationic lanthanide complexes, namely $[Ln(L^1)_2(bpy)_2]BPh_4$ (**Ln1**) and $[Ln(L^2)_2(bpy)_2]BPh_4$ (**Ln2**), where Ln = La, Nd, Eu, Gd, Tb, Lu, HL^1 = $Cl_3C(O)NHP(O)(OCH_3)_2$, HL^2 = $PhS(O_2)NHP(O)(OCH_3)_2$, and bpy is 2,2′-bipyridine, were synthesized. They were studied by elemental analysis, single crystal X-ray diffraction (for **Eu1, Tb1**, and **Eu2)**, powder X-ray diffraction, thermal analysis, IR, NMR, reflection, absorption, and luminescence spectroscopies. The Ln^{III} in these complexes are eight-coordinate, with a coordination core LnO_4N_4. The coordination polyhedra can be described as a square antiprism for **Eu1, Tb1** or an intermediate between a square antiprism and a triangular dodecahedron for **Eu2**. The **Ln2** complexes were found to be thermally more stable than **Ln1**. Effective energy transfer from the ligands to the Tb^{III} ion was demonstrated. However, sensitization of Eu^{III} luminescence was less efficient. The f-f luminescence of the europium(III) and terbium(III) complexes is characterized by an emission decay time of 1.70–1.85 ms at 77 and 298 K.

Słowa kluczowe

lanthanide, cationic heteroleptic complexes, carbacylamidophosphate, sulfonylamidophosphate, luminescence, crystal structure

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