Influence of the nitro group on the luminescent and magnetic properties of Yb^{3+} chelate with dimethyl [(4-nitrophenyl)sulfonyl]amidophosphate

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Single crystals of dimethyl [(4-nitrophenyl)sulfonyl]amidophosphate (H**L**^{1}) and its coordination compounds with Yb^{3+} and La^{3+} have been obtained. Their physicochemical properties using X-ray diffraction analysis, absorption (300 K and 5 K), emission (300 K and 77 K) and FTIR spectroscopy, thermogravimetry, differential scanning calorimetry, magnetization measurements have been determined and compared with those of Na[Ln(**L**^{2})$_4$], where H**L**^{2} = dimethyl (4-methylphenylsulfonyl)amidophosphate Ln = La^{3+}, Yb^{3+}, Gd^{3+}. The effect of substitution of a methyl group at the para position by a nitro group on structural (Yb–O distances, coordination polyhedra, non-covalent interactions, packing), spectroscopic ($^{2}F_{7/2}$ and $^{2}F_{5/2}$ crystal field splitting, radiative lifetime (τ_{rad}), emission decay time (τ), intrinsic quantum yield (QYb Yb), antenna effect) and magnetic properties in DC and AC fields were analyzed.

Słowa kluczowe

Ytterbium, N-phosphorylated sulfonamide, Nitro group, Luminescence, Crystal structure, Single-ion magnet

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