Modeling intramolecular energy transfer in lanthanide chelates : a critical review and recent advances.

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Streszczenie

A critical review on the mechanisms and behavior of 4*f* intraconfigurational transitions in controllable chemical environments related to nonradiative intramolecular energy transfer processes in lanthanide chelates is presented. The term “modeling” is here used in the sense of manipulating and controlling the photophysical properties of these compounds, allowing obtaining distinguished and specific luminescent behavior. In this chapter an effort is made to show that a theoretical model, jointly used with experimental available data, is able to provide this modeling process in a comprehensive and useful way. The model allows estimating quantitatively intramolecular energy transfer rates by several mechanisms. Selection rules and the spectral overlap factor (energy mismatch conditions, for which an analytical expression is available) may be used to define relevant energy transfer pathways, and the solution (analytically or numerically) of appropriate systems of rate equations is crucial to deduce dominant pathways. Emission quantum yields, then, can be estimated and rationalized. In these rate equations all possible transition channels (radiative and non-radiative) must be included; some of them may be taken into account through the level decaying lifetime. Attempts to standardize notation is made, and some misinterpretations, perspectives and challenges on this subject are discussed.

Słowa kluczowe

Intramolecular energy transfer, Lanthanides, Chelates, Photophysical properties

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