# Supporting Information for

# Synthesis, Characteristics and Photoluminescent Properties of Novel Ir-Eu Heteronuclear Complexes containing 2-carboxyl-pyrimidine as a Bridging Ligand

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**Table S1** Triplet energy level of $[Ir(dfppy)_2(pmc)]$ and $[Ir(ppy)_2(pmc)]$ calculated from TD-DFT and low temperature spectra experiment

| Triplet energy level | $[Ir(dfppy)_2(pmc)]$ | $[Ir(ppy)_2(pmc)]$ |
|---|---|---|
| TD-DFT | 464 nm($2.16 \times 10^4$ $cm^{-1}$) | 516 nm($1.94 \times 10^4$ $cm^{-1}$) |
| Low temperature spectra | 458 nm($2.18 \times 10^4$ $cm^{-1}$) | 488 nm($2.05 \times 10^4$ $cm^{-1}$) |

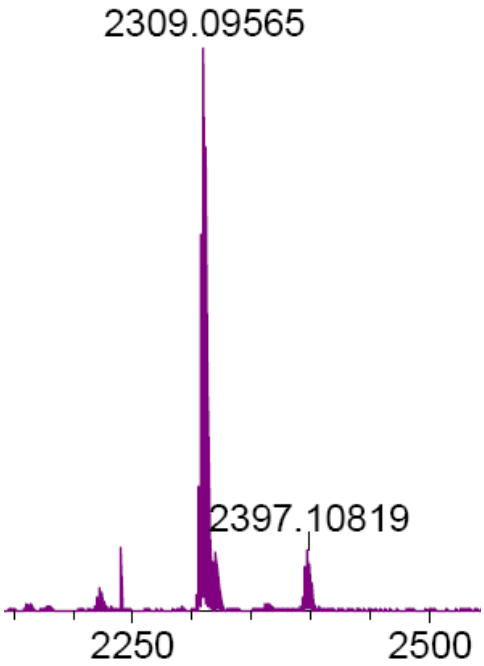


**Fig. S1** High-resolution ESI-MS of $\{[(dfppy)_2Ir(pmc)]_3EuCl_3\}$

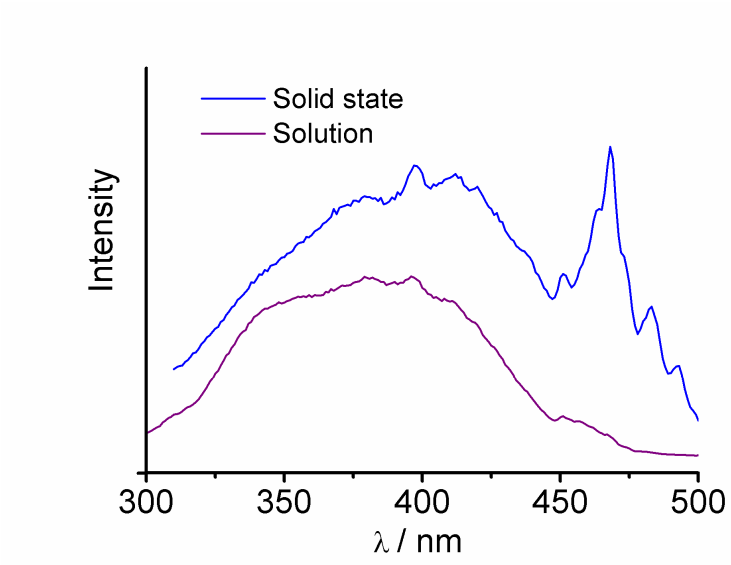


**Fig. S2** Excitation spectra of $\{[(dfppy)_2Ir(pmc)]_3EuCl_3\}$ (λem=615 nm) in solid state(blue) and in $CH_2Cl_2$ solution ($4 \times 10^{-5}$ M) at room temperature( purple).

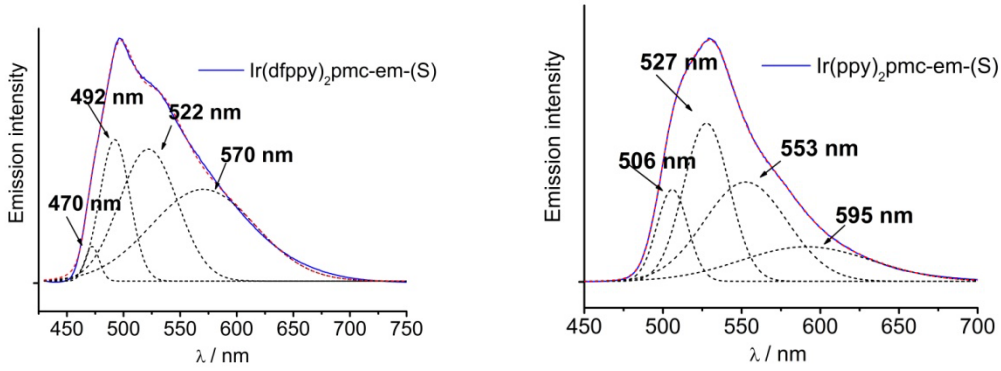


**Fig. S3** Multi-peak fitting of the solid state emission spectra of [Ir(dfppy)$_2$pmc] (left) and [Ir(ppy)$_2$pmc] (right). Blue solid lines standard for the original spectra, black dashed lines refer to the separate fitting peaks calculated by the program OriginPro 8.0 and pink dashed lines mean the total fitted curve.

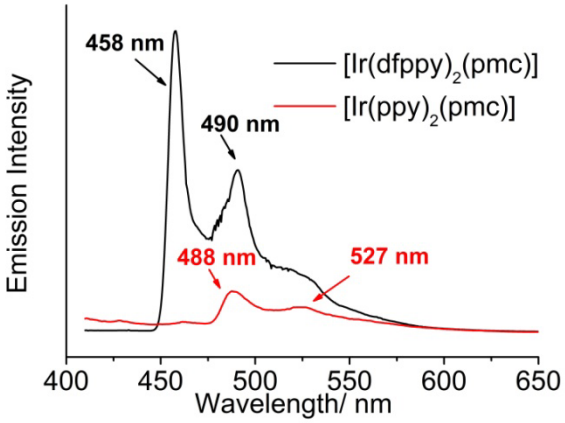


**Fig. S4** Emission spectra of [Ir(dfppy)$_2$(pmc)] and [Ir(ppy)$_2$(pmc)] in a rigid matrix of EtOH ($1\times10^{-5}$ M) at 77K. (This figure is similar to Fig. 5 in the article; it is shown here for convenient comparison)

In order to explain the spectral difference of [Ir(dfppy)$_2$pmc] (or [Ir(ppy)$_2$pmc]) between at 77K in solution and at room temperature in solid state, we carried out multi-peak fitting of the solid state emission spectra (Fig S3). It is shown that the fitted peaks are generally in corresponding to the peaks of the low temperature emission spectra (Fig S4). According to the result, we conclude that the sharp emission peak of [Ir(dfppy)$_2$pmc], for example, around 460 nm at 77K gets weaker and weaker because of the more and more active vibration when the temperature rises. As a result, the emission peak appears to move to longer wavelength (490 nm for [Ir(dfppy)$_2$pmc]) at room temperature.