

Spectroscopic behaviour of Na[Sm(SP)₄] (where SP = C₆H₅S(O)₂NP(O)(OCH₃)₂⁻) and its polymeric material-new orange emitting phosphors.

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In recent years the challenge is generating highly processed functional materials using minimum amount of 4f precious elements. Henceforth, the efforts are put into elaborating doped polymers, thin films and nanomaterials. The lanthanide chelates can be appropriate co-doping compounds covering the spectrum from blue to infrared. Moreover, compounds with proper chromophores can be the best way to excite and enhance the emission although the f-f transitions have forbidden character.

A new Sm(III) amidophosphate chelate; (a sulfono-derivative of beta-diketones) and polymeric material were obtained on its base and characterized by the high resolution spectroscopy at 293, 77 and 4 K; absorption, luminescence, using different energy and power of excitation lines as well as luminescence decay times and quantum yields. The general problem in this paper is explanation some unexpected results reported in our previous report [1]. Those new type of phosphors show a strong orange emission after excitation at 404 nm of the Sm(III) states stronger than ligand bands excitation at 280 nm what needs explanation. The crystal field (CF) parameters are calculated from the radiative 4f-4f transitions in absorption and luminescence spectra at 4.2 K. The crystal structure necessary for CF calculations and for the theoretical energy transfer consideration was solved by X-ray analysis. Effects of the temperature, rigidity of polymeric lattice and the power of excitation energy on intensities of the Sm(III) fluorescence and quantum yields were studied.

The possible paths of energy transfer and mechanism of the observed processes are discussed.

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