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Supporting Information

High-Efficiency Exciplex-Based White Organic Light-Emitting Diodes with a New Tripodal Material as a Co-Host

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Experimental Section:

All the materials used in this work were purchased from Lumtec Company without further purification. ^{1}H NMR and ^{13}C NMR spectra were recorded on a Bruker 400 spectrometer and Agilent DD2-600MHz NMR spectrometer at room temperature. Matrix-Assisted Laser Desorption/ Ionization Time of Flight Mass Spectrometry (MALDI-TOF-MS) was acquired with a BRUKER ultrafleXtreme MALDI-TOF spectrometer. Ultraviolet-visible (UV-Vis) absorption spectra were obtained on a Hitachi U-3900 UV–Vis spectrophotometer. PL spectra and phosphorescent spectra were recorded on a Hitachi F-4600 fluorescence spectrophotometer. PL lifetime spectra was obtained on HAMAMATSU compact fluorescence lifetime spectrometer C11637. Thermogravimetric analysis (TGA) was performed on a TA SDT 2960 instrument at a heating rate of 10 ℃/min under nitrogen. Differential scanning calorimetry (DSC) was performed on a TA DSC 2010 unit at a heating rate of 10 ℃/min under nitrogen. Cyclic voltammetry (CV) was carried out on a CHI600 voltammetric analyzer at room temperature with ferrocenium-ferrocene (Fc+/Fc) as the internal standard. A conventional three-electrode configuration consisting of a Pt-wire counter electrode, an Ag/AgCl reference electrode, and a platinum working electrode was used. The oxidative scans were performed at a scan rate of 0.05 V/s. Degassed DCM was used as solvent for oxidation scan with tetrabutylammonium hexafluorophosphate (TBAPF6) (0.1 M) as the supporting electrolyte.

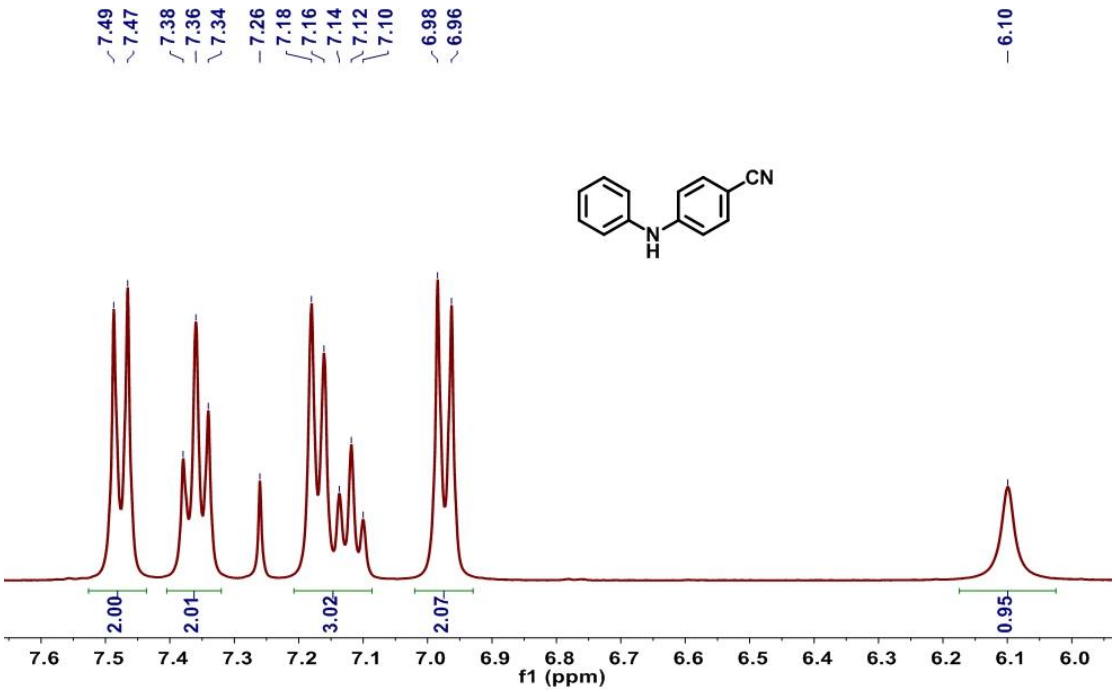

Fig. S1 ^{1}H NMR spectrum of 4-(phenylamino)benzonitrile (400 MHz, $CDCl_3$)

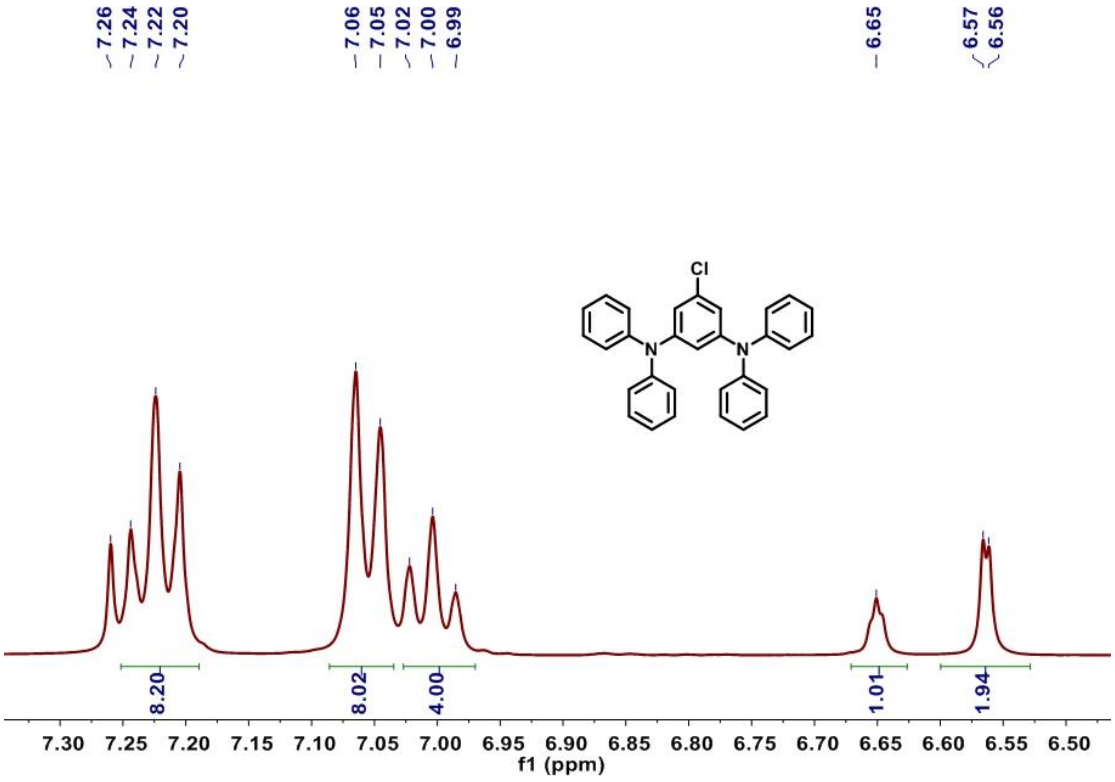

Fig. S2 ^{1}H NMR spectrum of 5-chloro-N1,N1,N3,N3-tetraphenylbenzene-1,3-diamine (400 MHz, $CDCl_3$)

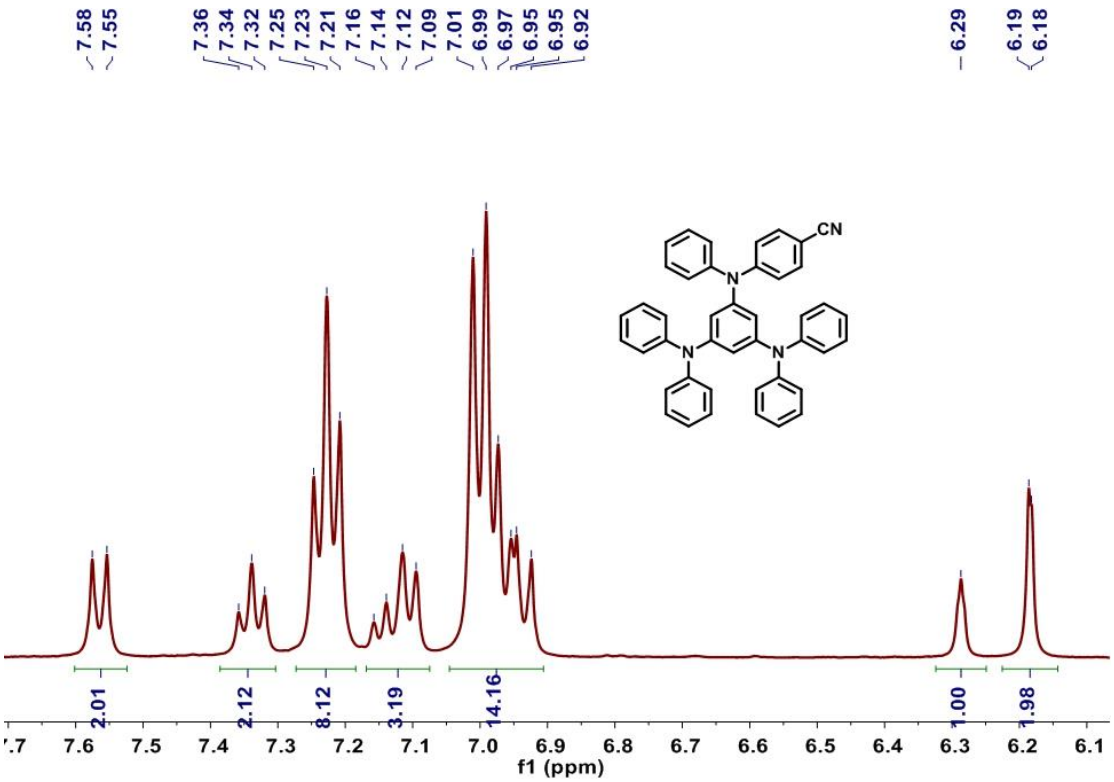

Fig. S3 [1]H NMR spectrum of 4-((3,5-bis(diphenylamino)phenyl)(phenyl)amino)benzonitrile (400 MHz, DMSO)

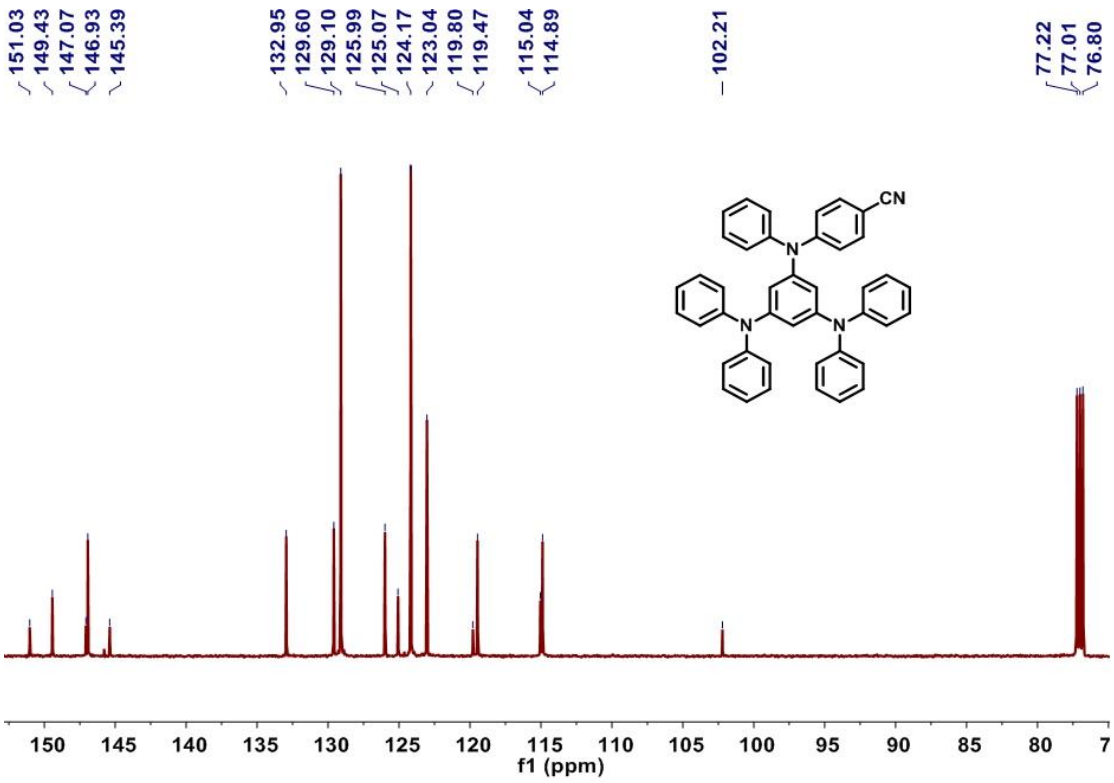

Fig. S4 [13]C NMR spectrum of 4-((3,5-bis(diphenylamino)phenyl)(phenyl)amino)benzonitrile (400 MHz, $CDCl_3$)

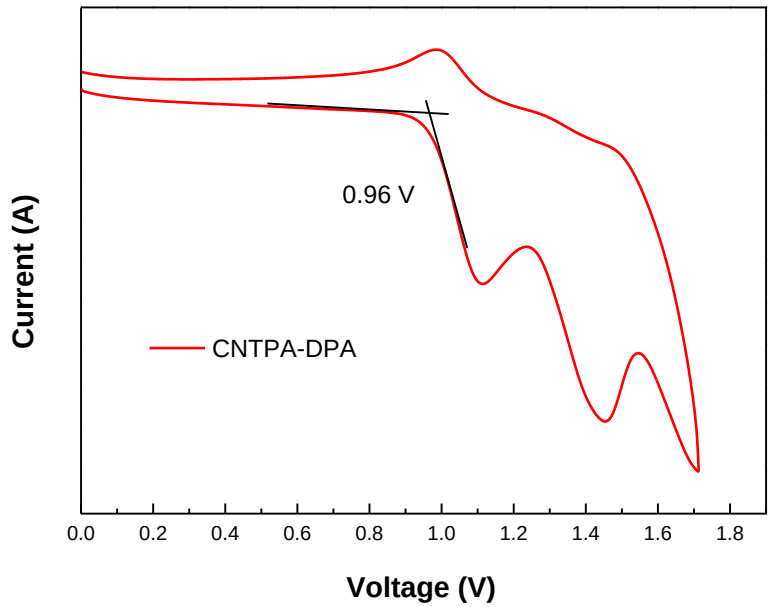

Fig. S5 Cyclic voltammogram of CNTPA-DPA

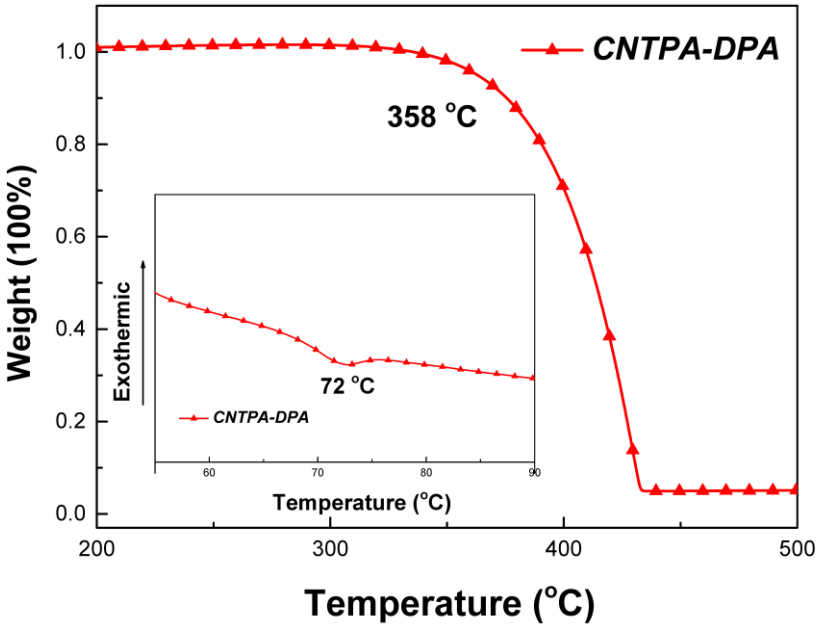

Fig. S6 DSC traces and TGA curves of CNTPA-DPA recorded at a heating rate of 10 °C min^{-1}.

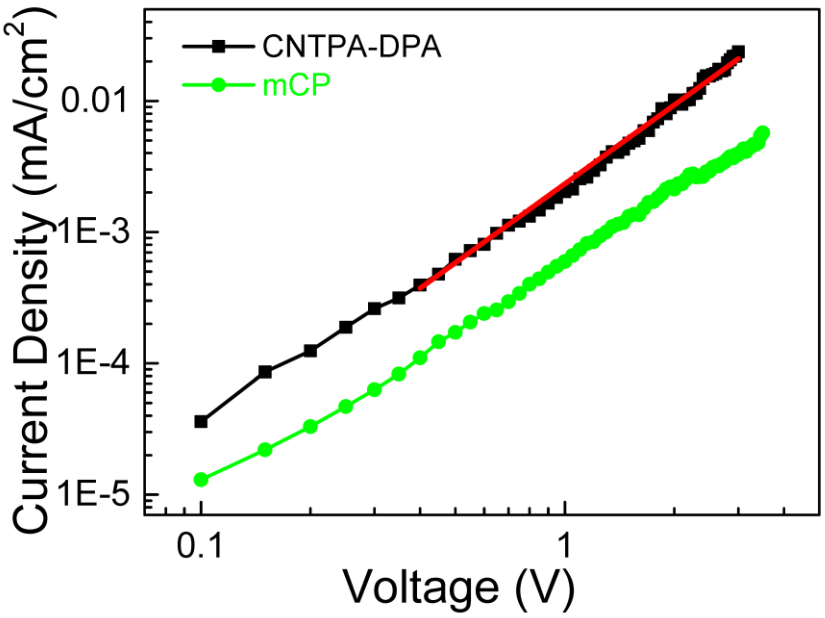

Fig. S7 Current density versus voltage curves of hole-only devices for CNTPA-DPA and mCP. (ITO/HAT-CN (10 nm)/CNTPA-DPA or mCP (100 nm)/HAT-CN (10 nm)/Al (120 nm)).

Table S1 Physical properties of CNTPA-DPA.

Compounds	T_g [°C]	T_d [°C]	S_1 [eV]	T_1 [eV]	ΔE_{ST} [eV]	HOMO [eV]	LUMO [eV]	E_g [eV]
CNTPA-DPA	72	358	3.01	2.74	0.27	-5.76	-2.49	3.27

(E_g = energy gap calculated from the onset absorption wavelength; HOMO estimated by cyclic voltammetry, LUMO deduced from E_g and HOMO; T_d = temperature for 5% weight loss; T_g = glass-transition temperature.)

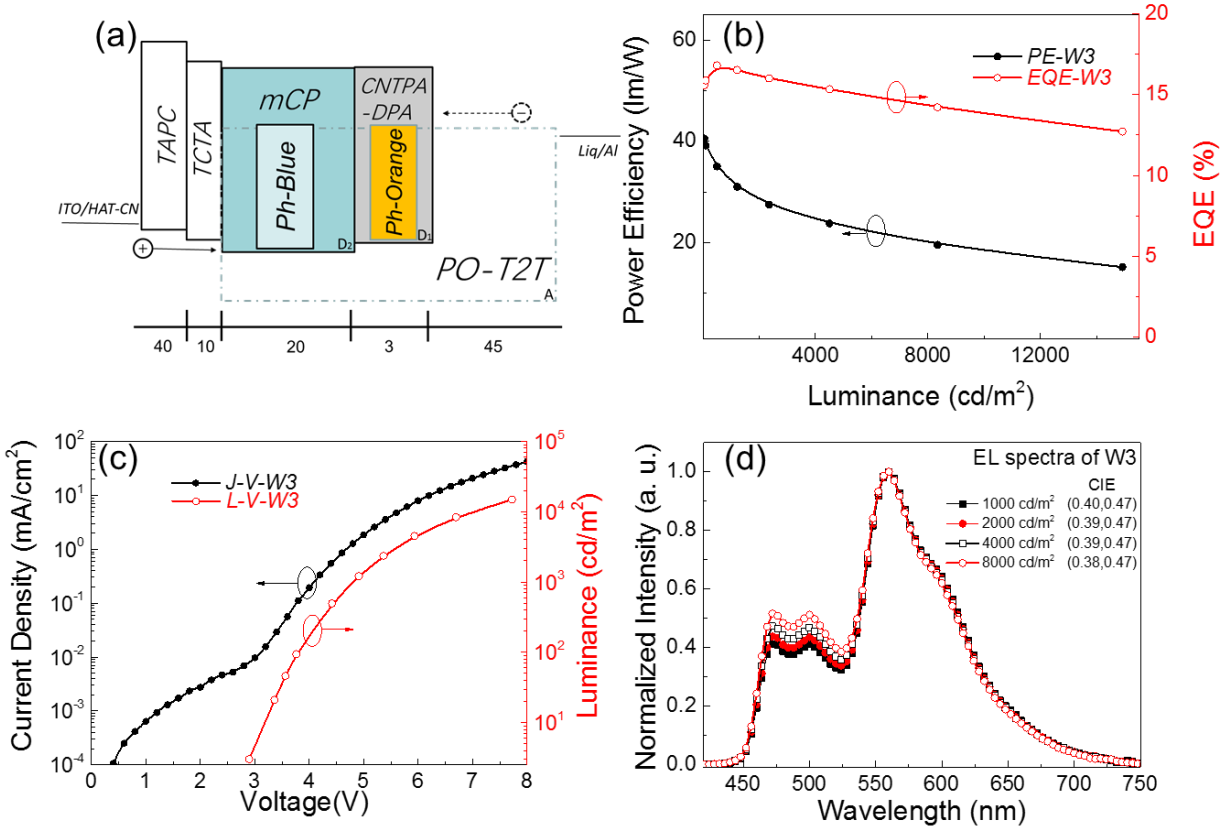

Fig. S8 EL characteristics of Device W3. (a) Schematic diagram of W3 structure. (b) PE-Luminance-EQE (PE-*L*-EQE) curves of W3. (c) CE-Voltage-Luminance (CE-*V*-*L*) curves of W3. (d) Normalized EL spectra at various luminance of 1000, 2000, 4000 and 8000 cd m^{-2} and the corresponding CIE values of W3.

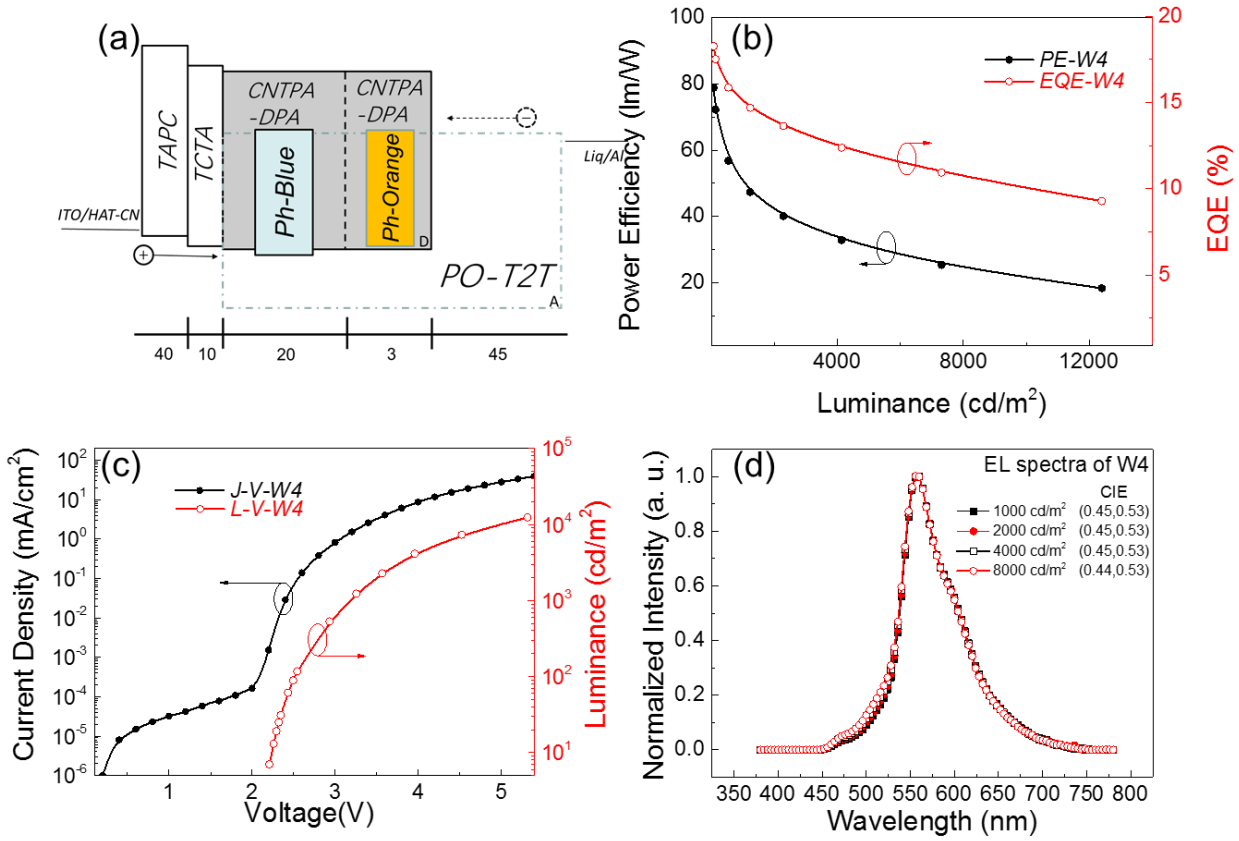

Fig. S9 EL characteristics of Device W4. (a) Schematic diagram of W3 structure. (b) PE-Luminance-EQE (PE-*L*-EQE) curves of W4. (c) CE-Voltage-Luminance (CE-*V*-*L*) curves of W4. (d) Normalized EL spectra at various luminance of 1000, 2000, 4000 and 8000 cd m^{-2} and the corresponding CIE values of W4.

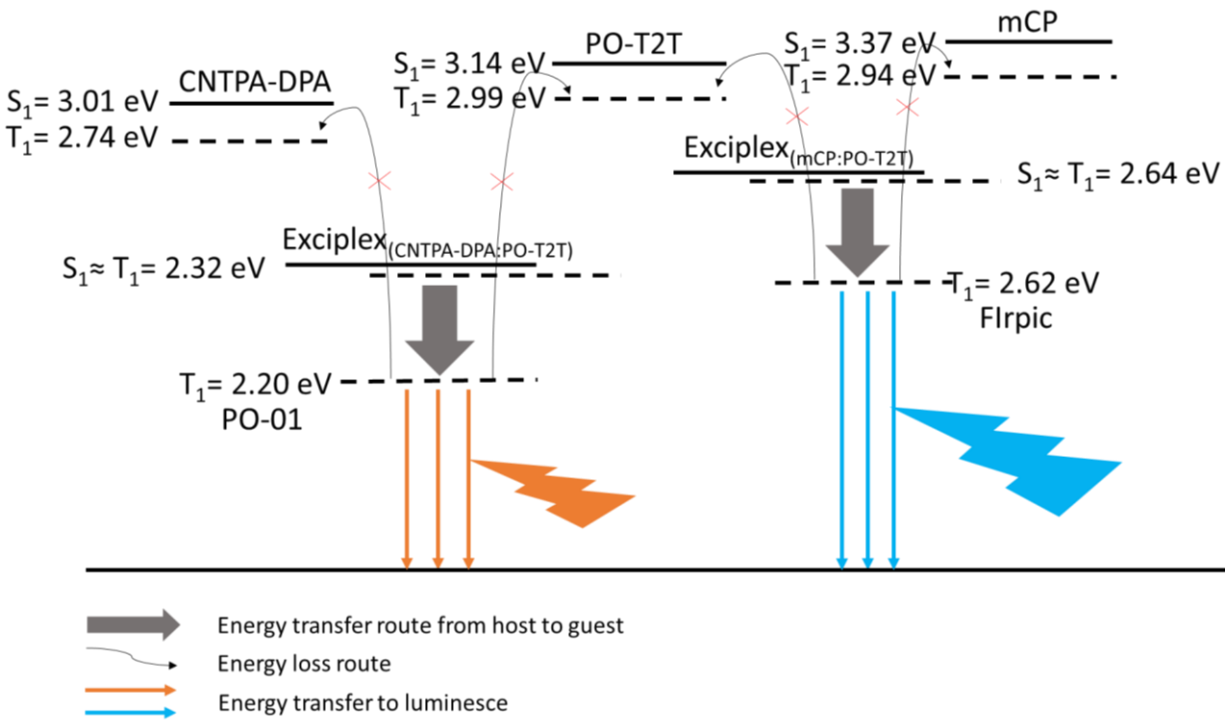

Fig. S10 Schematic diagram of the exciton energy transfer or loss process of MEHs system.

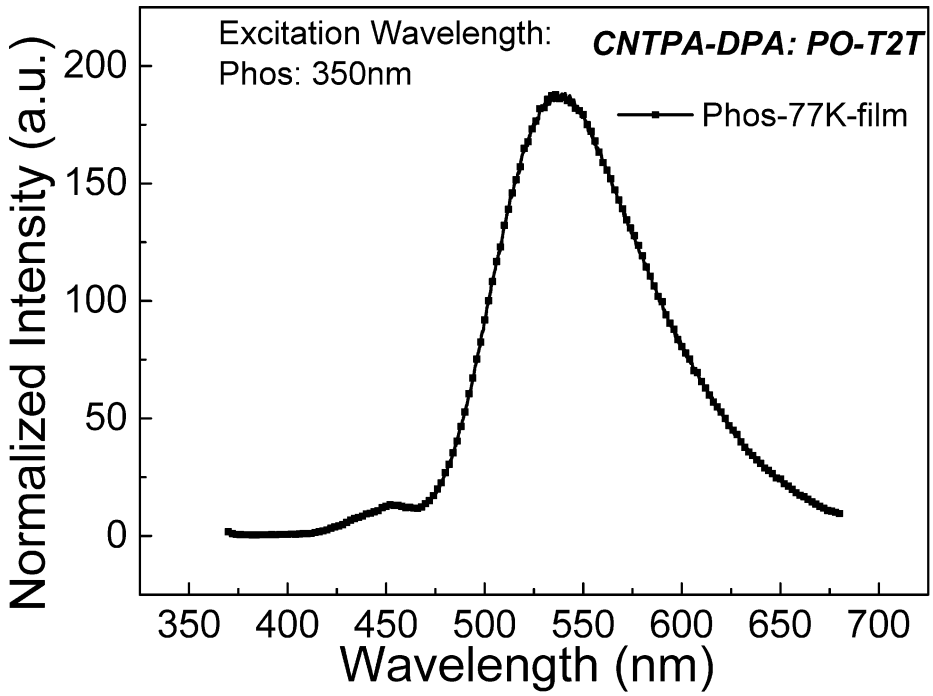

Fig. S11 Phosphorescence (77 K) spectra of CNTPA-DPA: PO-T2T solid film.