

Luminescence spectroscopy of polynuclear complexes with β -diketonate ligands

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The development of new rare earth based phosphors for different applications is associated to understand of spectroscopy properties of host matrix and rare earth ion. Specifically, for the lanthanide ions, their properties of emission were consequence of well-known intraconfigurational $4f^n$ transitions, though the $4f^n$ electrons were shielded by the closed $5s^2$ and $5p^6$ shells, the symmetry imposed by the ligand field play important role in the rare earth spectroscopy. In that sense, a series of polynuclear complexes of rare earth ions was prepared following route initially proposed by Luneau, et.al.^{2,3}, these systems have well-defined coordination symmetries and it allows the synthesis with different ions with a precise control of the ratios between the lanthanide ions. These systems and the insertion of then into different inorganic matrix it has been studied and the intensities for the transitions within the $4f^n$ configuration can be calculated using detailed theoretical models. The choice of the different β -diketone ligand enables the achievement of complexes with diverse structure due to the steric hindrance of the substituent³. Complexes of general formula $[Y_{9-x}Eu_x(acac)_{16}(\mu_3-OH)_8(\mu_4-O)(\mu_4-OH)]_y \cdot yH_2O$ and $[Eu_5(dbm)_{10}(\mu_3-OH)_4(\mu_4-OH)]$ were prepared by the use of ligands acetylacetone and dibenzoylmethane respectively, and fully characterized. Their spectroscopic properties such as lifetime and time-resolved spectra were studied for complexes with different ratios Y/Eu.

References:

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