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## Electronic Supplementary Information

# Gold(III)-TADF Emitter as Sensitizer for High-Color-Purity and Efficient Deep-Blue Solution-Processed OLEDs

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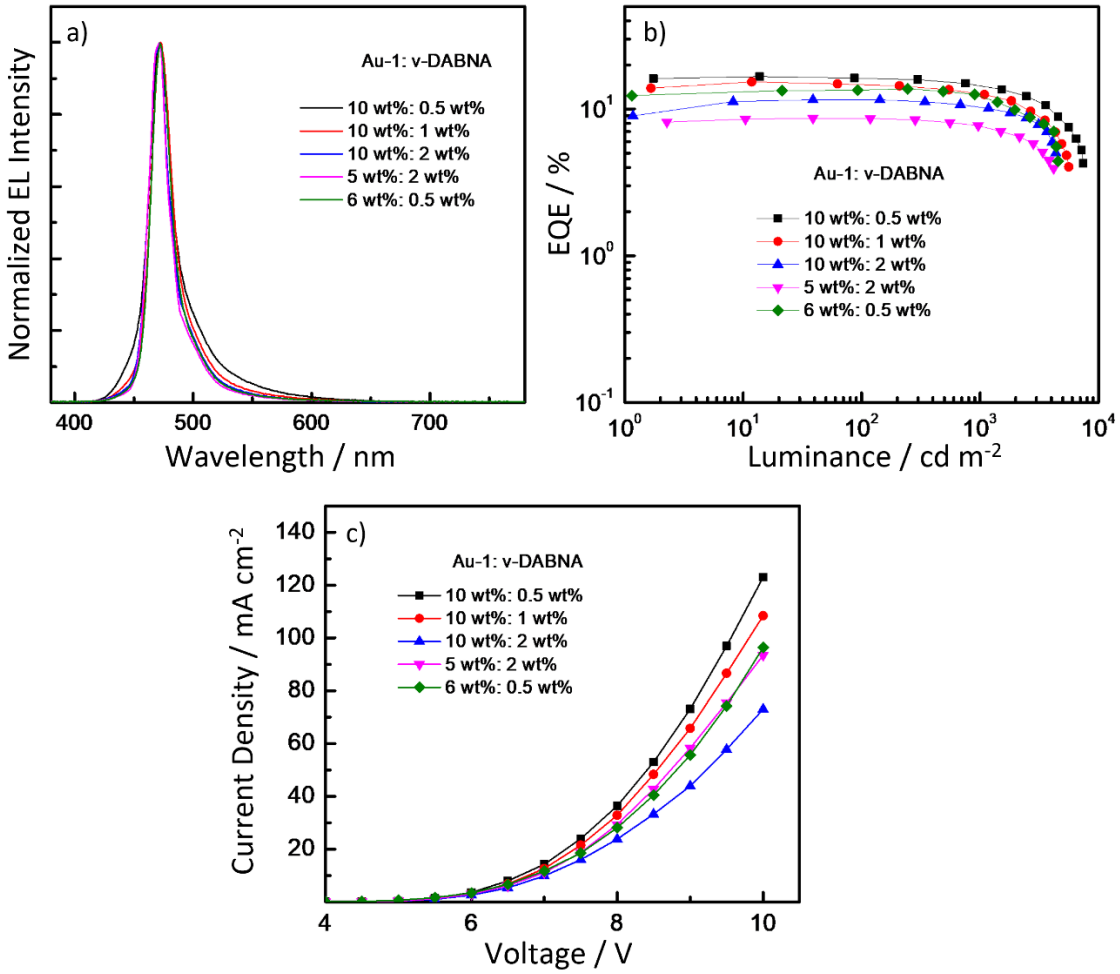


**Figure S1.** a) Normalized EL spectra, b) EQE-luminance, and c) current density-voltage characteristics of the sensitized SP-OLEDs with various concentrations of **Au-1** and *v*-DABNA.

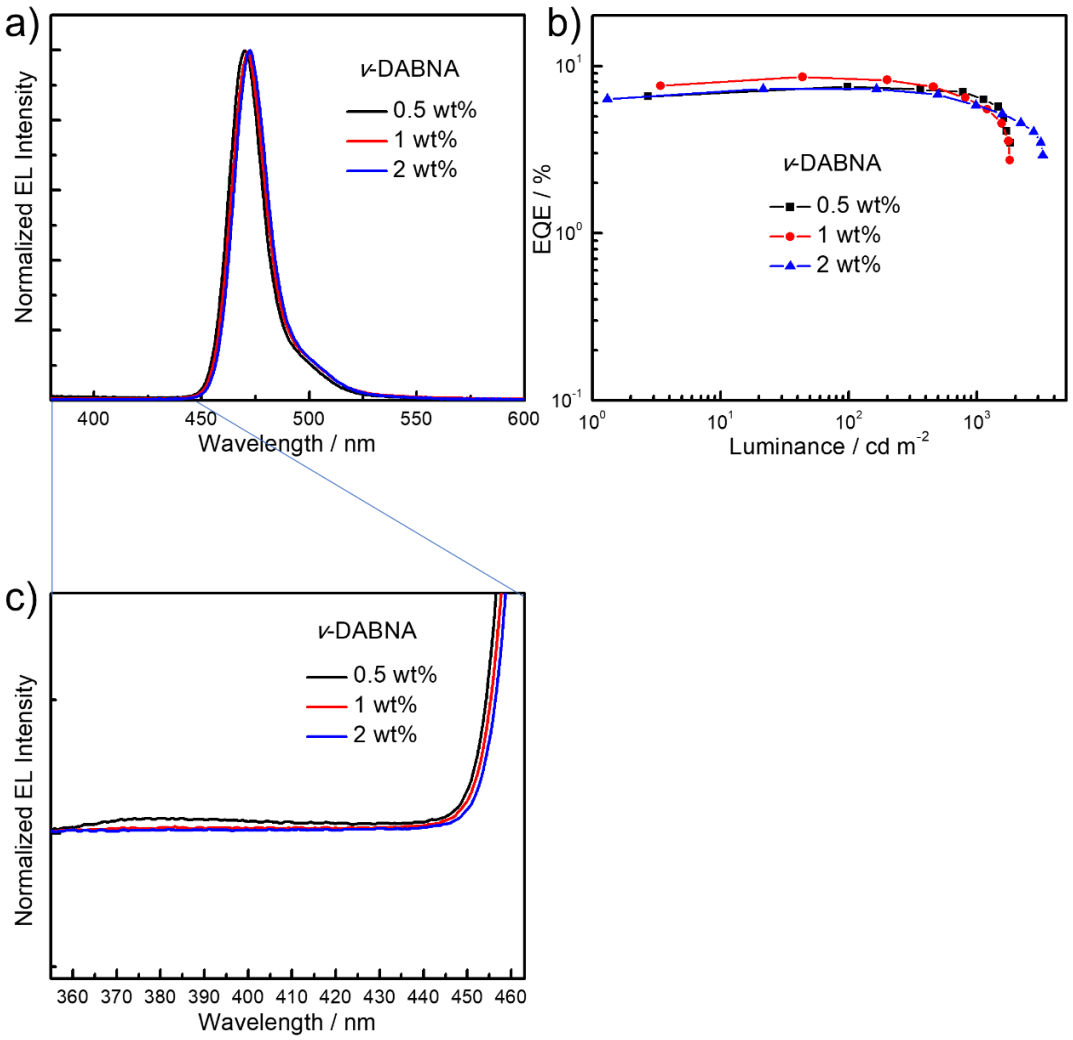


**Figure S2.** a) Normalized EL spectra and b) EQE-luminance characteristics of SP-OLEDs based on *ν*-DABNA with different doping concentration ranging from 0.5 to 2 wt%. c) Enlarged spectrum of a) between wavelength from 355 to 465 nm.

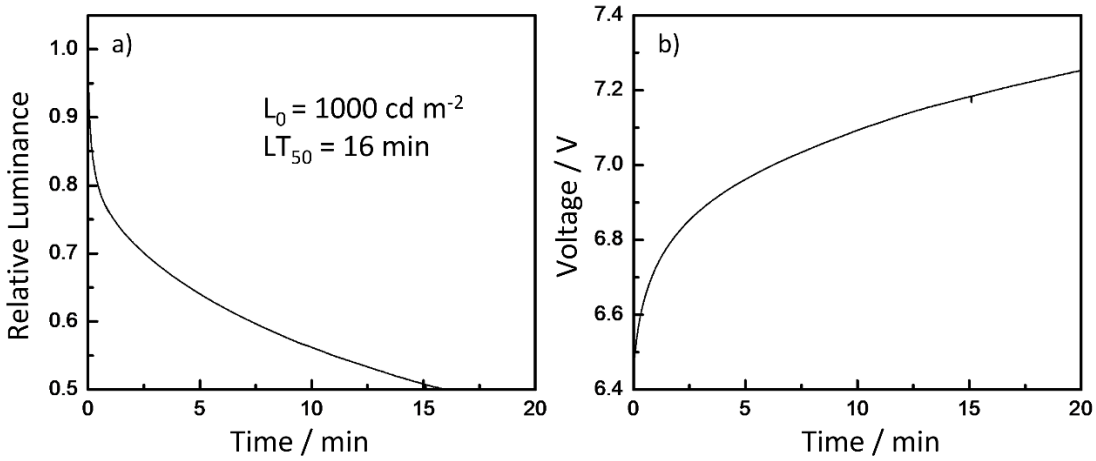


**Figure S3.** The dependence of a) relative luminance and b) driving voltage of the device with 10 wt% **Au-1** and 0.5 wt% *v*-DABNA upon operation time at the initial luminance of 1000 cd m$^{-2}$.

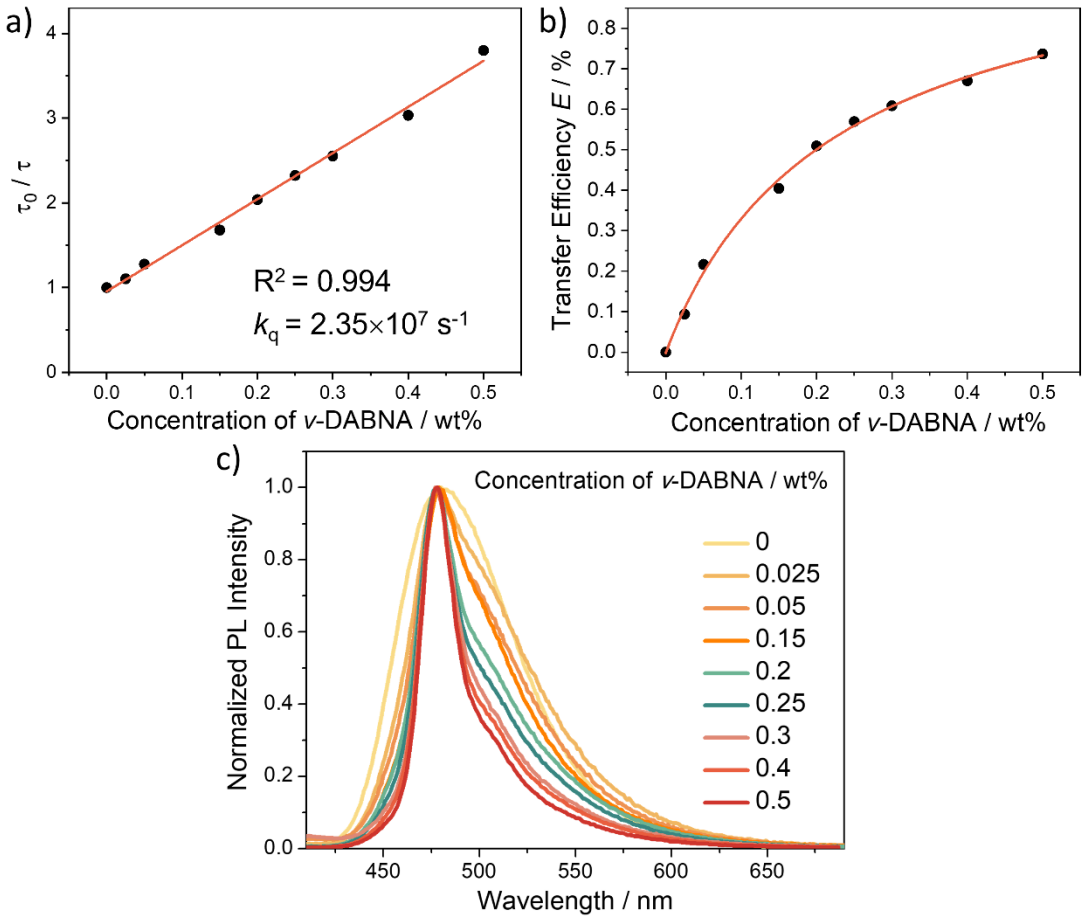


**Figure S4.** a) Stern-Volmer plot of the sensitized system PYD2:**Au-1**(10 wt%):*v*-DABNA (0–0.5 wt%). The emission lifetimes were measured at 450 nm. The straight line is a linear fit to the data. b) the plot of transfer efficiency versus the concentration of *v*-DABNA. c) normalized emission spectra of **Au-1** (10 wt%) doped in PYD2 and the sensitized systems with different concentration of *v*-DABNA.

**Table S1**. Photophysical properties and corresponding energy transfer parameters of **Au-1**.

| sensitizer | $\lambda_{em}$ [nm] | $\Phi_{PL}$ [%] | $\tau$ [μs] | $k_r$ [$s^{-1}$] | HOMO/LUMO [eV] | $R_0/R_{hg}$ [nm] | $k_{ET}$ [$s^{-1}$] | $\Phi_{ET}$ [%] |
|---|---|---|---|---|---|---|---|---|
| **Au-1** | 480 | 28 | 0.52 | $5.38\times10^5$ | −5.16/−2.67 | 2.81/1.92 | $1.89\times10^7$ | 91 |

[a] The PL data of **Au-1** were recorded in PYD2 thin films (10 wt%); HOMO and LUMO energy levels were estimated according to the CV data measured in DMF.

**Table S2.** Key performances of SP-OLEDs studied in this work.

| Concentration of **Au-1**: *v*-DABNA | $L_{max}$[a] (cd $m^{-2}$) | $CE_{max}$[b] (cd $A^{-2}$) | $PE_{max}$[c] (lm $W^{-1}$) | $EQE_{max}$[d] (%) | $EQE_{1000}$[e] (%) | Roll-offs[f] (%) | CIE[g] (x, y) | $\lambda_{max}$ (nm) | FWHM[h] (nm) |
|---|---|---|---|---|---|---|---|---|---|
| 0: 0.5 wt% | 1900 | 6.31 | 4.41 | 7.51 | 6.41 | 14.6 | 0.12, 0.11 | 470 | 18 |
| 0: 1 wt% | 1900 | 8.07 | 5.67 | 8.60 | 5.96 | 30.7 | 0.12, 0.12 | 471 | 18 |
| 0: 2 wt% | 3300 | 7.09 | 4.94 | 7.30 | 5.83 | 20.1 | 0.12, 0.13 | 472 | 18 |
| 10 wt%: 0 | 7800 | 23.9 | 18.7 | 12.9 | 8.98 | 30.4 | 0.16, 0.25 | 473 | 68 |
| 10 wt%: 0.5 wt% | 7430 | 22.5 | 17.9 | 16.6 | 14.4 | 13.3 | 0.14, 0.18 | 472 | 23 |
| 10 wt%: 1 wt% | 5620 | 19.7 | 14.0 | 15.3 | 12.7 | 17.0 | 0.13, 0.17 | 472 | 22 |
| 10 wt%: 2 wt% | 4370 | 13.8 | 9.35 | 11.6 | 10.2 | 12.1 | 0.12, 0.17 | 474 | 21 |
| 5 wt%: 2 wt% | 4200 | 9.82 | 7.27 | 8.64 | 7.66 | 11.3 | 0.12, 0.17 | 475 | 20 |
| 6 wt%: 0.5 wt% | 4560 | 14.8 | 10.4 | 13.7 | 12.1 | 11.7 | 0.12, 0.17 | 472 | 20 |

[a] Maximum luminance; [b] maximum current efficiency; [c] maximum power efficiency; [d] maximum external quantum efficiency; [e] external quantum efficiency at 1000 cd $m^{-2}$; [f] efficiency roll-offs were calculated based on the formula of $\frac{EQE_{max}-EQE_{1000}}{EQE_{max}}\times100$; [g] CIE coordinates at 1000 cd $m^{-2}$; [h] full width at half maximum.

**Table S3.** Key performances of recently reported blue-emitting SP-OLEDs.

| Emitter type | $EQE_{max}$[a] (%) | $EQE_{1000}$[a] (%) | CIE[b] (x, y) | FWHM[c] (nm) | $\lambda_{max}$ (nm) | Reference |
|---|---|---|---|---|---|---|
| Hot-exciton | 7.06 | N/A | 0.15, 0.09 | 52 | 452 | 5 |
| TADF-polymer | 18.8 | 16.1 | 0.20, 0.31 | N/A | 469 | 6 |
| TADF | 10.7 | 7.25[d] | 0.21, 0.41 | N/A | 496 | 7 |
| TADF | 15.25 | 9.98 | 0.16, 0.25 | 68 | 473 | 8 |
| TADF | 9.90 | 1[e] | 0.17, 0.07 | 42 | 424 | 9 |
| TADF | 21.6 | 19.6 | 0.16, 0.30 | 76 | 478 | 10 |
| Fluorescence | 4.10 | N/A | 0.15, 0.09 | 62 | 440 | 11 |
| TADF | 15.8 | 12.0[d] | 0.16, 0.05 | 42 | 428 | 12 |
| TADF | 23.23 | 6[e] | 0.19, 0.36 | N/A | 492 | 13 |
| TADF | 10.1 | 2[e] | 0.16, 0.08 | 61 | 424 | 14 |
| TADF | 1.08 | N/A | 0.19, 0.19 | 32 | 464 | 15 |
| TADF | 11.0 | 7.4 | 0.15, 0.24 | 67 | 474 | 16 |
| TASF | 16.6 | 14.2 | 0.14, 0.18 | 23 | 472 | This work |

[a] External quantum efficiency; [b] CIE coordinates; [c] full width at half maximum; [d] at 500 cd $m^{-2}$; [e] estimated from the corresponding figures.