The luminescence, molecular and electronic structure, and excited state energetics of tris complexes of 4-phenylethynyl-2,6-pyridinedicarboxylic acid with Eu(III) and Tb(III) prepared in sol-gel.

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Streszczenie

The incorporation of high symmetry racemic lanthanide complexes into sol–gels has recently been demonstrated to be a useful technique to eliminate racemization, and thus allow one the ability to probe individual enantiomers by circularly polarized excitation (CPE) followed by circularly polarized luminescence (CPL). Reduced CPL from sol–gels containing high concentrations of lanthanide complexes has also led to an interpretation of the results in terms of racemization due to excited state energy transfer. This paper is a continuation of our previous studies on the diminished differential excited states concentration of a photoenriched racemic mixture of incorporated in a sol–gel. The high resolution emission, emission excitation spectra, decay times and CPL of the Eu(III) and Tb(III) complexes of the 4-phenyl-ethynyl-dipicolinic acid at 300 and 77 K in solution and incorporated into silica sol–gel are reported. The kind of experiments mentioned above are inherently sensitive to the nature of the local environment of the complexes in the sol–gel, and this is the focus of the results presented here. This information is critical in the continued development of sol–gel based sensors. Comparison of the CPL, total luminescence, and excitation results with spectra obtained from aqueous solution are interpreted in terms of local and bulk structural properties of the sol–gel system. The mechanism of intra- and intermolecular energy transfer in Eu(III) and Tb(III) systems is also analyzed.

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