

Spectroscopic properties and luminescence enhancement of lanthanide mixed complexes $\text{Ln}\beta_3\text{L}$ in zirconia glasses.

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The search for new compounds sensitizing lanthanides emission is of growing interest. Lanthanide mixed chelates of the type $\text{Ln}\beta_3\text{L}$ (L-Lewis base; 2,2'-bipyridine, 1.10-phenanthroline) seem to be promising in this area. In this work the new types of the lanthanide mixed chelates with phosphoro-azo-derivatives of β -diketonates and 2,2'-bipyridine were incorporated in zirconia glasses by the sol-gel techniques. The thin zirconia films were investigated at room temperature and at 77 K. The emission and excitation spectra, as well as the decay times, were recorded. Comparison is made with the respective spectroscopic data obtained for single crystals of the pure chelates. We found a dramatic increase of luminescence intensities of europium and terbium in the complexes as compared with the emission of lanthanide oxides in similar films. This effect is a result of the efficient exchange energy-transfer between the ligand and the lanthanide and the increase of rigidity of the complex incorporated in zirconia glasses. The necessary conditions for such transfer are discussed. These materials can find wide application as light conversion molecular devices, organic layered electroluminescence diodes (OLEDs) and in fluorimetric techniques.

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