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## **Supporting Information**

Color tuning of the dibenzo[a,c]phenazine-2,7-dicarbonitrile derived thermally activated delayed fluorescence emitters from yellow to deep-red

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**Table S2.** Electroluminescence performance of the tCz-BPCN, Ac-BPCN and DACz-BPCNemitter doped (5%) TADF-OLEDs.

#### **General Information**

4,5-Difluorobenzene-1,2-diamine 3,6-di-tert-butylcarbazol, 9,9-dimethyl-9,10-dihydroacridine, and N3,N3,N6,N6-tetraphenyl-9H-carbazole-3,6-diamine were purchased from P&H tech.. Sodium hydride (NaH) was purchased from Tokyo Chemical Industry (TCI) Ltd. Copper cyanide (CuCN) was purchased from Alfa Aesar. *N*,*N* dimethyl formamide (DMF) and acetic acid were obtained from Duksan Sci. Co. All these chemicals were used without further purification. Column chromatography (Silica Gel 60, 230–400 mesh, Merck) and sublimation (10<sup>-3</sup> Torr at 300 °C) purification processes were used to obtain highly pure final materials for OLED device study.

The ultraviolet–visible (UV–vis) spectra were obtained using a UV–vis spectrophotometer (JASCO, Easton, MD; V-730), and the photoluminescence (PL) spectra were recorded on a fluorescence spectrophotometer (PerkinElmer, Waltham, MA; LS55). CV measurement was carried out in dichloromethane solution with scan rate at 100 mV/s. The glassy carbon, platinum wire and Ag/AgCl were used as working, counter and reference electrodes respectively. Internal standard was ferrocenium/ferrocene couple and supporting electrolyte was 0.1 M tetrabutylammonium perchlorate (TBAClO<sub>4</sub>). Absolute photoluminescence quantum yields (PLQYs) of 1 wt % doped polystyrene solid film were measured with a Hamamatsu Quantaurus-QY C11347-11 spectrometer under a nitrogen atmosphere condition at room temperature. The transient photoluminescence lifetime measurement system (C11367-31, Hamamatsu Photonics). The mass spectra were recorded using aAdvion, Expression LCMS spectrometer in APCI mode. The <sup>1</sup>H and <sup>13</sup>C nuclear magnetic resonance (NMR) spectra were recorded in deuterated chloroform (CDCl<sub>3</sub>) solution on an Avans 500 MHz spectrometer. Chemical shifts of the <sup>1</sup>H and

<sup>13</sup>C NMR signals were quoted relative to tetramethylsilane ( $\delta = 0.00$ ). All coupling constants are reported in Hertz.

#### **Device Fabrication and Measurements**

The device structure was indium tin oxide (ITO. 50 nm)/poly(3,4-(PEDOT:PSS, 60 ethylenedioxythiophene):poly(styrenesulfonate) nm)/4,4'cyclohexylidenebis[N,N-bis(4-methylphenyl)aniline] (TAPC, 20 nm)/1,3-bis(Ncarbazolyl)benzene (mCP, 10 nm)/ 2-phenyl-4,6-bis(12-phenylindolo[2,3-a]carbazole-11-yl) -1,3,5-triazine(PBICT):dopant (25 nm; 1, and 3 wt%)/diphenylphosphine oxide-4-(triphenylsilyl)phenyl (TSPO1, 5 nm)/2,2',2"-(1,3,5-benzinetriyl)-tris(1-phenyl-1-Hbenzimidazole) (TPBi) (40 nm)/LiF(1.5 nm)/Al(200 nm). The dopants were tCz-BPCN, Ac-BPCN and DACz-BPCN. All layers of the device structure were deposited by vacuum thermal evaporation under a high pressure of  $3.0 \times 10^{-7}$  Torr. The material was thermally evaporated and then encapsulated with a glass lid in a nitrogen-filled glove box to protect the device from moisture and oxygen. Electrical characterization of the devices was performed using a Keithley 2400 source meter and optical characterization was carried out using a CS 2000 spectroradiometer.



**Figure S1.** DFT optimized structures of tCz-BPCN, Ac-BPCN and DACz-BPCN with their dihedral angles between donor and acceptor unit at groung state.



Figure S2. PL spectra of tCz-BPCN in different organic solvents.



Figure S3. PL spectra of Ac-BPCN in different organic solvents.



Figure S4. EL spectra of tCz-BPCN at 1, 3 and 5 % doping concentration.



Figure S5. EL spectra of Ac-BPCN at 1, 3 and 5 % doping concentration.



Figure S6. EL spectra of DACz-BPCN at 1, 3 and 5 % doping concentration.

**Table S1.** Electroluminescence performance of the **tCz-BPCN**, **Ac-BPCN** and **DACz-BPCN** emitter doped (3%) TADF-OLEDs.

Emitter	$\lambda_{EL}$	<b>CE</b> <sub>max</sub>	PE <sub>max</sub>	EQE <sub>max</sub>	CIE (x,y)
	[nm]	[cd A <sup>-1</sup> ]	[lm W <sup>-1</sup> ]	[%]	
Cz-BPCN	554	52.4	54.9	7.4	(0.39, 0.58)
Ac-BPCN	608	26.7	28.0	15.7	(0.57, 0.42)
DACz-BPCN	651	9.4	8.4	9.0	(0.62, 0.37)

**Table S2.** Electroluminescence performance of the **tCz-BPCN**, **Ac-BPCN** and **DACz-BPCN** emitter doped (5%) TADF-OLEDs.

Emitter	$\lambda_{EL}$	CE <sub>max</sub>	<b>PE</b> <sub>max</sub>	EQE <sub>max</sub>	CIE (x,y)
	[nm]	[cd A <sup>-1</sup> ]	[lm W <sup>-1</sup> ]	[%]	
Cz-BPCN	559	41.2	43.1	6.6	(0.44, 0.54)
Ac-BPCN	615	20.5	21.4	14.3	(0.58, 0.41)
DACz-BPCN	663	3.6	2.4	7.1	(0.66, 0.34)





Figure S8.<sup>13</sup>C NMR spectrum of tCz-BPCN







Figure S10.<sup>13</sup>C NMR spectrum of Ac-BPCN





Figure S11. <sup>1</sup>H NMR spectrum of DACz-BPCN

# Figure S12.<sup>13</sup>C NMR spectrum of DACz-BPCN

