Supporting Information

High Efficiency Blue and Color-Stable Hybrid Warm White Organic Light-Emitting Diodes Based on a Thermally Activated Delayed Fluorescent Material as Assistant Host

Yuwen Chen, Qian Sun, Yanfeng Dai, Dezhi Yang, Xianfeng Qiao and Dongge Ma*

Institute of Polymer Optoelectronic Materials and Devices, Guangdong Provincial Key Laboratory of Luminescence from Molecular Aggregates , State Key Laboratory of Luminescent Materials and Devices, South China University of Technology, Guangzhou, Guangdong 510640, P. R. China

E-mail: msdgma@scut.edu.cn

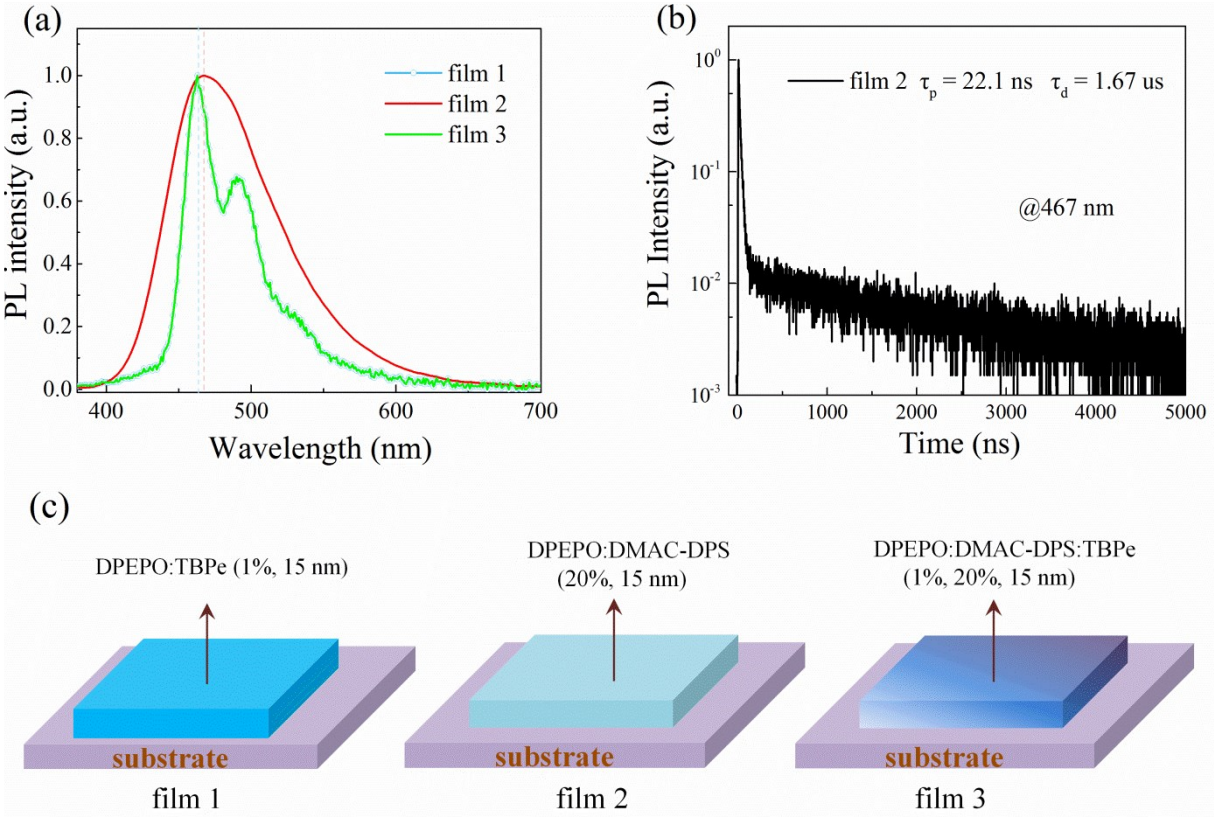

Fig. S1 (a) PL spectra of film 1: DPEPO:TBPe (1%, 15 nm), film 2: DPEPO:DMAC-DPS (20%, 15 nm) and film 3: DPEPO:DMAC-DPS:TBPe (1%, 20%, 15 nm). (b) Transient PL decay characteristic of film 2. (c) Structure diagrams of films 1–3.

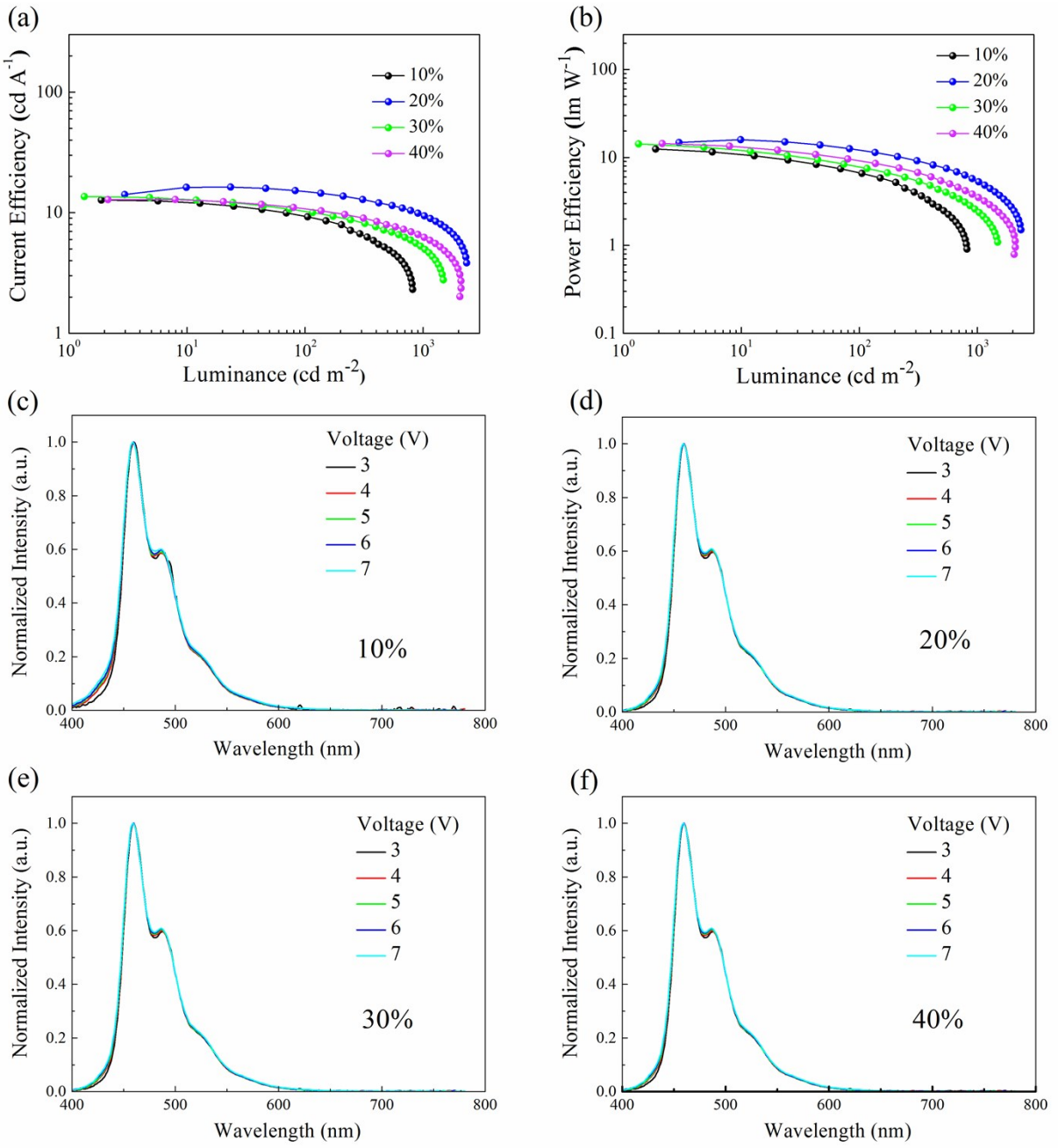

Fig. S2 (a) CE−L and (b) PE−L characteristics of devices B1−B4. Normalized EL spectra of devices (c) B1, (d) B2, (e) B3 and (f) B4 at different driving voltages.

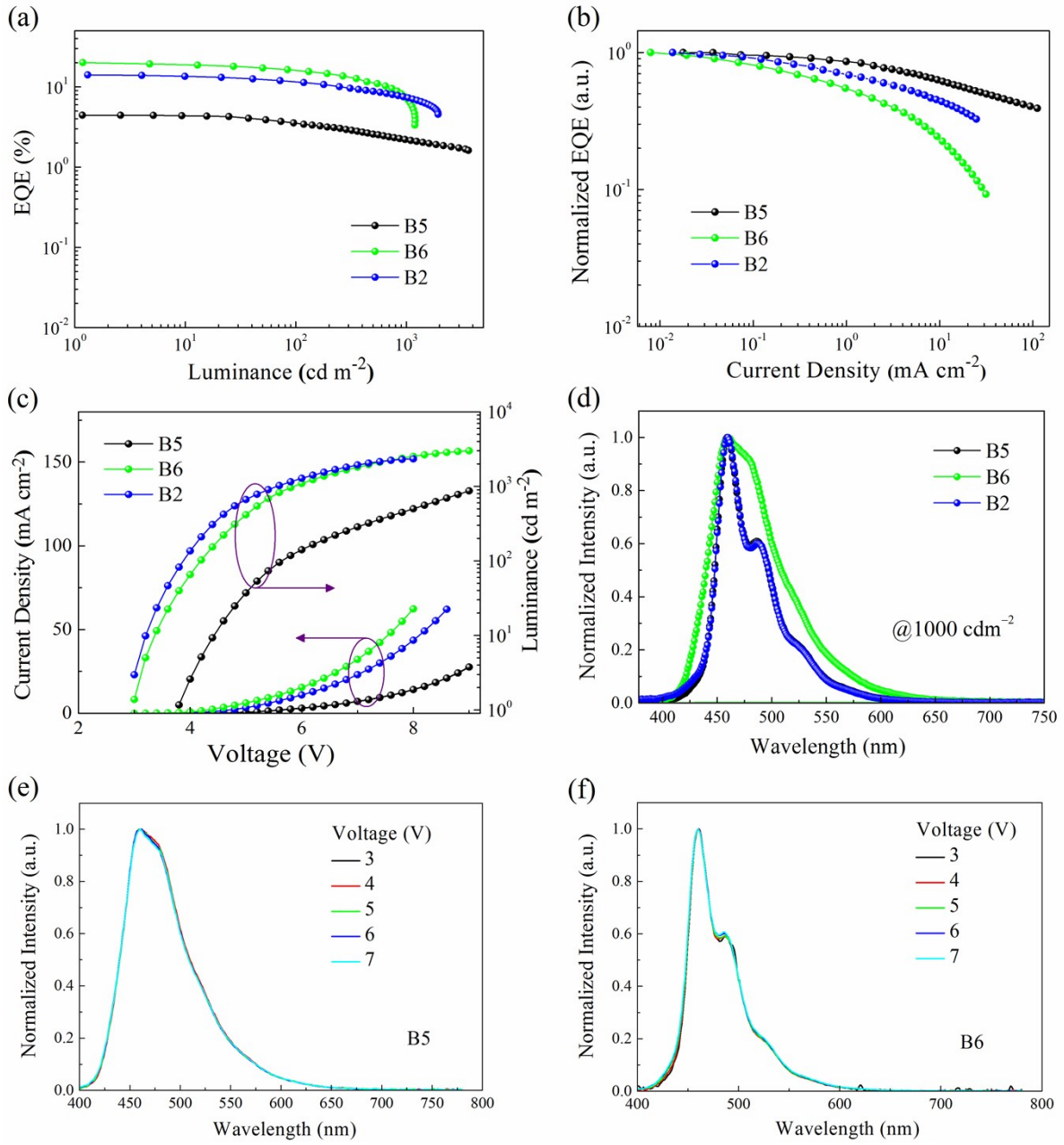

Fig. S3 (a) EQE−L, (b) Normalized EQE−J and (c) J−V−L characteristics of devices B2, B5 and B6. (d) Normalized EL spectra of devices B5 and B6 at 1000 cd m^{-2}. Normalized EL spectra of devices (e) B5 and (f) B6 at different driving voltages.

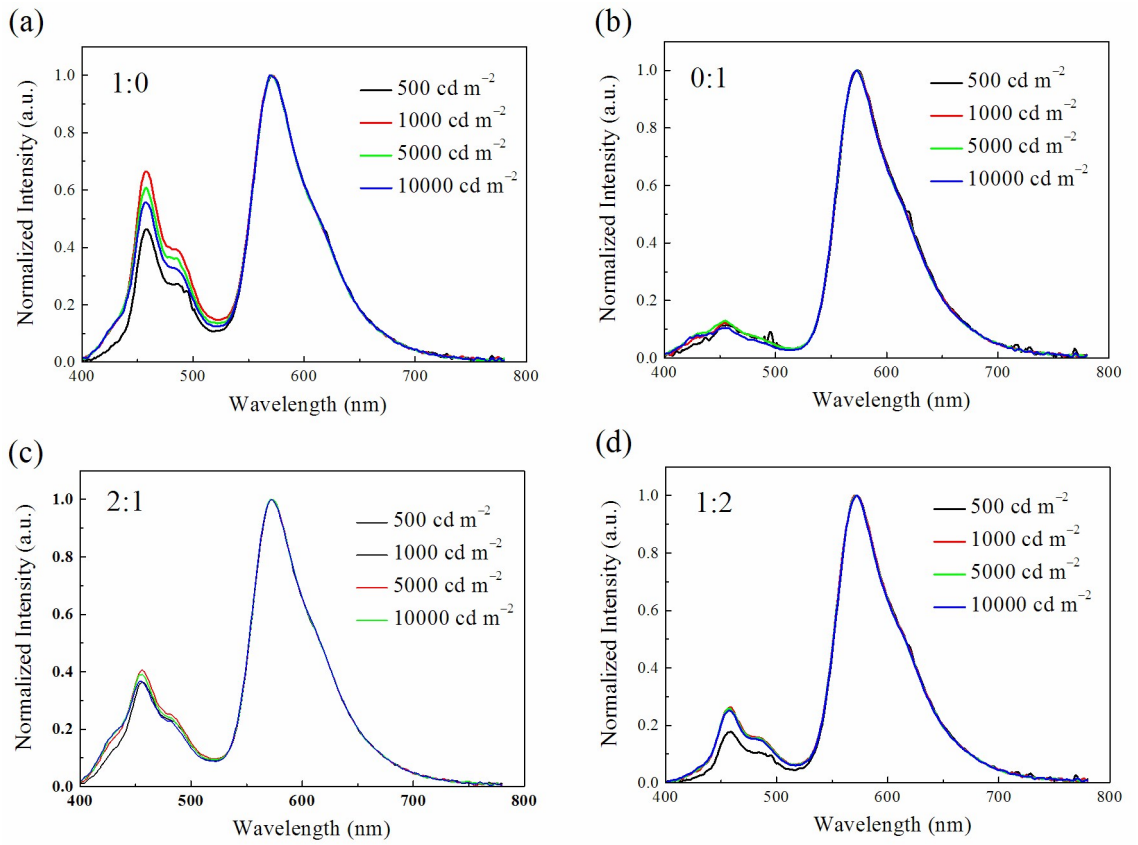

Fig. S4 Normalized EL spectra of devices (a) W1, (b) W2, (c) W4 and (d) W5 at different luminance.

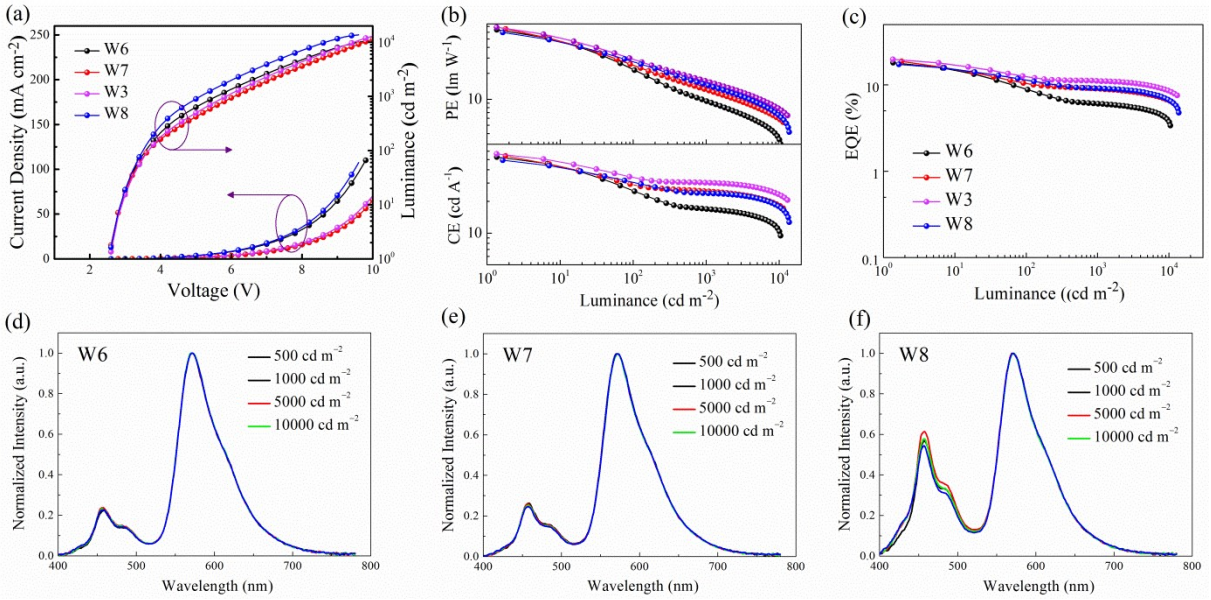

Fig. S5 (a) J–V–L, (b) CE-PE−L, and (c) EQE−L characteristics of device W3, W6–W8. Normalized EL spectra of devices (d) W6, (e) W7, and (f) W8 at different luminance.

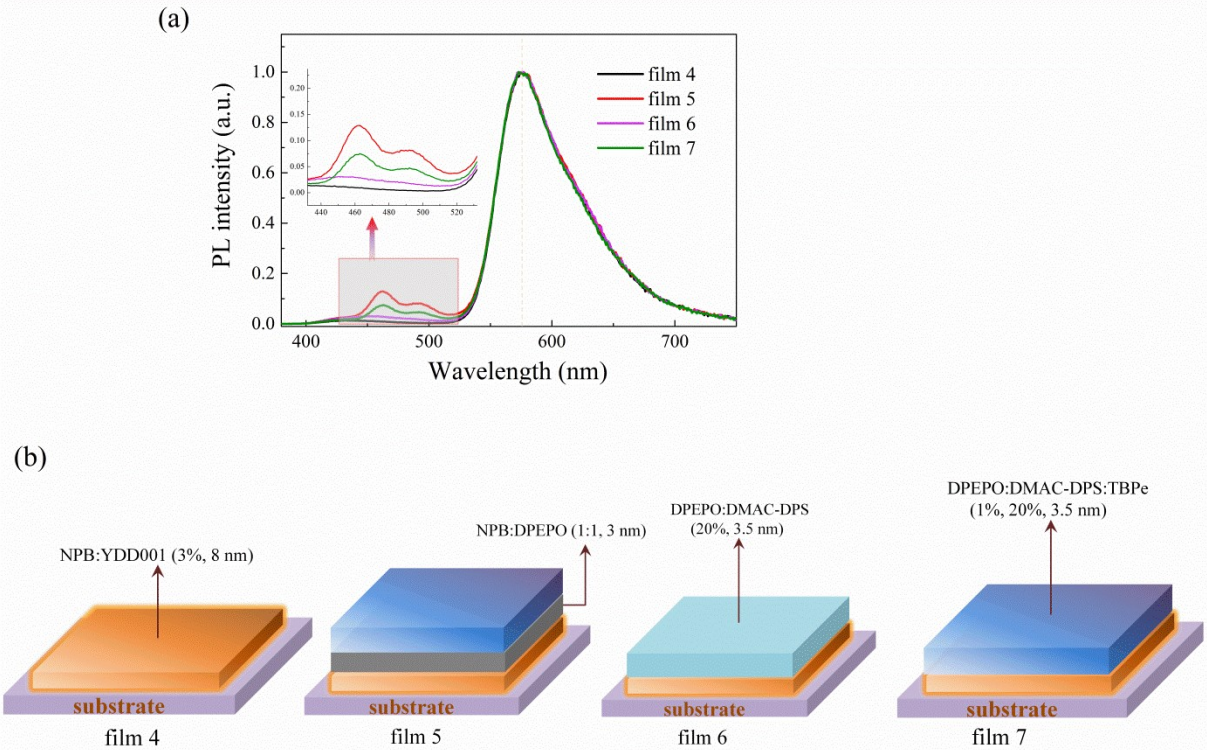

Fig. S6 (a) PL spectra of film 4: NPB:YDD001 (3%, 8 nm), film 5: NPB:YDD001 (3%, 8 nm)/NPB:DPEPO (1:1, 3 nm)/DPEPO:DMAC-DPS:TBPe (1%, 20%, 3.5 nm), film 6: NPB:YDD001 (3%, 8 nm)/DPEPO:DMAC-DPS (20%, 3.5 nm) and film 7: NPB:YDD001 (3%, 8 nm)/DPEPO:DMAC-DPS:TBPe (1%, 20%, 3.5 nm). (b) Structure diagrams of films 4–7.

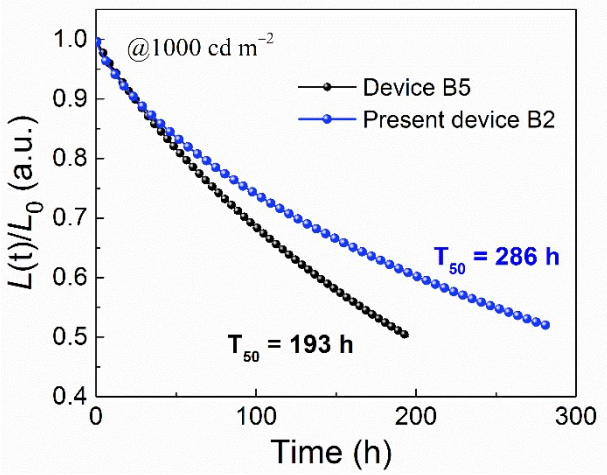

Fig. S7 Lifetime curves of the resulting Blue-OLEDs with and without TADF assistant host at an initial brightness of 1000 cd m^{-2} under constant current.

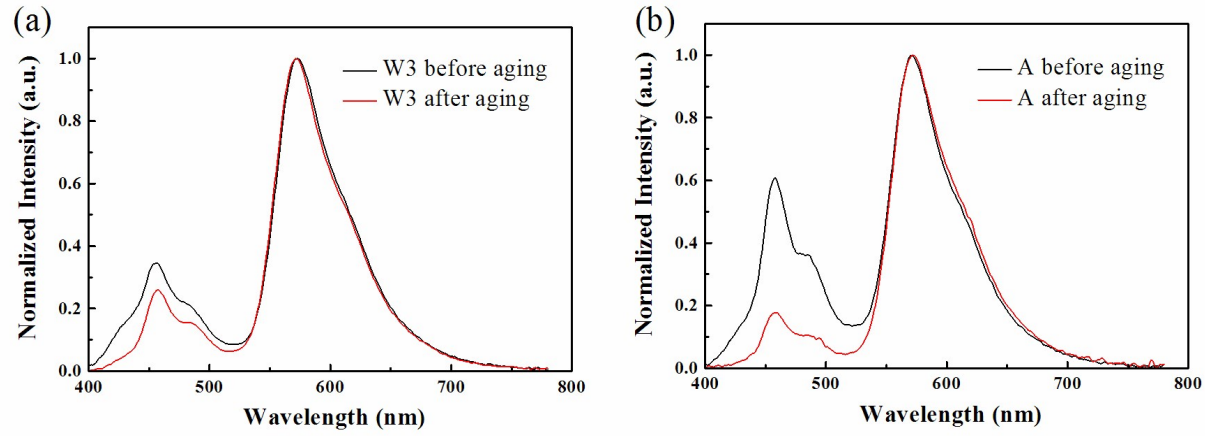

Fig. S8 EL spectra before and after accelerated aging of device W3 and A.

Table S1. Summary of EL performances of the fabricated hybrid WOLEDs.

Device	V_{on}[a] [V]	EQE[b] [%]	CE[b] [cd A^{-1}]	PE[b] [lm W^{-1}]	CRI[c]	CCT[c] [K]	CIE[c] (x, y)
W6	2.6	18.1/8.8/6.1	52.9/25.0/16.9	63.9/21.8/9.5	39	2880	(0.45,0.43)
W7	2.6	18.8/10.1/9.0	54.2/27.9/24.9	65.5/23.0/12.6	40	2900	(0.45,0.42)
W8	2.6	17.3/11.0/9.1	49.3/29.2/23.9	59.6/25.5/14.5	51	3695	(0.39,0.36)

[a] At a luminance of 1 cd m^{-2}, [b] Order of measured value: maximum, then values at 100 and 1000 cd m^{-2}, [c] Measured at 1000 cd m^{-2}.