# Supporting Information

# High-Performance Organic Light-Emitting Diodes with Natural White Emission Based on Thermally Activated Delayed Fluorescence Emitters

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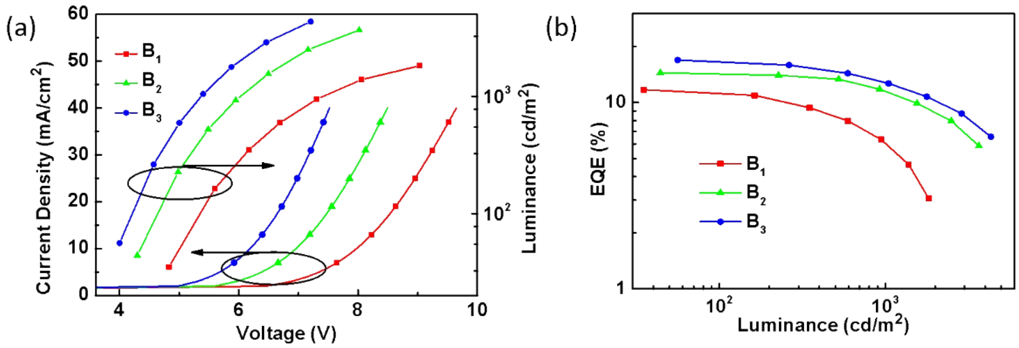

**Figure S1.** (a) Current density-voltage-luminance characteristics of devices B$_1$-B$_3$. (b) EQE-luminance characteristics of these devices.

**Table S1.** Summary of the blue device performance.

| Device | V$_{on}$ (V)$^a$ | Concentration | EQE$_{max}$ (%)$^b$ | PE$_{max}$ (lm/W)$^b$ | CE$_{max}$ (cd/A)$^b$ | CIE (X, Y)$^c$ |
|---|---|---|---|---|---|---|
| B$_1$ | 4.42 | 10% | 11.7 | 11.4 | 17.5 | (0.16, 0.20) |
| B$_2$ | 4.26 | 15% | 14.5 | 16.1 | 22.7 | (0.16, 0.21) |
| B$_3$ | 3.91 | 20% | 16.9 | 22.0 | 28.0 | (0.16, 0.22) |

$^a$V$_{on}$ is the voltage at 0.2 mA/cm$^2$, $^b$Maximum external quantum efficiency, maximum power efficiency and maximum current efficiency; $^c$Commission Internationale de L'Eclairage measured at 1000 cd/m$^2$.

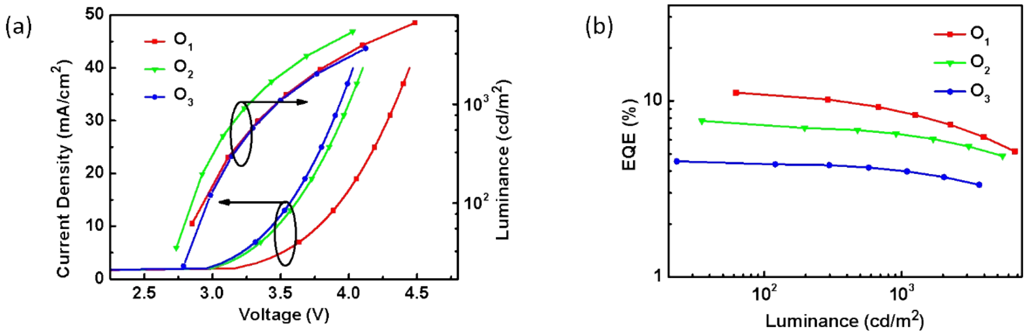

**Figure S2.** (a) Current density-voltage-luminance characteristics of devices O$_1$-O$_3$. (b) EQE-luminance characteristics of these devices

**Table S2.** Summary of the orange devices.

| Device | $V_{on}$ (V)[a] | Concentration | $EQE_{max}$ (%)[b] | $PE_{max}$ (lm/W)[b] | $CE_{max}$ (cd/A)[b] | CIE (X, Y)[c] |
|---|---|---|---|---|---|---|
| $O_1$ | 2.85 | 1% | 11.1 | 35.6 | 32.0 | (0.43, 0.47) |
| $O_2$ | 2.73 | 3% | 7.7 | 22.1 | 21.5 | (0.49, 0.49) |
| $O_3$ | 2.78 | 6% | 4.5 | 13.0 | 12.5 | (0.53, 0.47) |

[a] $V_{on}$ is the voltage at 0.2 mA/cm$^2$, [b] Maximum external quantum efficiency, maximum power efficiency and maximum current efficiency; [c] Commission Internationale de L'Eclairage measured at 1000 cd/m$^2$.

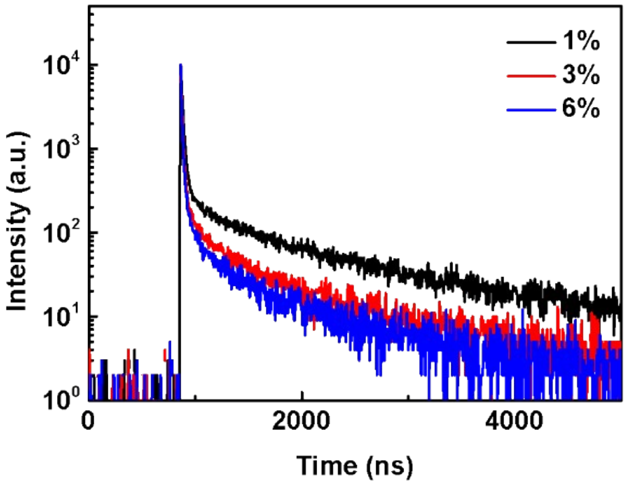

**Figure S3.** Transient photoluminescence decay curves of 4CzTPN-Ph doped in DMAC-DPS with doping concentrations of 1, 3, and 6 wt% measured at 470 nm with an excitation wavelength of 350 nm.

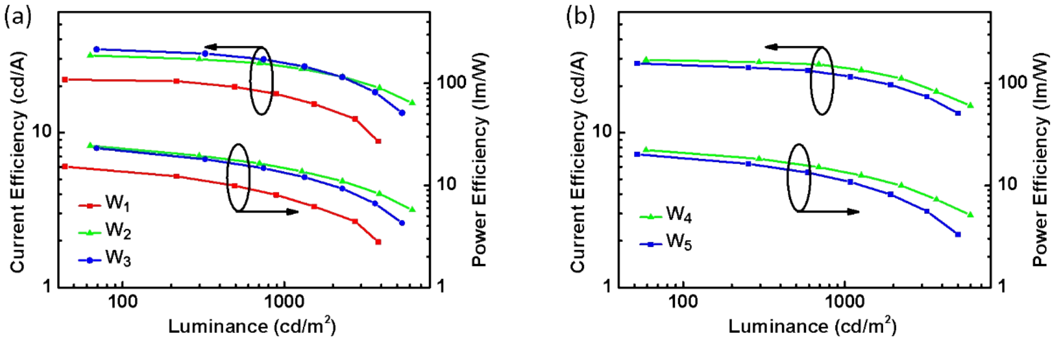

**Figure S4.** Current efficiency-luminance-power efficiency characteristics of devices: (a) $W_1$, $W_2$ and $W_3$. (b). $W_4$ and $W_5$.

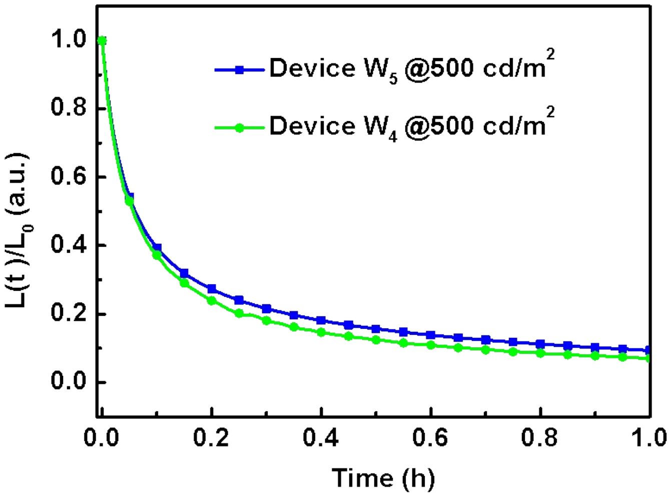

**Figure S5.** Devices lifetime of $W_4$ and $W_5$ at 500 cd/m$^2$.

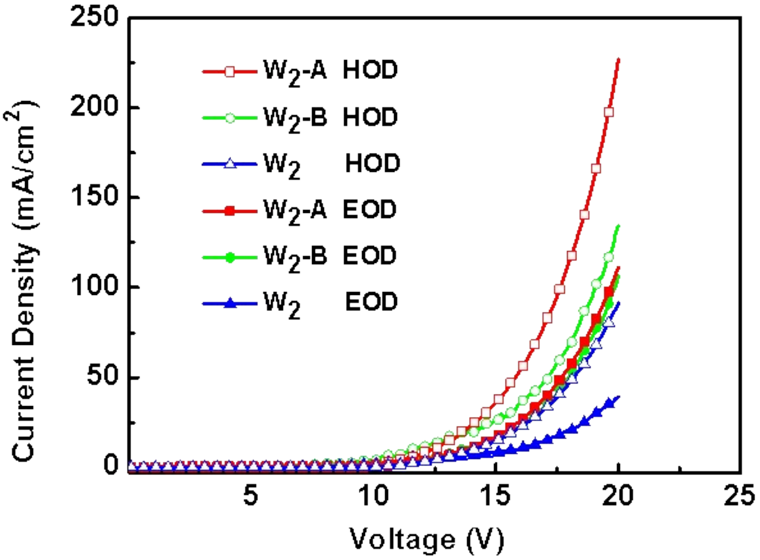

**Figure S6.** Current density-voltage characteristics of the hole-only devices (HOD) with the structure of ITO/HAT-CN (10 nm)/TAPC (40 nm)/EML (based on $W_5$, $W_5$-A and $W_5$-B)/TAPC (40 nm) /HAT-CN (10 nm)/Al (120 nm), and electron-only devices (EOD) with the structure of ITO/BPhen (40 nm)/EML (based on $W_5$, $W_5$-A and $W_5$-B)/ BPhen (40 nm) /Liq (2 nm)/Al (120 nm).

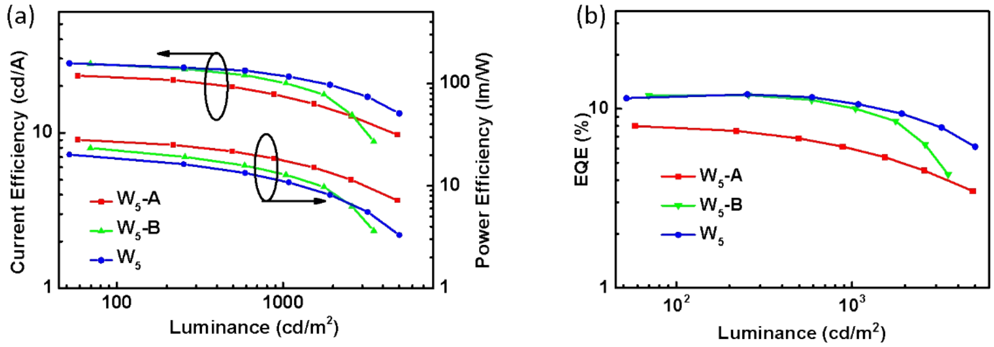

**Figure S7.** (a) Current efficiency-luminance-power efficiency characteristics of W$_5$-A, W$_5$-B and W$_5$. (b) EQE-luminance characteristics of the three device.