LANTHNIDE COMPLEXES WITH 2-(TOSYLAMINO)-BENZILIDENE-*N*-(ARYLOYL)-HYDROZONES FOR BIOIMAGING, THERMOMETRY AND OLEDS

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Lanthanide complexes with 2-(tosylamino)-benzylidene-N-(aryloyl)-hydrazones are prospective candidates to the luminescent materials due to the possibility to tune their photophysical and electrical properties through the design of the ligand. At the same time, the synthesis of such complexes is a difficult task due to both the complexity of their formation and variable composition. Therefore, the purpose of this work was to study the peculiarities of the synthesis and the structure of lanthanide complexes with 2-(tosylamino)-benzylidene-N-(aryloyl)-hydrazones H_2L^n in single crystals, powders and solutions, and their testing for bioimaging, thermometry and OLEDs.

It was shown that the composition of the product depends on the local excess of Ln^{3+} or L^- and corresponds to $Ln(HL)_2X$ (X = Cl, NO_3) and to Ln(L)(HL), respectively. The interaction of Ln(L)(HL) with KOH leads to the formation of a highly soluble complexes $K[Ln(L)_2](solvent)_x$. All the complexes are monomeric, and the structure of the $[Ln(H_xL)_2]^{(1-x)}$- fragment does not depend on the degree of deprotonation of the ligand, nor on the substituent in its composition. The composition and structure of the complexes in the solution was determined for benzoyl-containing ligand L^1 derivatives according to 1D and 2D ^{1}H NMR spectroscopy based on the comparison of theoretically calculated and experimentally determined pseudocontact shifts.

OLED device based on $K[Yb(L^1)_2]$ demonstrated the record efficiency for the Yb-based OLEDs of 385μW/W. This complex was also sucessfully used for bioimaging. While Eu(L)(HL) complexes were used as materials for luminescent thermometry and demonstrated record sensitivity (up to 17%) in the operating temperature range.

References
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