Supplementary Materials

Exploring Ln(III)-Ion-Based Luminescent Species as Down-Shifters for Photovoltaic Solar Cells

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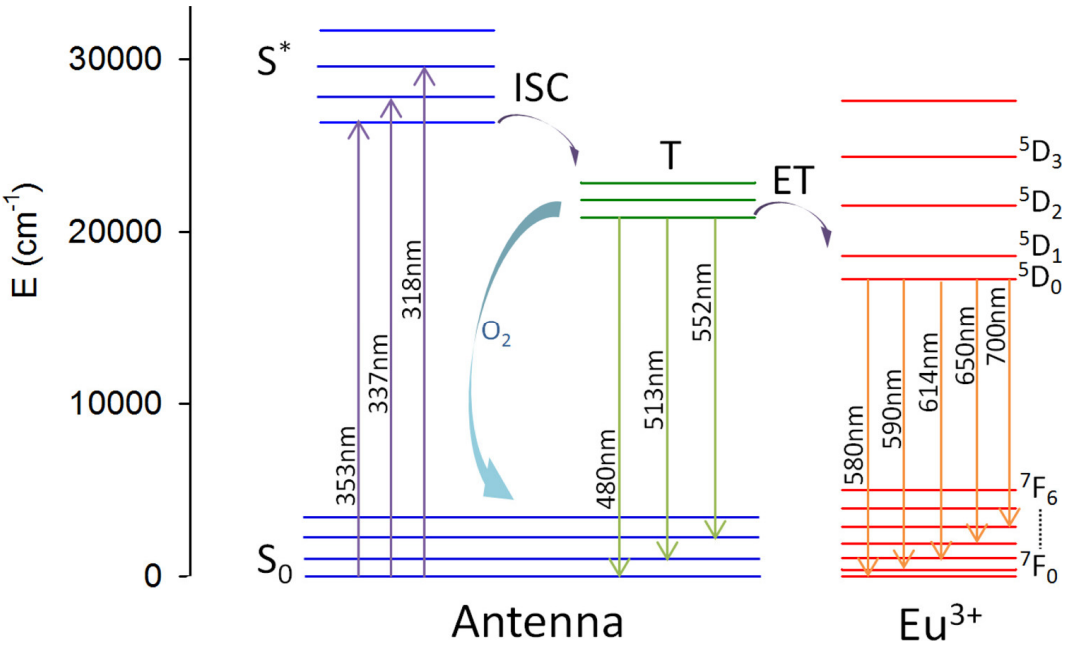

Figure S8. Photophysical processes in $[Eu_2(bphen)_2(bz)_6]$ under UV excitation taking to Eu^{3+} red emission (antenna effect).

The diagram of Figure S8 shows the excitation of the antenna form the ground state S_o to the excited S* (or S_1) single state, followed by intersystem crossing (ISC) to the triplet

state T, (or T_1). Subsequent quenching of the triplet states by molecular oxygen produces singlet oxygen (O_2). Finally, energy transference (ET) from the T state of the ligand to the excited state of the Eu^{3+} ion is produced.

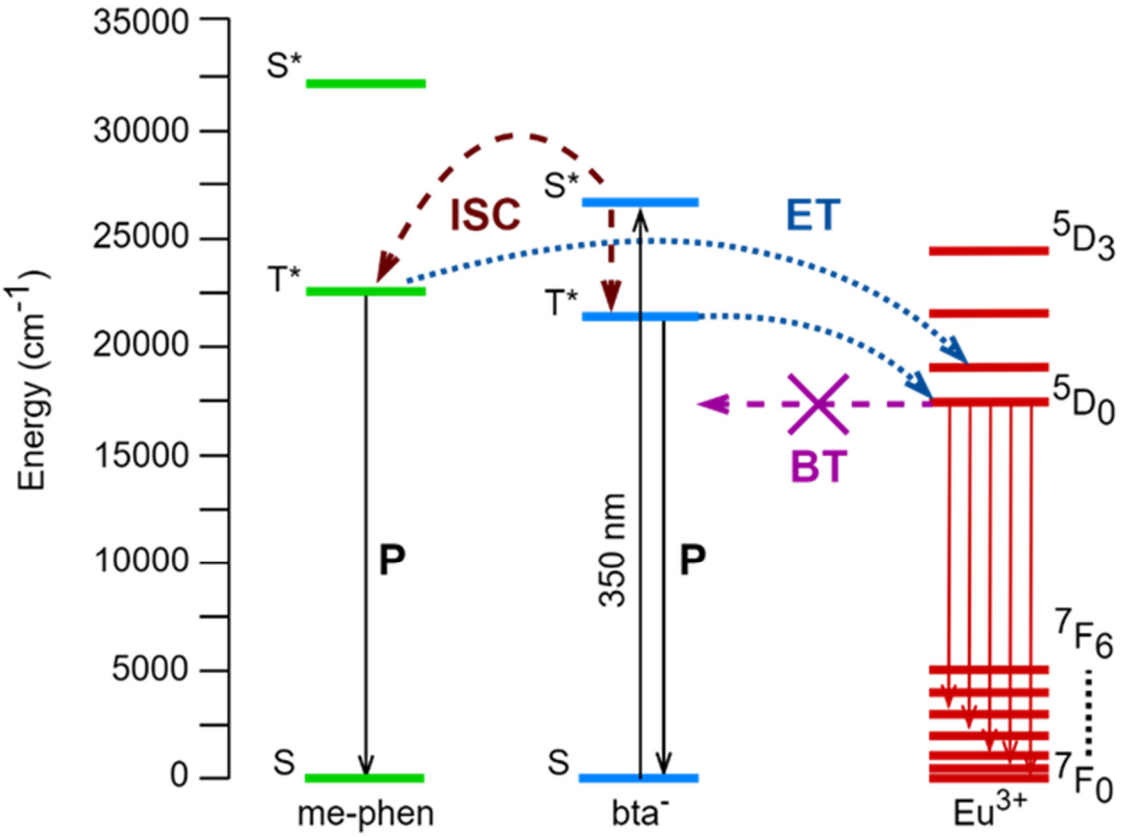

Figure S9. Figure 3.17. Scheme of the energy transfer mechanism and photoluminescence process for [Eu(bta)$_3$me-phen].

Energies of the states and the transitions that take place in the luminescent down-shifting process of [Eu(bta)$_3$me-phen] are shown in Figure S9.

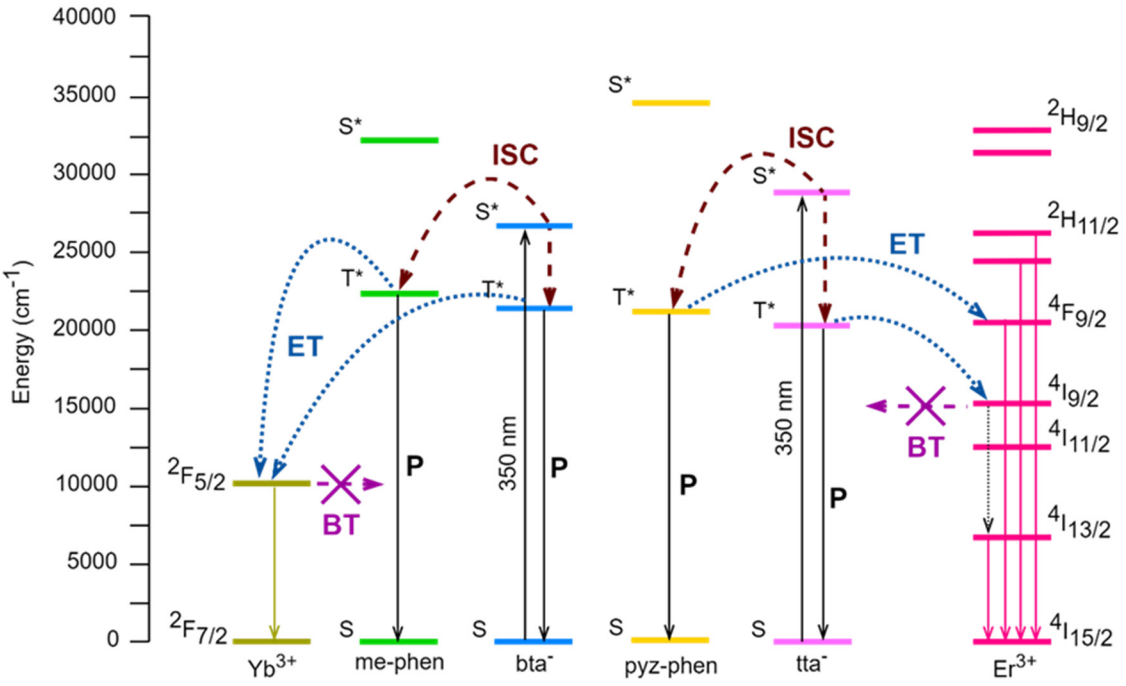

Figure S10. Scheme of the energy transfer mechanism and photoluminescence process for Yb(III) and Er(III) complexes.

Figure S10 shows the energy diagram for Yb(III) and Er(III) complexes with the β-diketonates bta- and tta- and the 1,10-phenanthroline derivates me-phen and pyz-phen.

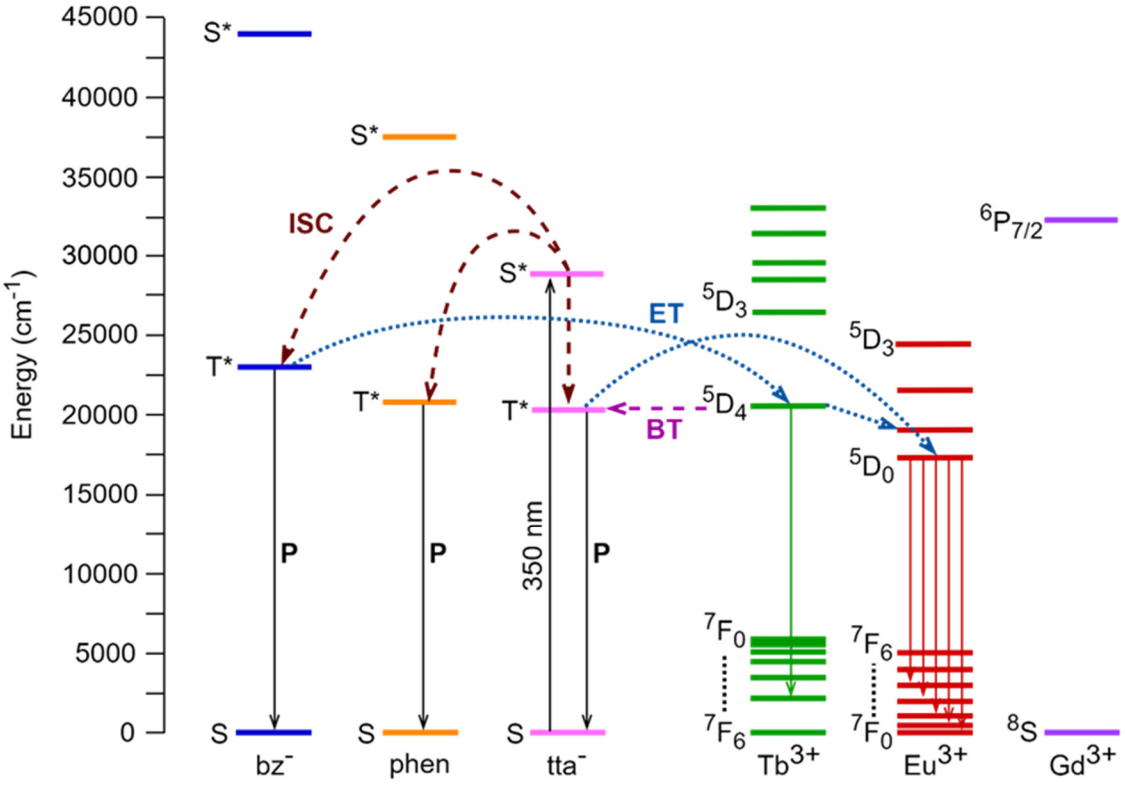

Figure S11. Scheme of the energy transfer mechanism and photoluminescence process for $[M1M2(bz)_4(tta)_2(phen)_2]$ series.

The energy diagram for $[M1M2(bz)_4(tta)_2(phen)_2]$ series is shown in figure S11.