Non-radiative energy transfer in lanthanide materials

Oscar L. Malta[#]

Department of Fundamental Chemistry Federal University of Pernambuco, Brazil

In this lecture three main points will be highlighted: 1) to call attention for shielding effects, produced by the 5s and 5p filled sub-shells, in the multipolar mechanisms (dipole-dipole, dipole-quadrupole and quadrupole-quadrupole) of energy transfer rates between lanthanide ions and ligand-ion. As for the very short-range exchange mechanism, no shielding factors are explicitly necessary, once they are implicitly taken into account in the ion-ion (4f-4f) overlap integrals between their valence shells. 2) to use a new model for treating the Judd-Ofelt Ω_λ intensity parameters by using a thermal root mean squared displacement around each ligating atom (ion) in the analysis of the intensity parameters. This might have an important role for the rationalization of 4f-4f transition intensities and ion-ion energy transfer processes, mainly when the lanthanide ions occupy a center of inversion. 3) to call attention to the fact that the quadrupole-quadrupole mechanism may be dominant for ion-ion distances as far as 20 Å, provided shielding effects are taken into account. Spectral overlap integrals are evaluated analytically. The mechanisms of intramolecular energy transfer in lanthanide coordination compounds will be discussed.

Financial support by CNPq (Brazilian Agency) and INCT-LumiNanoTec (Brazilian Project)

O.L. Malta, *J. Non. Cryst. Solids.* 354, 4770 (**2008**)

[#] oscar.malta@ufpe.br