Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supplementary Information

Heterobimetallic Iridium^{III}-Europium^{III} complex: The role of donor energy on sensitizing the Eu^{III} ion

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Structural characterization of the complexes (Ir-p and Ir-p-Eu):

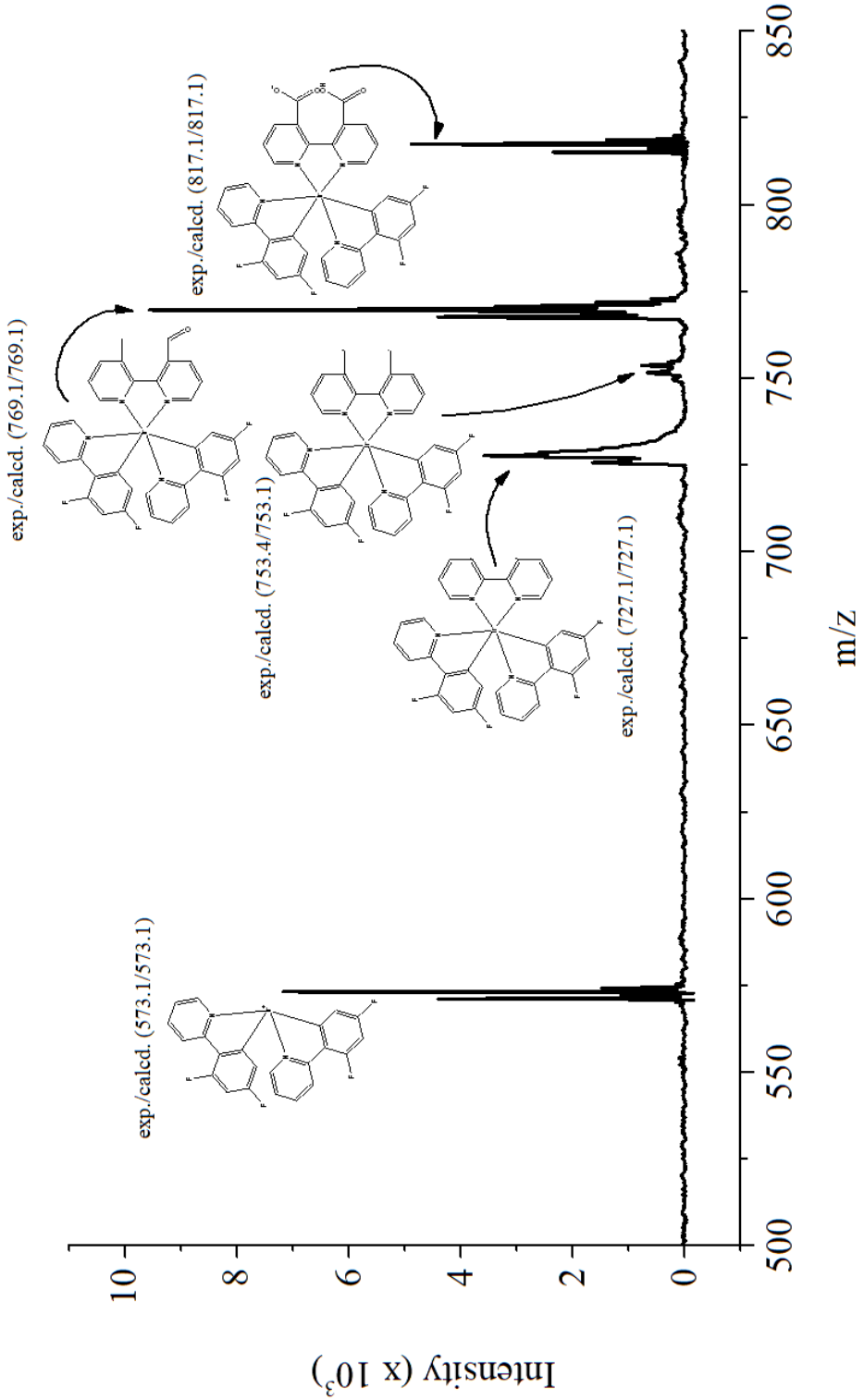

Fig. S1 MALDI-TOF spectrum of the Ir-p complex.

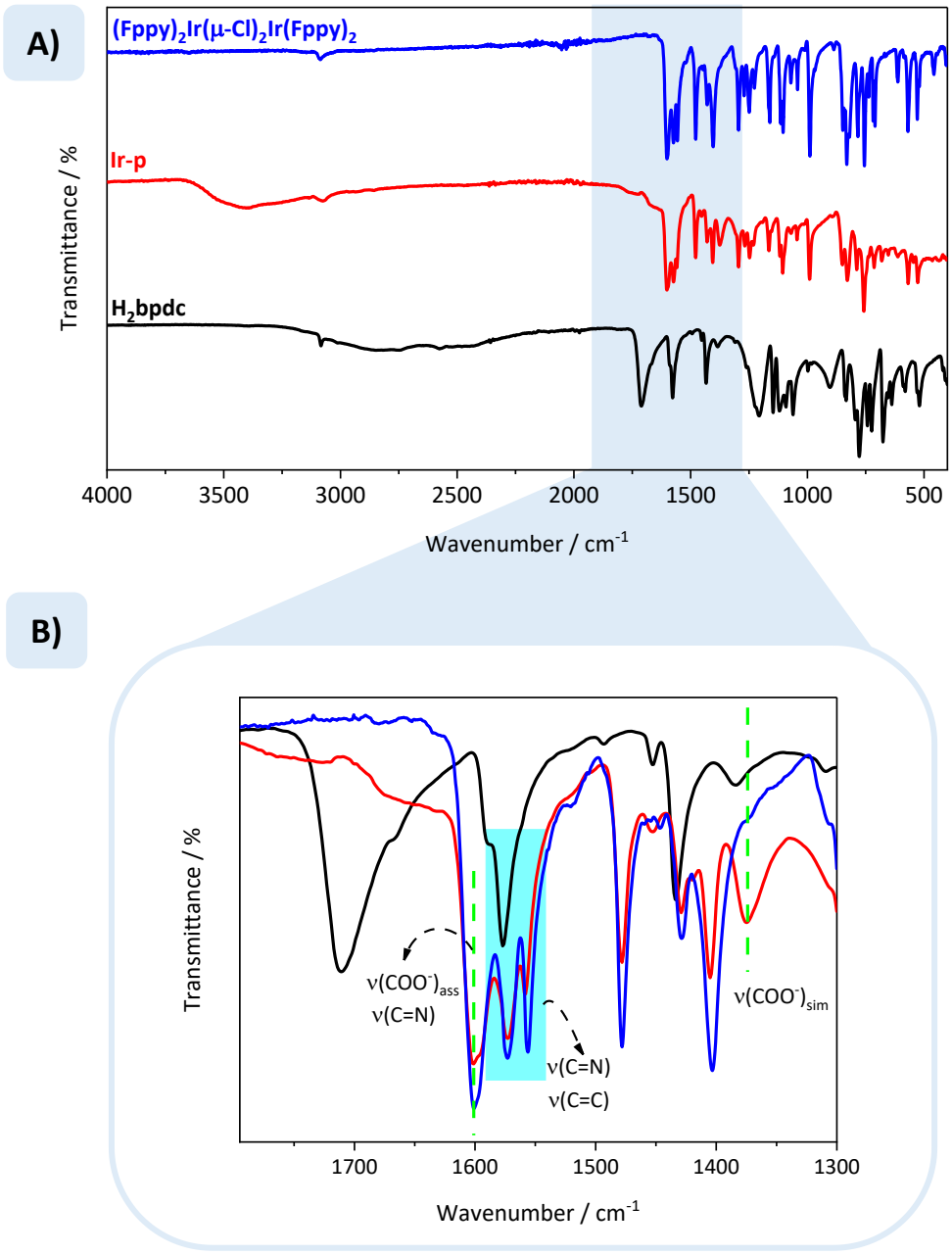

Fig. S2 A) FTIR spectra of the bpdc ligand, the [(Fppy)$_2$Ir(μ-Cl)$_2$Ir(Fppy)] dimer, and the Ir-p complex, and B) magnification of the region from 1300 cm^{-1} to 1800 cm^{-1}.

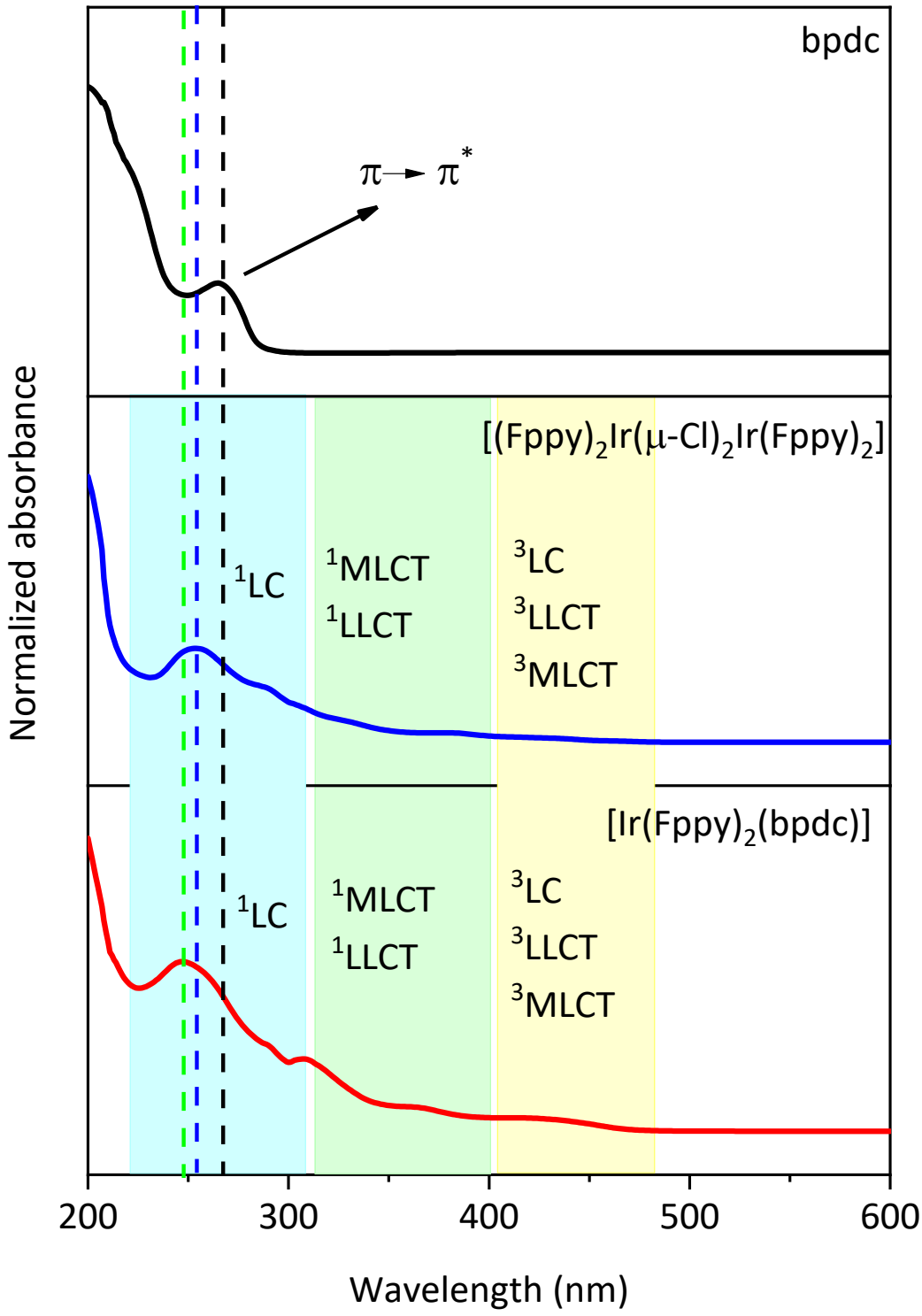

Fig. S3 UV-Vis spectra of the bpdc ligand in black, the [(Fppy)$_2$Ir(μ-Cl)$_2$Ir(Fppy)] dimer in blue, and the Ir-p complex in green.

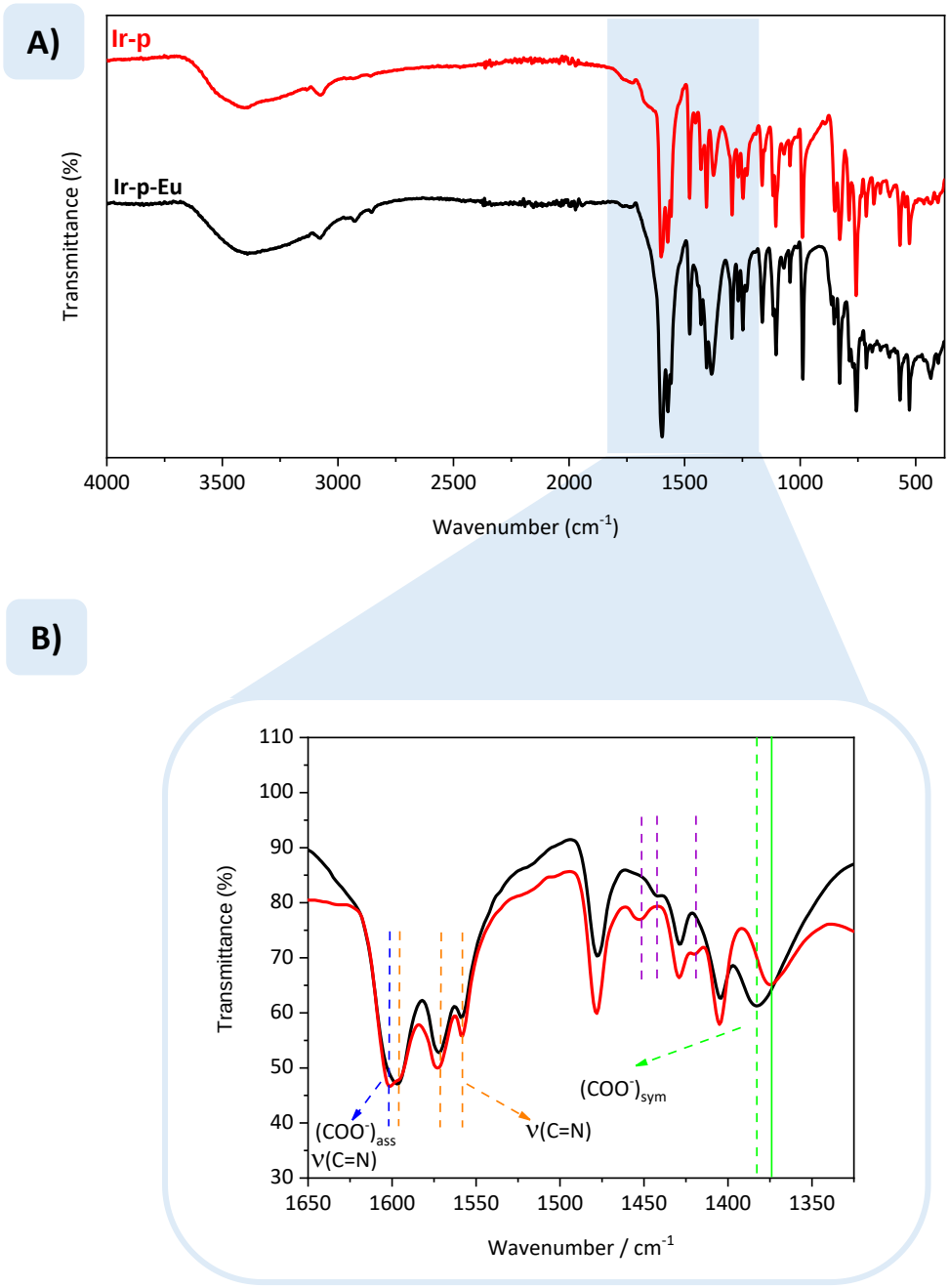

Fig. S4 A) FTIR spectra of the Ir-p, and the Ir-p-Eu complexes, B) magnification of the region from 1325 cm^{-1} to 1650 cm^{-1}.

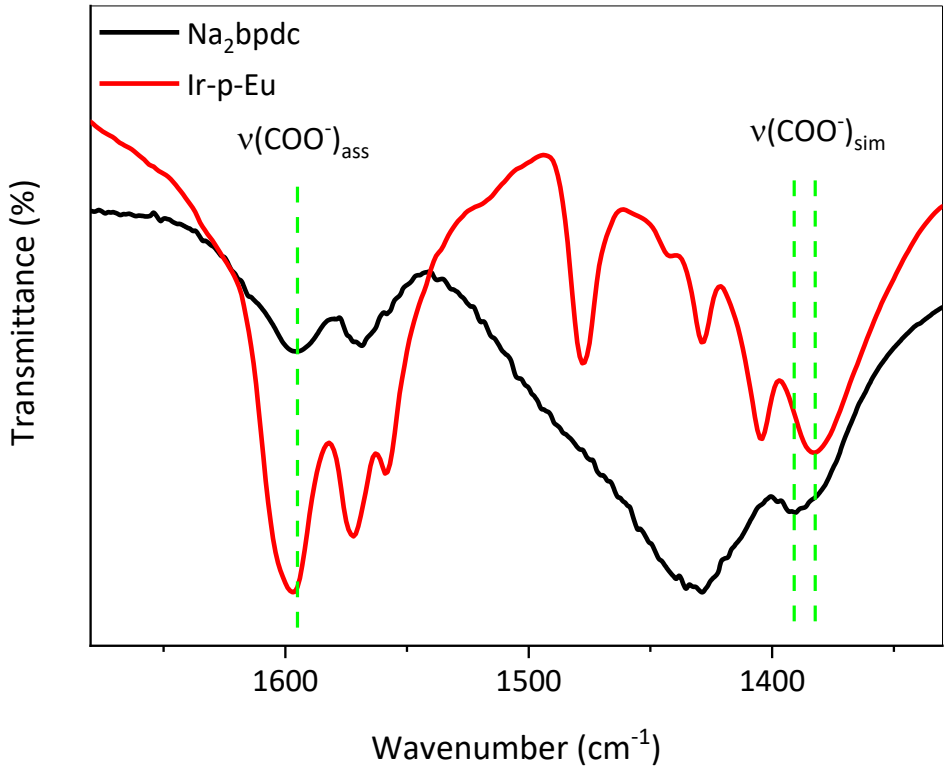

Fig. S5 FTIR spectra of the Na_2bpdc ligand, and the Ir-p-Eu complex.

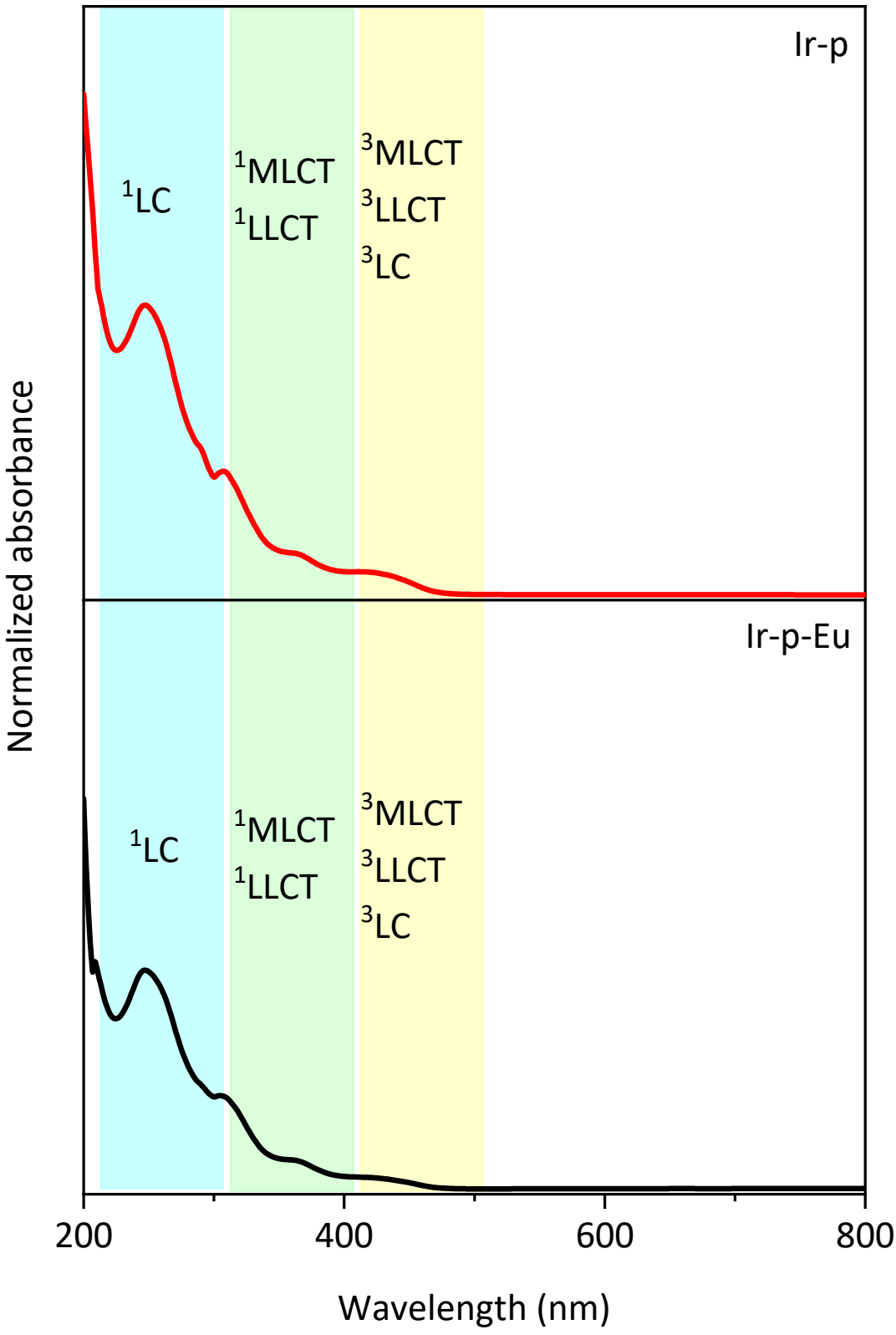

Fig. S6 UV-Vis spectra of the Ir-p, and the Ir-p-Eu complexes.

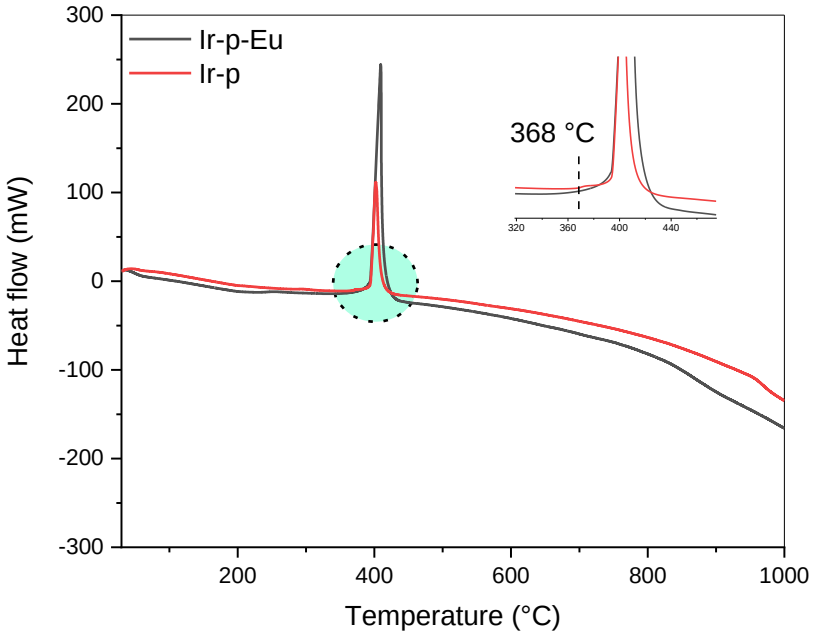

Fig. S7 DSC curves of the complexes.

SI 2 - Luminescent characterization of the complexes (Ir-p and Ir-p-Eu):

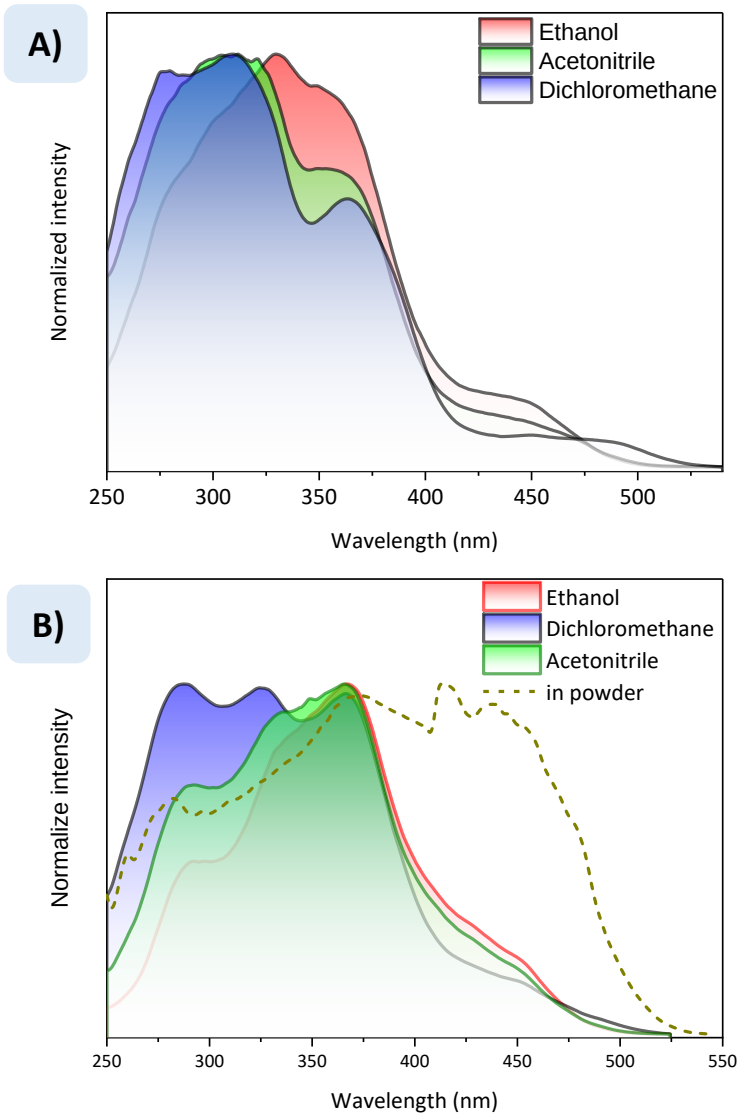

Fig. S8 Excitation spectra of Ir-p in A), and Ir-p-Eu in B). The excitation spectra were recorded fixing the maximum emission wavelength of each complex. For Ir-p complex: λ_{DCM}= 553 nm, λ_{ACN}= 573 nm, and λ_{EtOH}= 580 nm. For Ir-p-Eu complex: all spectra were recorded using the emission wavelength of the $^5D_0 \rightarrow {}^7F_2$ transition at λ=616 nm. Emission and excitation slit of 10 nm and cutting filter of 390 nm.

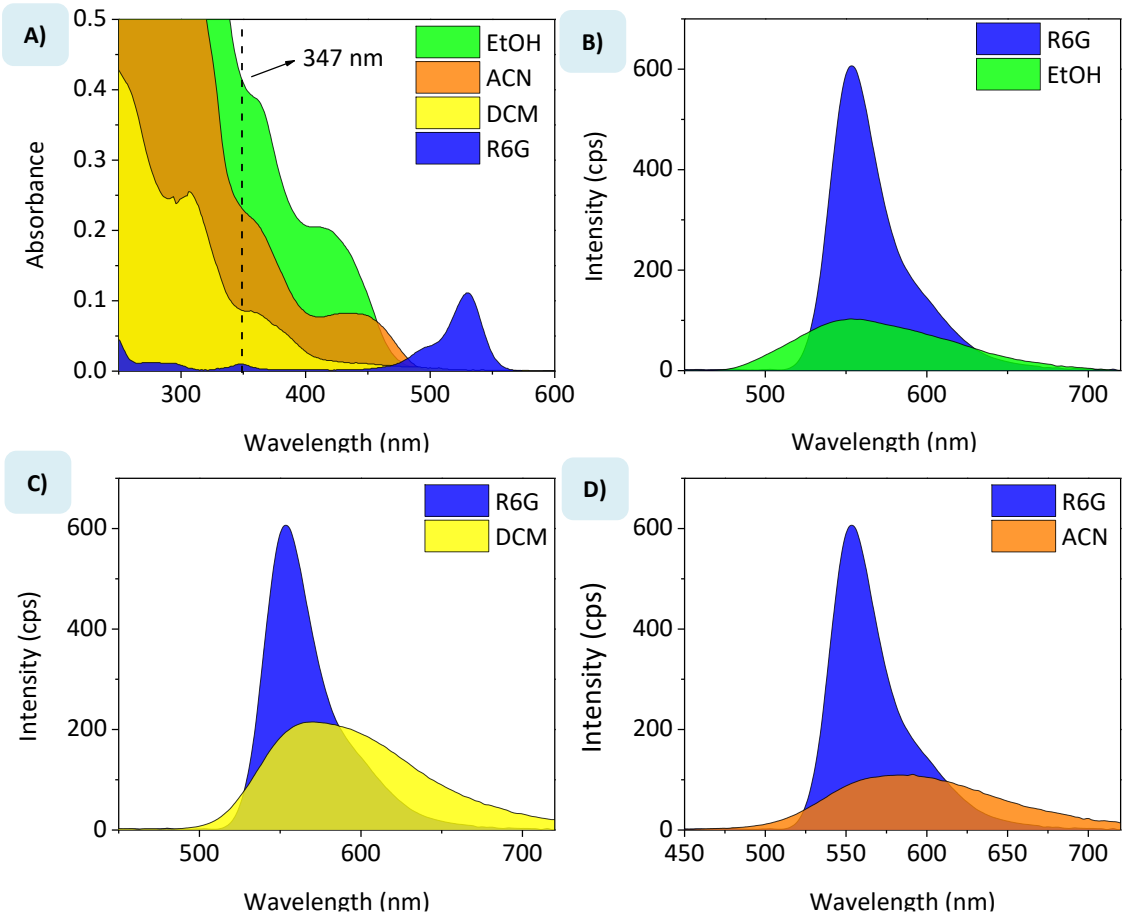

Fig. S9 A) UV-Vis absorption spectra of Rhodamine 6G (R6G) in EtOH (blue), and of the Ir-p in EtOH (green), in ACN (orange), and DCM (yellow). In (B), (C) and (D) the emission spectra of R6G in ethanolic solution (blue), and of the Ir-p in EtOH (B), DCM (C), and ACN (D); all emission spectra were recorded using 347 nm as excitation wavelength, with excitation and emission slit of 10 nm and cutting filter of 390 nm.

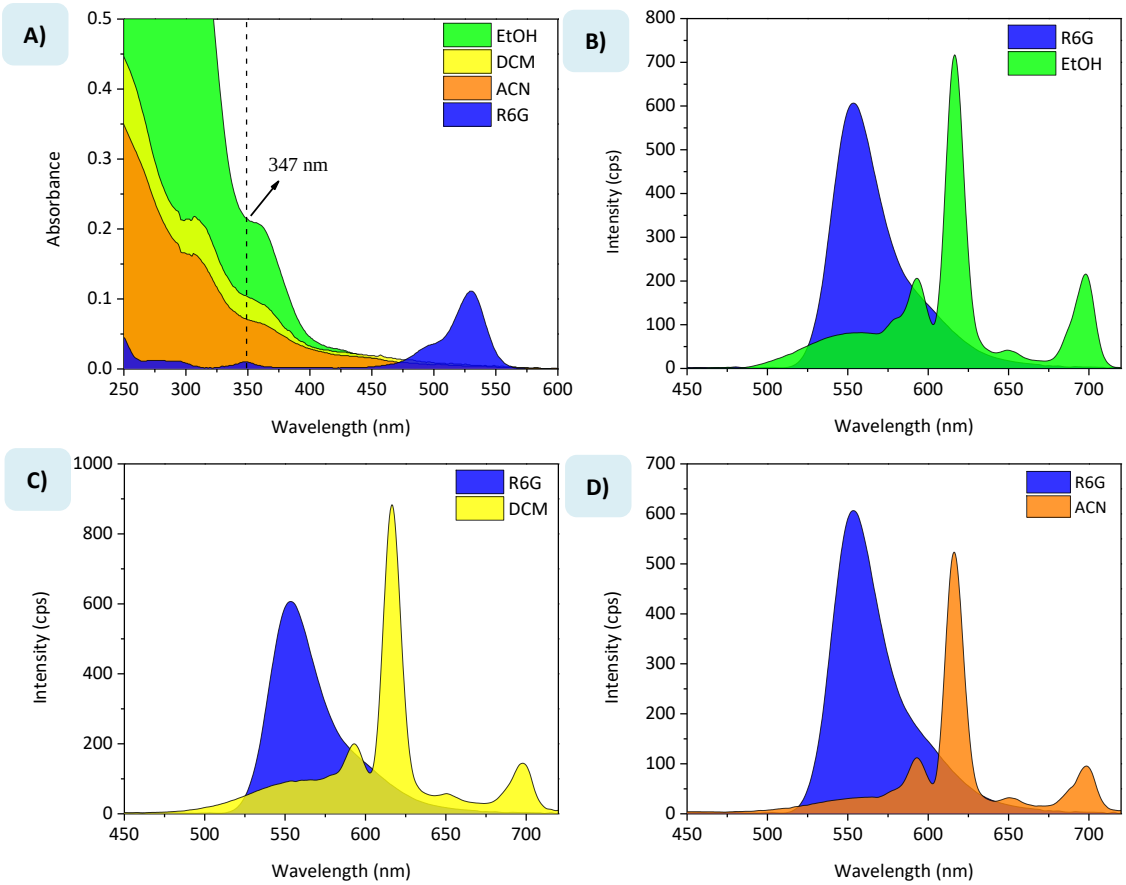

Fig. S10 A) UV-Vis absorption spectra of Rhodamine 6G (R6G) in ethanol (blue), and of the Irp-Eu in EtOH (green), in ACN (orange), and DCM (yellow). In (B), (C), and (D) the emission spectra of R6G in ethanolic solution (blue), and of the Ir-p-Eu in EtOH (B), DCM (C), and ACN (D); all emission spectra were recorded using 347 nm as excitation wavelength, with excitation and emission slit of 10 nm and cutting filter of 390 nm.

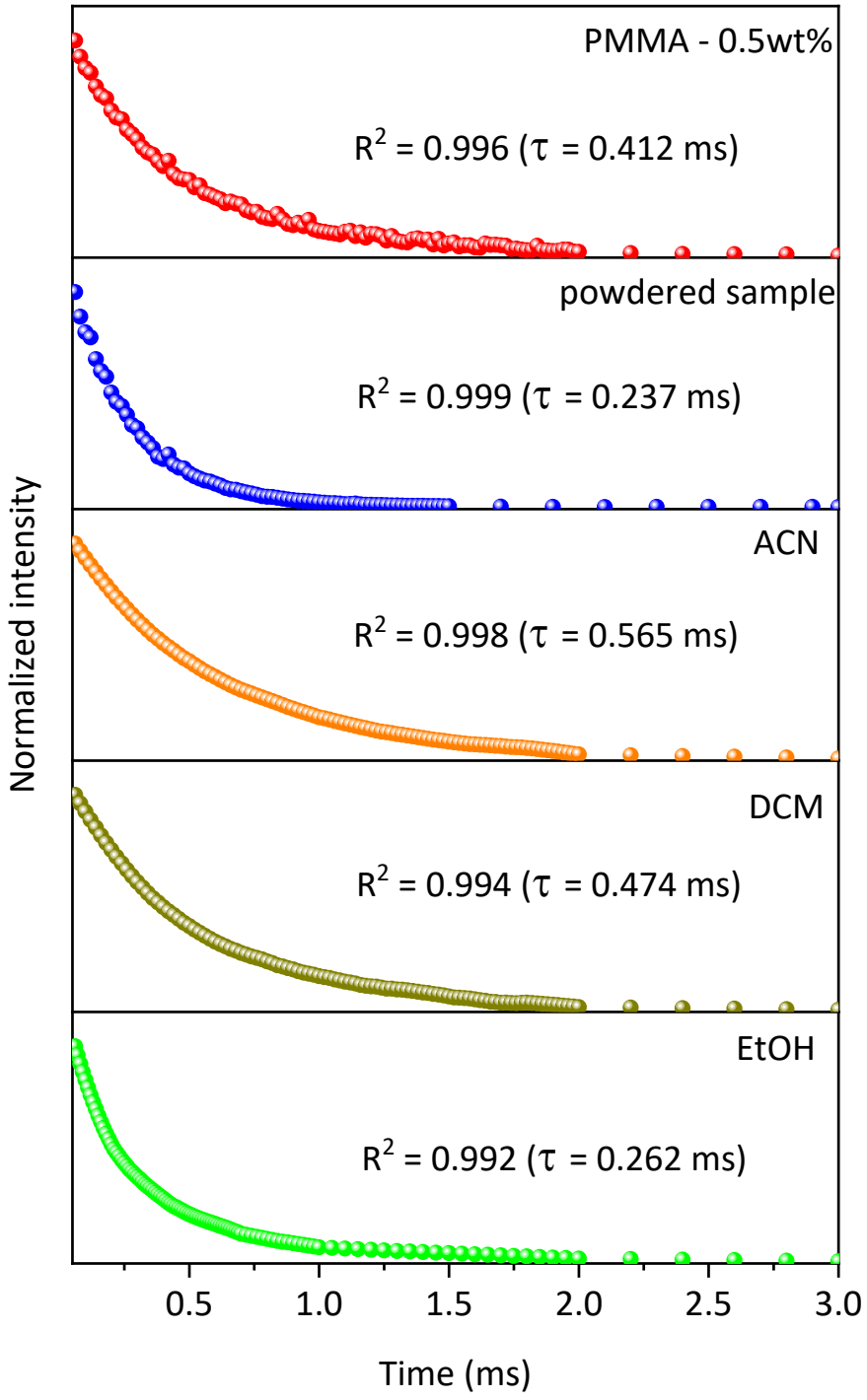

Fig. S11 Decay curves related to the Eu^{III} $^5D_0 \rightarrow {}^7F_2$ transition observed in the Ir-p-Eu complex in all tested solvents, in the powder, and doped in PMMA at 0.5 wt%. All lifetime decays were recorded using 350 nm as excitation source and the maximum emission peak in 616 nm as emission wavelength.

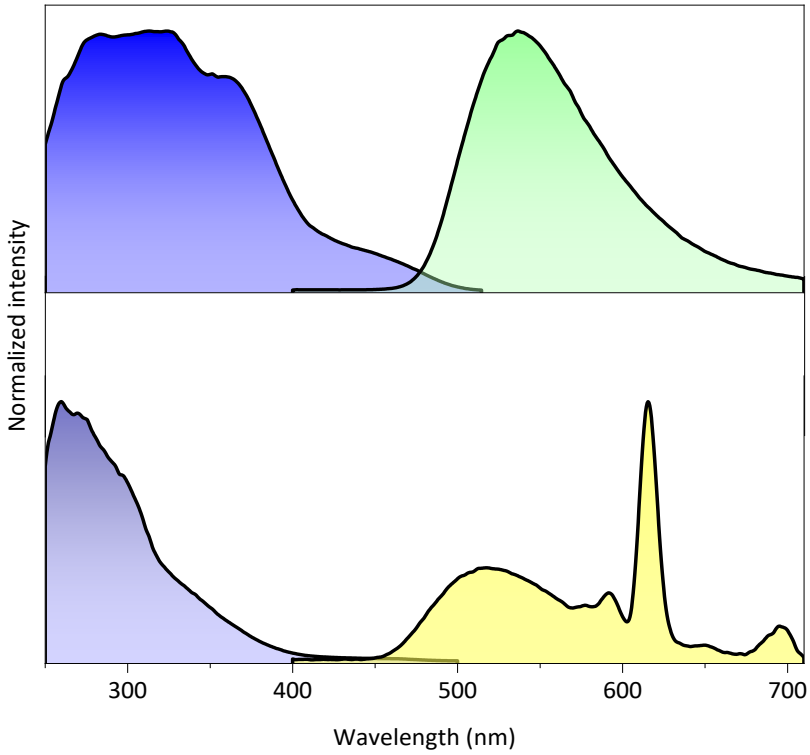

Fig. S12 Excitation and emission spectra of the PMMA film doped at 0.5 wt% with Ir-p (top), and Ir-p-Eu (bottom).

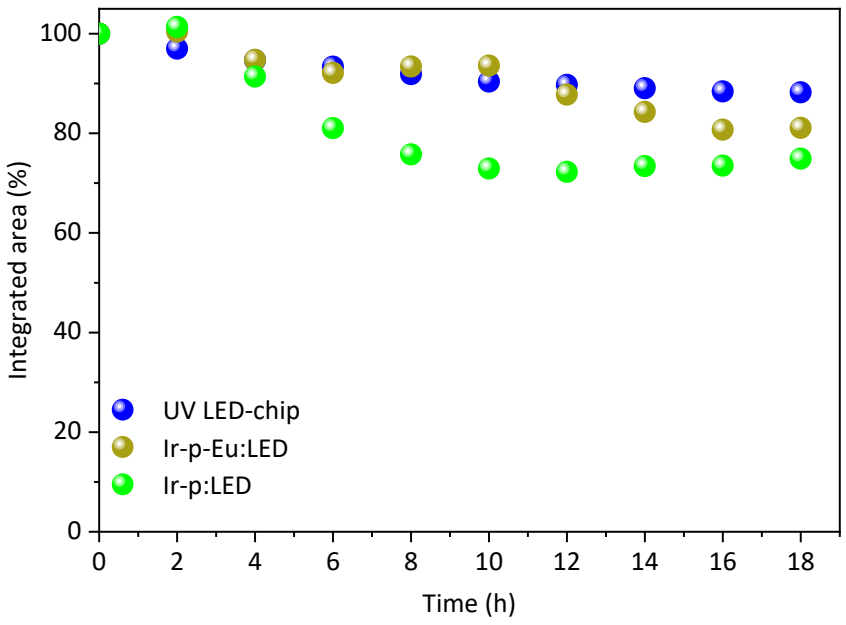

Fig. S13 Radiant stability of each UV LED prototype analyzed within 18 hours.

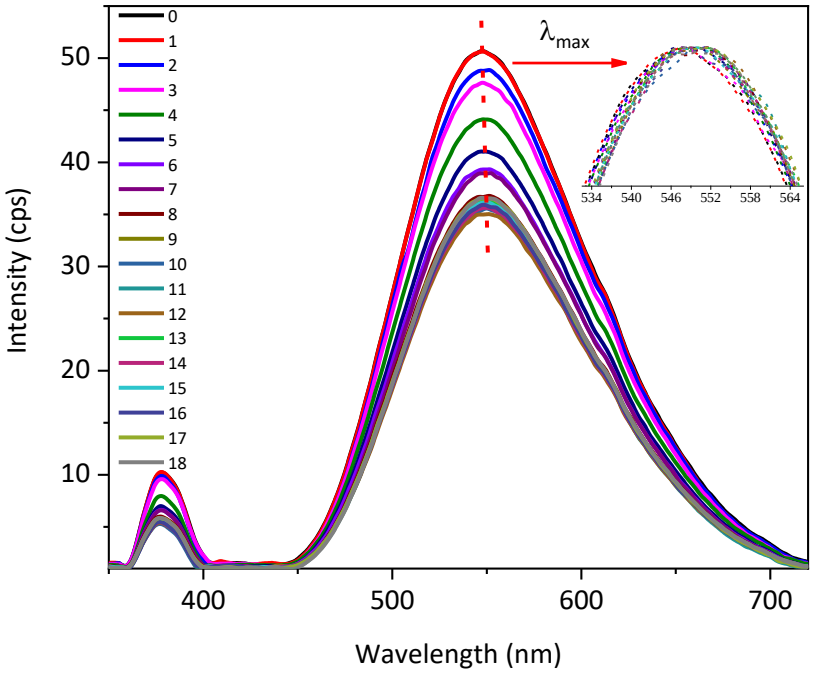

Fig. S14 Emission spectra obtained hourly from the Ir-p:LED prototype. The inset shows the normalized emission spectra, highlighting the shift to lower energy.

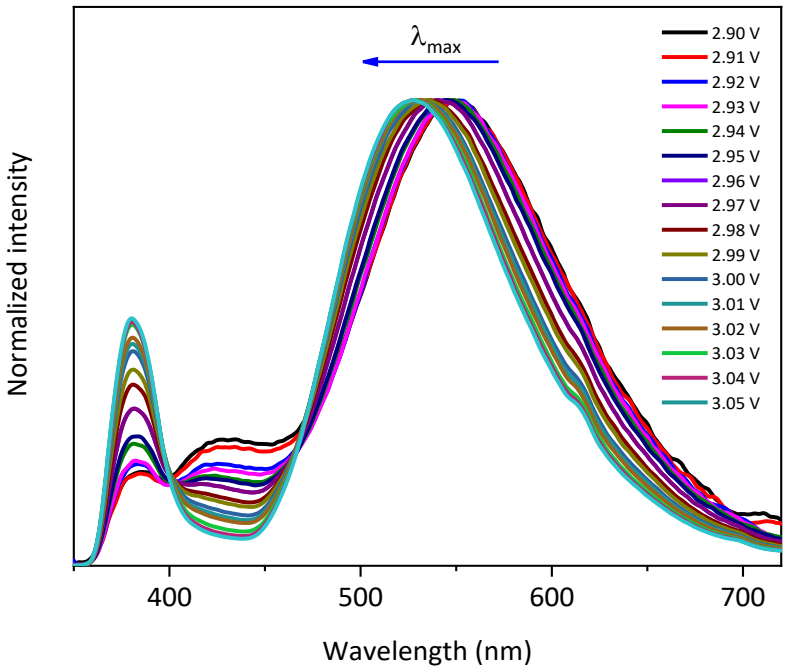

Fig. S15 Emission spectra obtained under different voltage operation from the Ir-p:LED prototype.

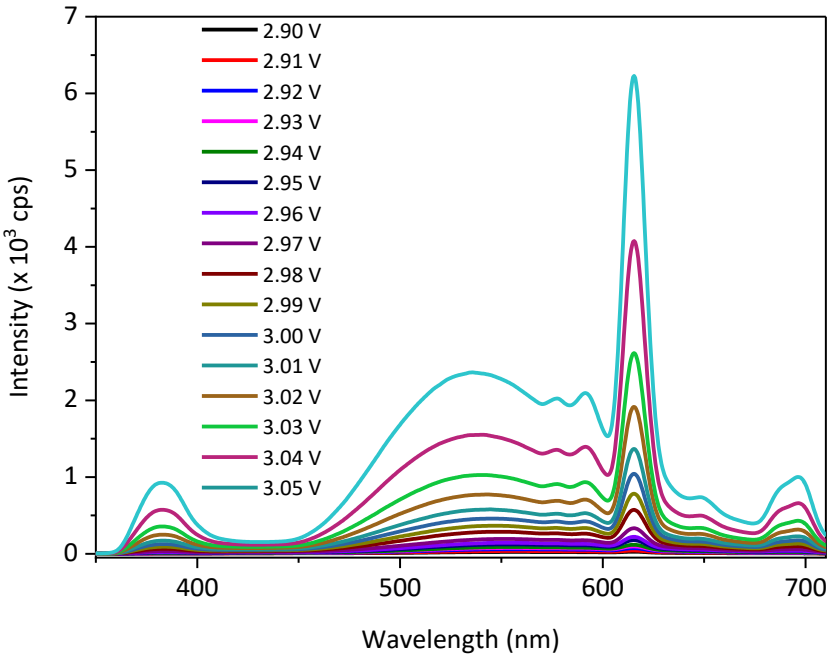

Fig. S16 Emission spectra obtained under different operating voltages of the Ir-p-Eu:LED prototype.

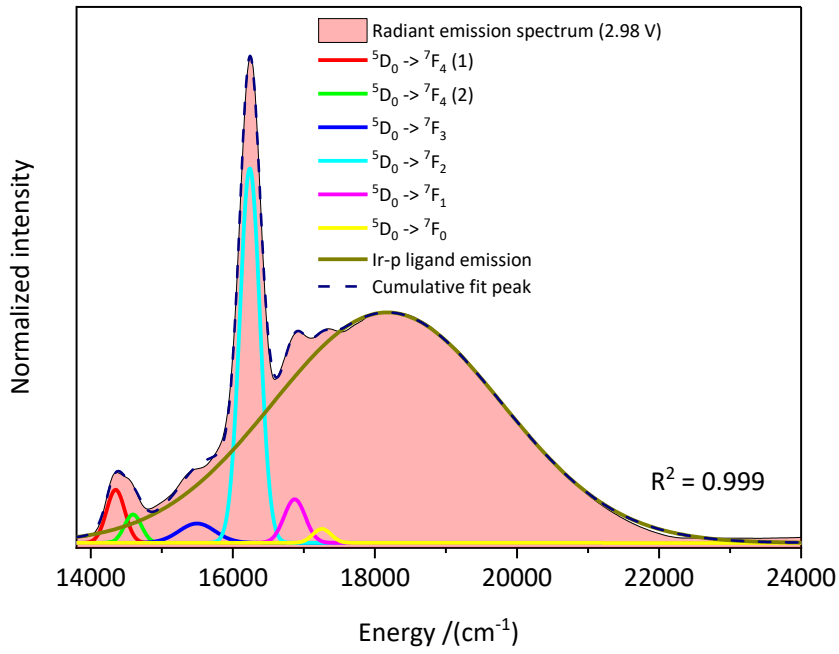

Fig. S17 Deconvolution of the emission spectra obtained at 2.98 V of the Ir-p-Eu:LED prototype.

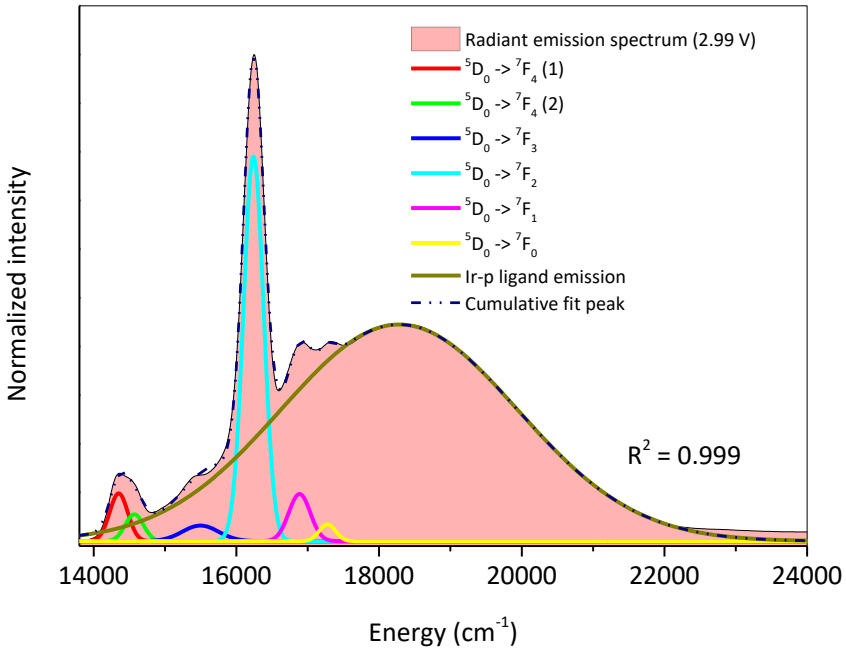

Fig. S18 Deconvolution of the emission spectra obtained at 2.99 V of the Ir-p-Eu:LED prototype.

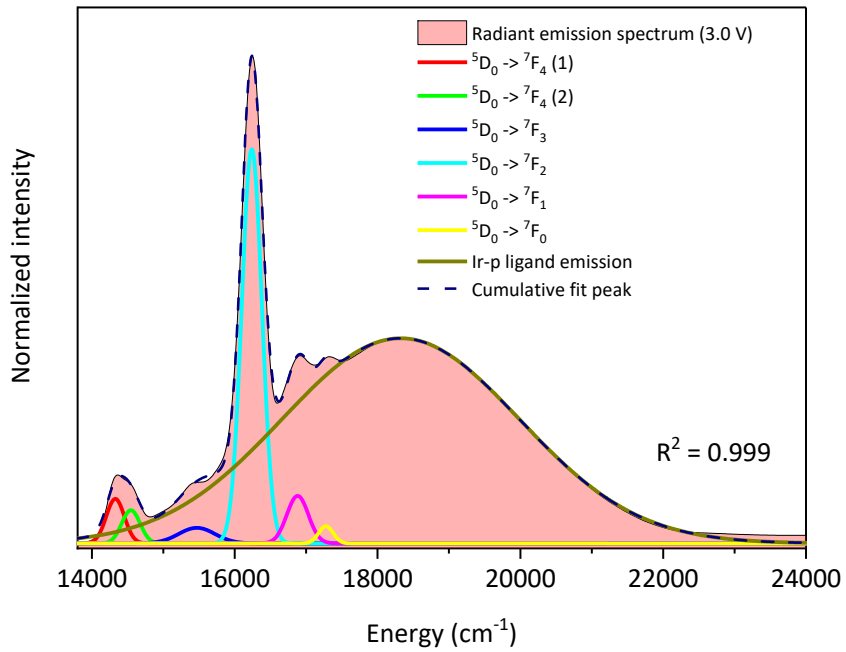

Fig. S19 Deconvolution of the emission spectra obtained at 3.00 V of the Ir-p-Eu:LED prototype.

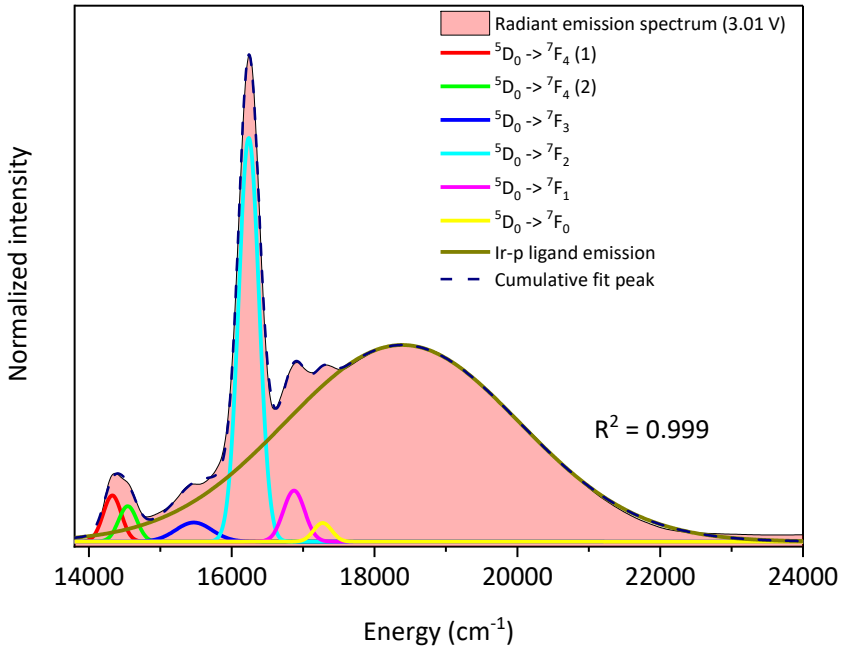

Fig. S20 Deconvolution of the emission spectra obtained at 3.01 V of the Ir-p-Eu:LED prototype.

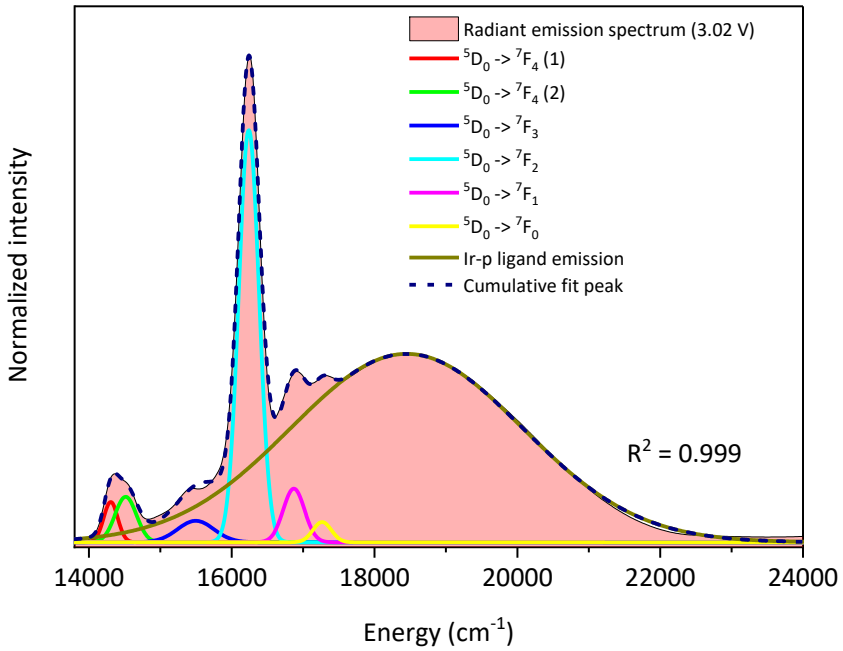

Fig. S21 Deconvolution of the emission spectra obtained at 3.02 V of the Ir-p-Eu:LED prototype.

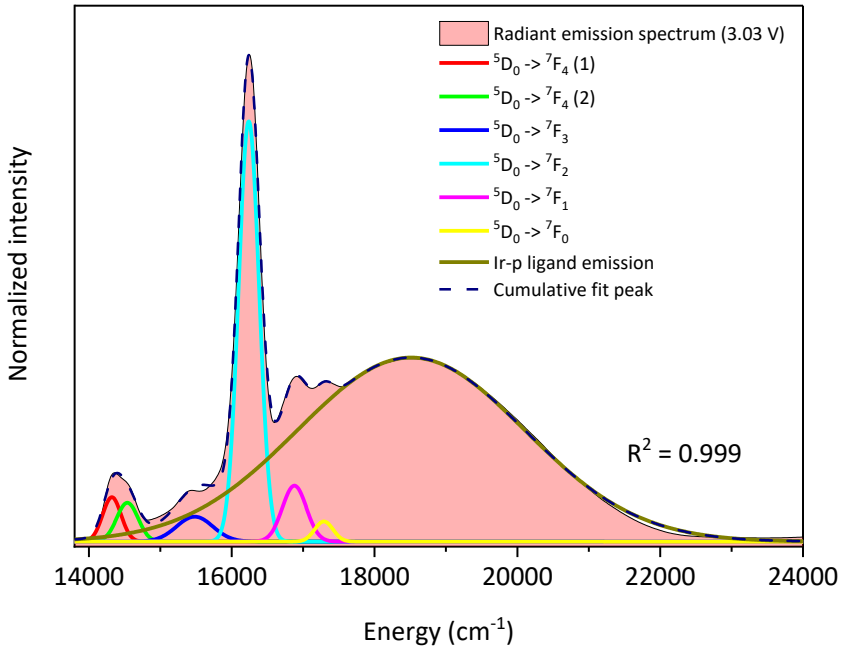

Fig. S22 Deconvolution of the emission spectra obtained at 3.03 V of the Ir-p-Eu:LED prototype.

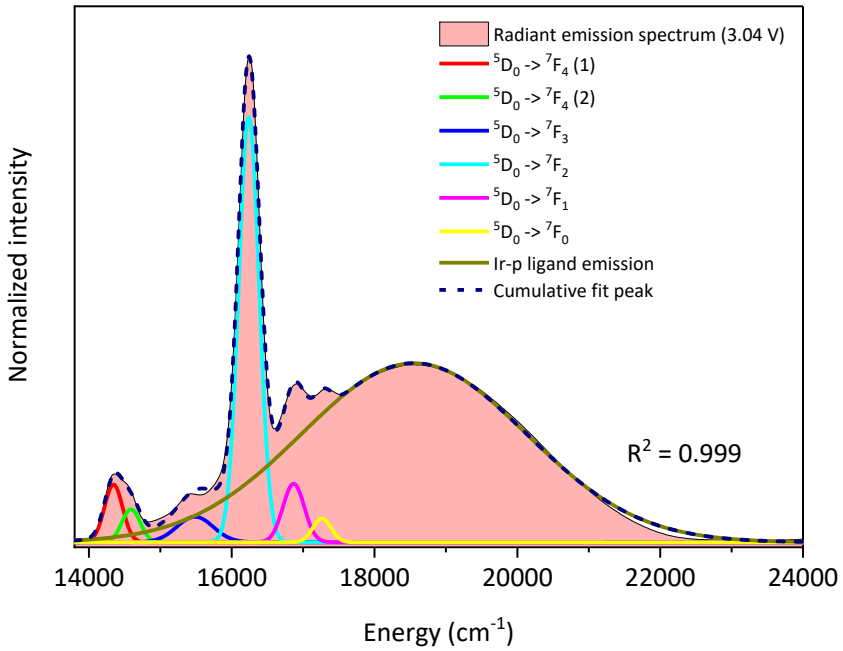

Fig. S23 Deconvolution of the emission spectra obtained at 3.04 V of the Ir-p-Eu:LED prototype.