

Supporting Information

Unravelling Electroplex Emission from Long-range Charge Transfer Based on a Phosphorescent Dendrimer as the Electron Donor

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Experimental Section

General information: Iridium dendrimer (P2G2) and the TADF host m-ACSO₂ were synthesized in our lab according to the literature. PEDOT:PSS and PSSA were purchased from Heraeus and Sigma-Aldrich. The electron transporting materials including DPEPO, TmPyPB, TPBi were purchased from Luminescence Technology Corporation (Taiwan). The electron injecting material Liq was purchased from Xi'an Polymer Light Technology Corp.

The PL and UV absorption spectra were measured by a Hitachi F-4600 fluorescence spectrophotometer and Shimadzu UV-2700 UV-VIS spectrophotometer, respectively. The transient PL spectrum was measured by Edinburgh Instruments (FLS920) with a Picosecond Pulsed UV-LASTER (LASTER377) as the excitation source. The transient EL decay was measured by Paios 4.0 (Fluxim, Switzerland) under the mode of the square-wave voltage pulses.

OLED fabrication: The pre-patterned ITO glass substrates were cleaned with acetone and ethanol ultrasonic bath continuously. Afterwards, the substrates were dried with N₂ and loaded into a UV-ozone chamber for 20 min. A layer of 45 nm-thick modified PEDOT:PSS

(m-PEDOT:PSS) was spin-coated onto the ITO substrate, and then annealed at 120 °C for 10 min. The 50 nm-thick dendrimer P2G2 was also prepared by spin-coating directly on m-PEDOT:PSS, following a 90 °C annealing for 10 min. The other organic layers were thermally evaporated in a high vacuum chamber. All the devices were encapsulated with UV-curable resin. The voltage-current-luminance characteristics and the EL spectra were simultaneously measured with a PR735 SpectraScan Spectroradiometer and a Keithley 2400 source meter unit under ambient atmosphere at room temperature.

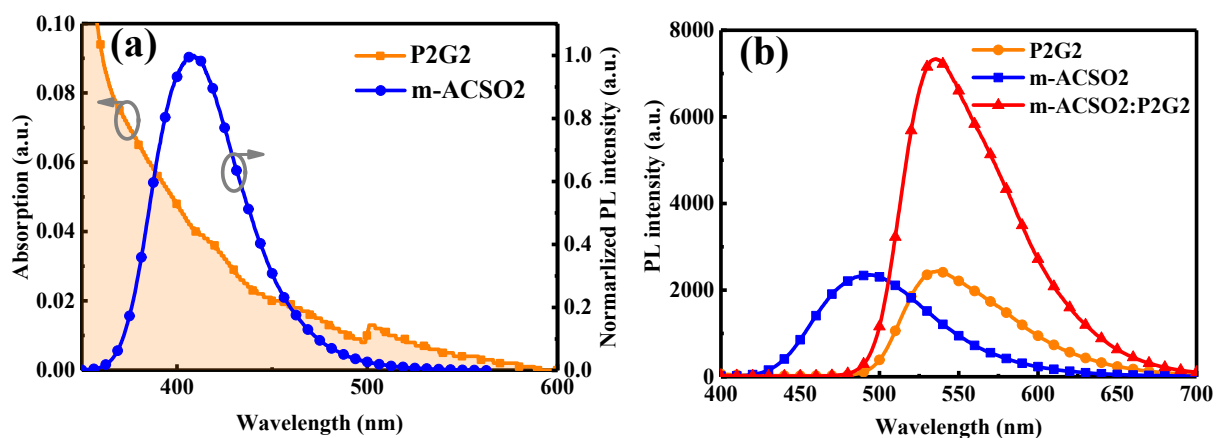


Figure S1. (a) The overlapping of the absorption of the P2G2 film and the PL spectrum of m-ACSO2. (b) PL intensity of m-ACSO2, P2G2 and m-ACSO2:P2G2 = 30:70 films prepared at the same condition. The thicknesses of these films are kept the same.

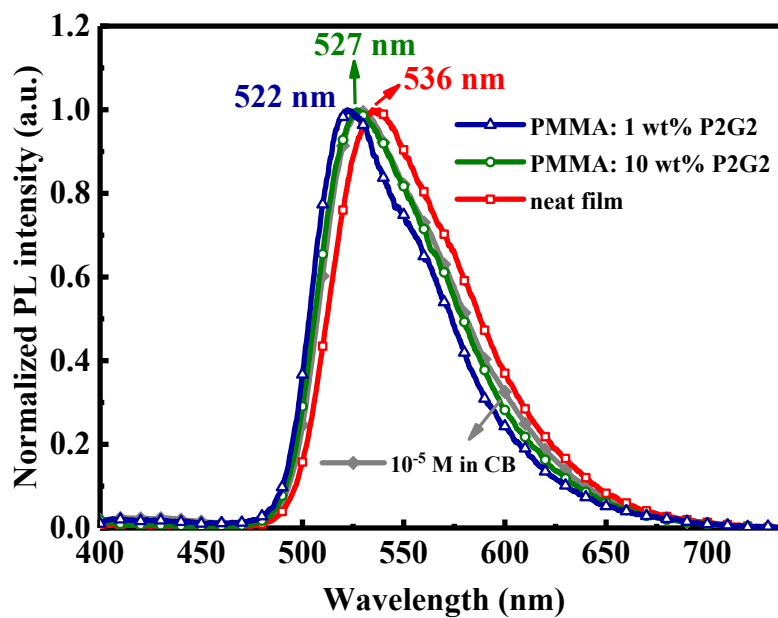


Figure S2. Normalized PL spectra of P2G2 in chlorobenzene solution (10^{-5} M) and PMMA films (1 wt.% and 10 wt.%). The emission of the neat P2G2 film and the EL spectrum of the device with neat P2G2 (the device 1) were added for better comparison.

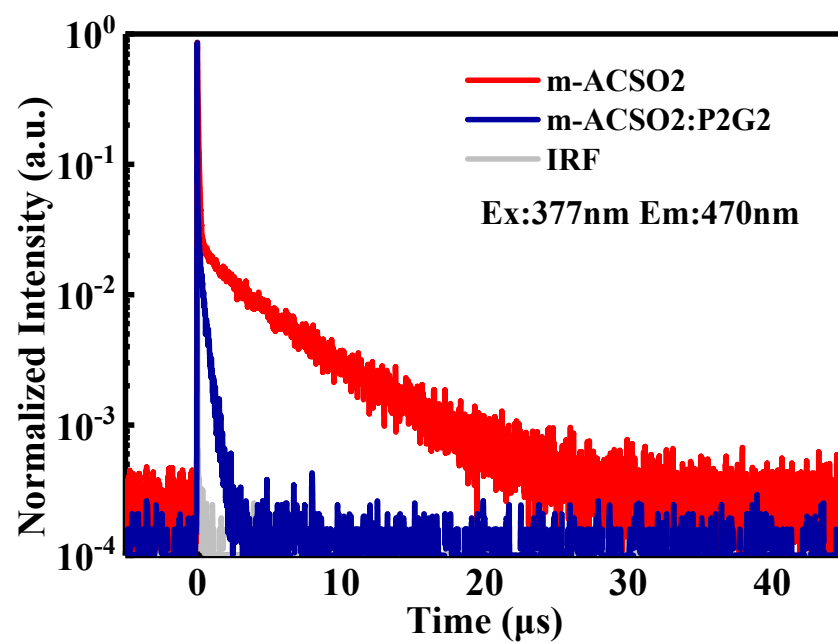


Figure S3. The PL transient decays of m-ACSO2 and m-ACSO2:P2G2 films observed at 470 nm.

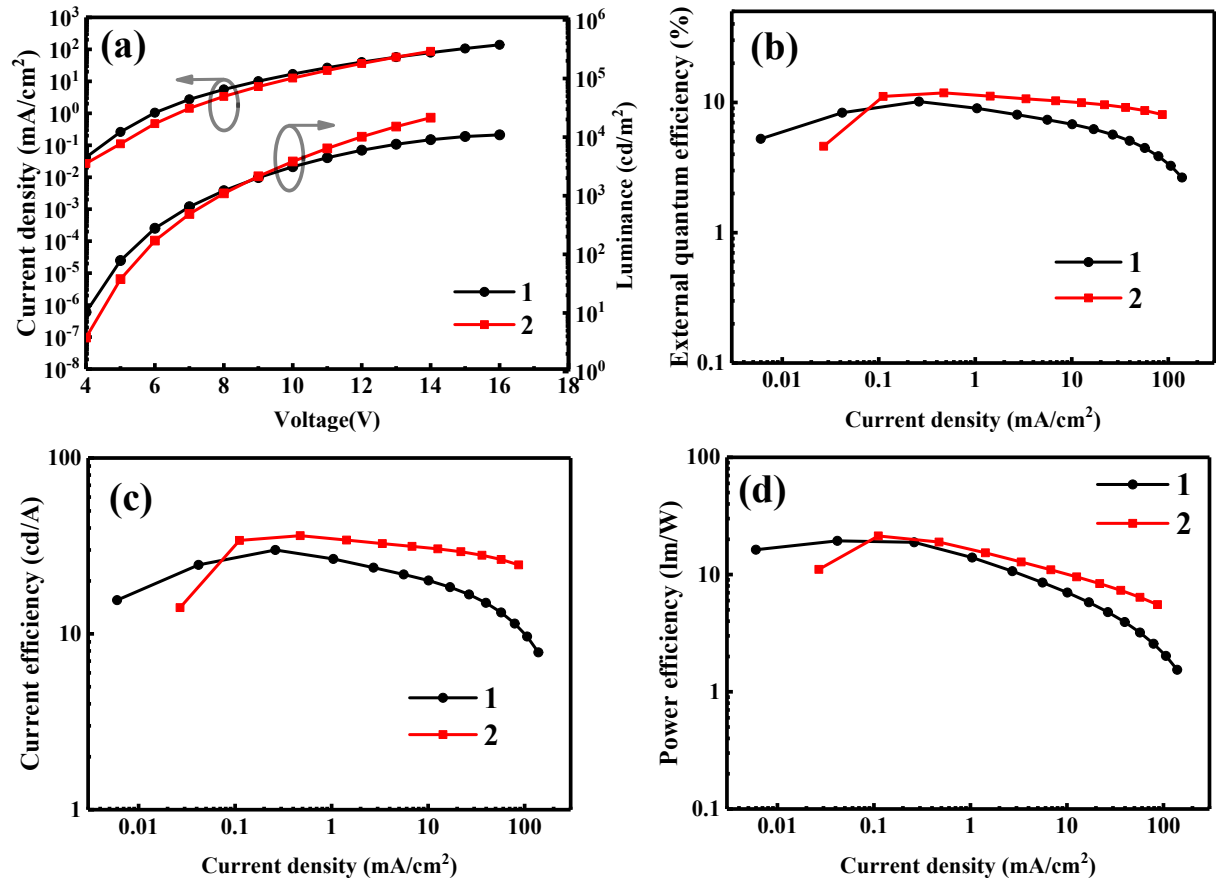


Figure S4. (a) Current density - voltage - luminance, (b) external quantum efficiency - current density, (c) current efficiency - current density and (d) power efficiency - current density curves of the devices 1 and 2.

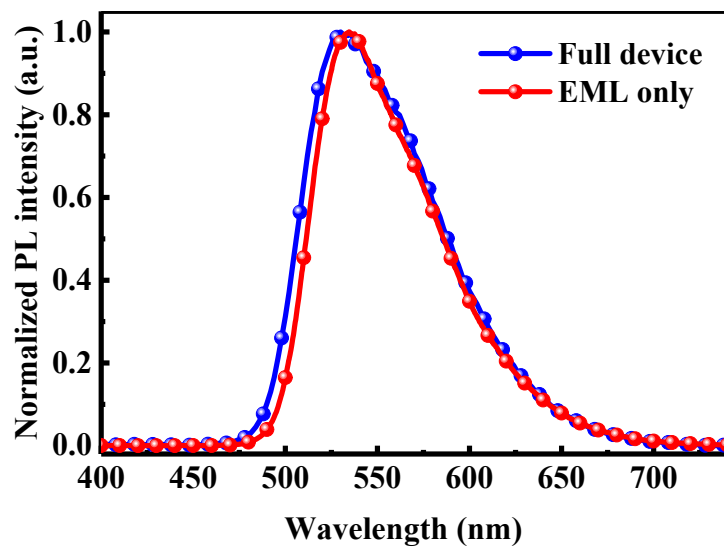


Figure S5. Normalized PL spectra from the emissive area of the device 2 without any bias and the identical spin-coated doped film (m-ACSO₂:P2G2 = 30:70, weight ratio).

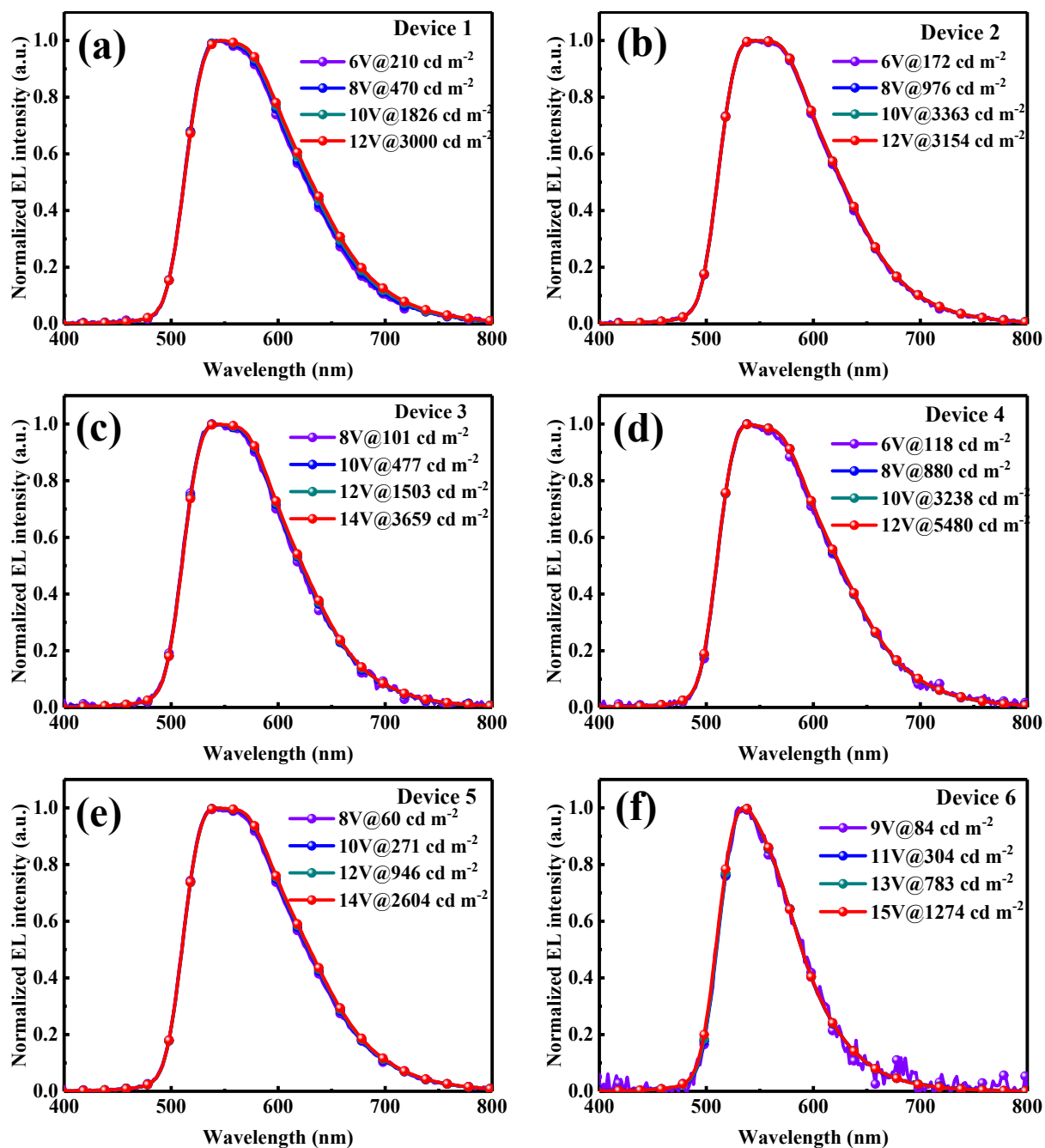


Figure S6. Normalized EL spectra of the devices 1-6 at different voltages.

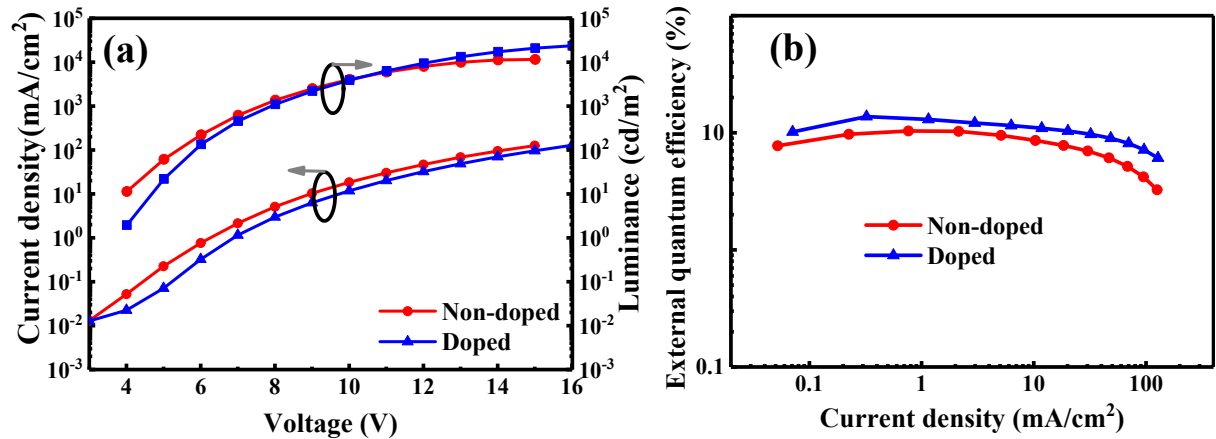


Figure S7. (a) Current density - voltage - luminance and (b) external quantum efficiency

- current density curves of the devices 8 and 9.

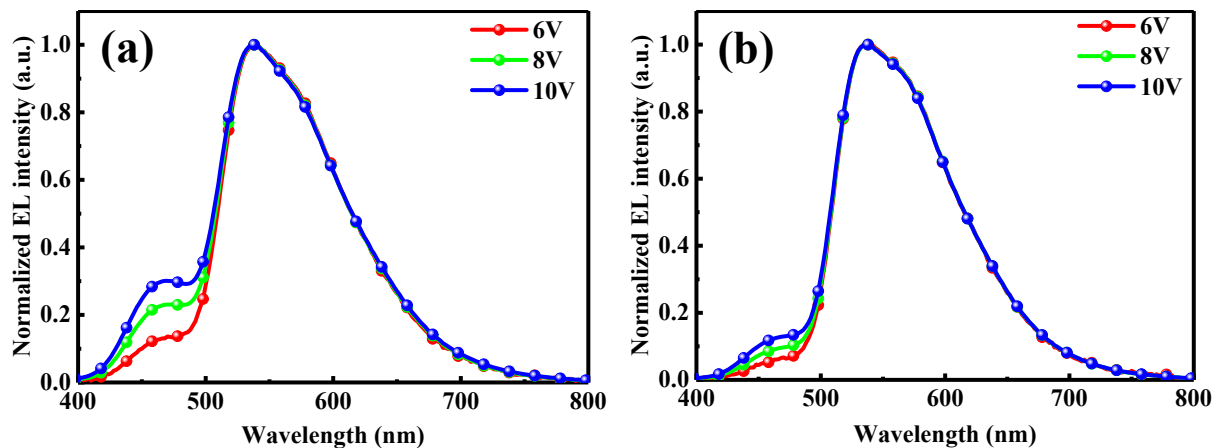


Figure S8. Normalized EL spectra of the warm-white devices with the non-doped (a, the device 8) and doped (b, the device 9) EMLs.

Table S1. EL performances of the warm-white devices

Device	EML1 (EL contribution)	EML2	Maximum ^a	FWHM (nm)	CIE ^b (x, y)
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(EL contribution)			EQE, CE, PE		
8	P2G2	mono-DMACDPS	10.3, 29.0, 13.0	109	(0.37, 0.48)
	(89%)	(11%)			
9	m-ACSO ₂ :P2G2 = 30:70	mono-DMACDPS	13.7, 41.8, 21.9	113	(0.39, 0.52)
	(83%)	(17%)			

^aThe maximum efficiencies of EQE (%), current efficiency (CE) (cd A⁻¹) and power efficiency (PE) (lm W⁻¹)