Structural characteristic and luminescence properties of first known example of a pair of europium(III) complexes of phosphoroazo-derivative of β-diketone with inner and both inner and outer sphere 2,2'-bipyridine.

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The photophysical properties of two europium(III) complexes: $EuL_3bpy(1/2bpy)$ (**1**) [M. Borzechowska, V. Trush, I. Turowska-Tyrk, W. Amirkhanov, J. Legendziewicz, J. Alloys Compd. 341 (2002) 98] and EuL_3bpy (**2**) (L = $CCl_3C(O)NP(O)(OCH_3)_2$, bpy = 2,2′-bipyridine) were investigated with the aim of finding new interesting optical materials. X-ray studies of both compounds have shown some structural similarities. The lattice consists of discrete mononuclear units EuO_6N_2 with the same coordination modes of ligands. Additionally, the crystal structure of the complex (**1**) comprises non-coordinated molecules of 2,2′-bipyridine, what causes a change of coordination polyhedron geometry around Eu(III) ion. High resolution emission and excitation of emission spectra and also lifetimes of both europium(III) complexes in solid state as well as in methanol solution have been measured at 77 and 300 K. On the basis of optical studies we have proven efficient sensitised luminescence and proposed the probable energy transfer mechanism. Observed considerable differences in luminescence spectra confirm structural distinction between two investigated compounds. It is to our knowledge the first reported structural and spectroscopic characteristics of a pair of europium(III) complexes from which one comprises inner and outer sphere 2,2′-bipyridine but the second inner sphere only. It was proved that the presence of non-coordinated 2,2′-bipyridine molecule influences spectroscopic properties of the complex (**1**) very much.

Słowa kluczowe

Europium(III) complexes, molecule, 2′-Bipyridine, Luminescence, Energy transfer, Lifetimes

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