

Sensitized emissions in actinide complexes of benzimidazole based ligands: evidence for efficient intramolecular energy transfers.

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Direct f-f excitation in actinide and lanthanide ions is inherently inefficient, as it represents a Laporte forbidden transition. One strategy to circumvent this low absorptivity involves coordination of f-elements with energy transmitting ligands, usually one with chromophores of high-molar extinction coefficients. Ligands possessing aromatic and/or heteroaromatic groups are easily excited by near UV-radiation, and can enhance excited-state energy-transfers in donor/acceptor systems. The rich body of literature on "sensitized" luminescence involving lanthanide systems contrasts with the minimal attention that has been given to the corresponding transuranium species. Our laboratory is currently engaged in developing a class of benzimidazole based ligands suitable for such intramolecular energy transfer processes. A systematic "tuning" of their energy levels through variation of electron donating substituents can lead to a proper energy match-up between the ligand's triplet $^3\pi\pi^*$ state and the levels in the acceptor metal ion. In this presentation, the importance of the ligand's triplet position in the overall energy transfer process is analyzed by comparing selected actinide and lanthanide systems that show large enhancement in the sensitized emission.