

Supporting Information

For

Phenanthro[9,10-*d*]imidazole Group as A New Building Block for Blue Light

Emitting Materials

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1. Single Carriers Device

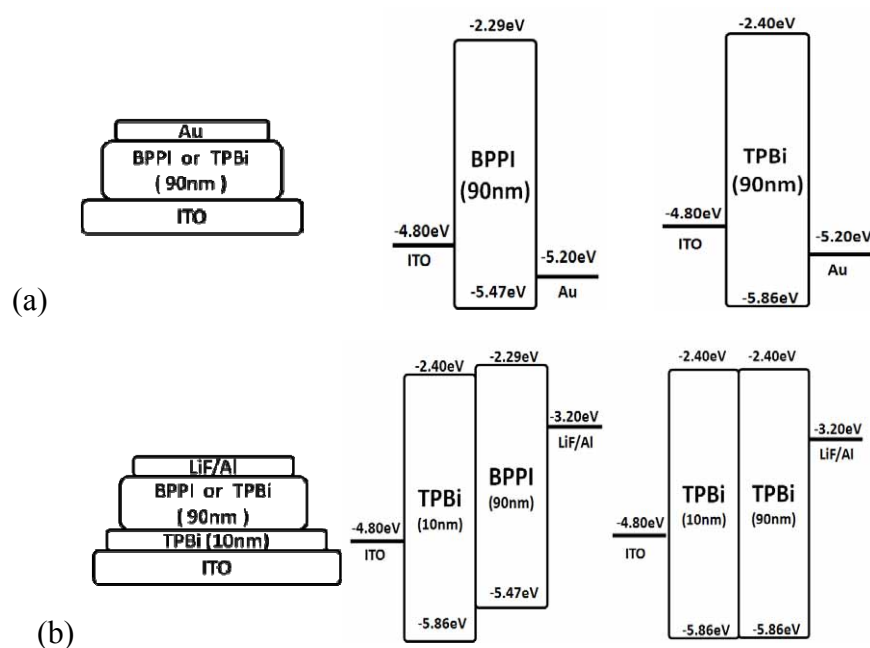


Figure S1. The device structures of hole-only (a) and electron-only devices (b).

The electric field intensity was calculated by the voltage and the thickness of the film that was obtained in deposited progress. While in low electric field intensity ($E = 4.0 \times 10^7$ V/cm), the electron current densities of **BPPI** and **TPBi** are 1.72×10^{-4} mA/cm² and 1.48×10^{-4} mA/cm², respectively. The hole current of **BPPI**

(4.39×10^{-3} mA/cm²) is one order magnitude higher than that of **TPBi** (6.59×10^{-4} mA/cm²). In high electric field intensity ($E = 1.3 \times 10^8$ V/cm), the electron current densities of **BPPI** and **TPBi** are 5.12 mA/cm² and 31.2 mA/cm², respectively, and **TPBi** shows better electron injection and transport ability. But the hole current of **BPPI** (1.08×10^{-1} mA/cm²) is two orders magnitude higher than that of **TPBi** (2.56×10^{-3} mA/cm²). The hole injection and transport ability of **BPPI** is improved a lot compared to **TPBi**. The result proves that the **BPPI** is more suitable for playing a role of combining an emission layer with an electron transport layer, whereas the **TPBi** is suitable for use as electron-injection and hole-blocking layer.

2. Electroluminescence

To measure the electroluminescence of these **PI**-based oligomers, first we measure the energy levels of the materials involved in device. For better comparison, the energy levels of **BPPI**, **NPB** and **TPBi** are all measured in same condition. The device structure and performance of Device A and Device B is shown in Figure S2.

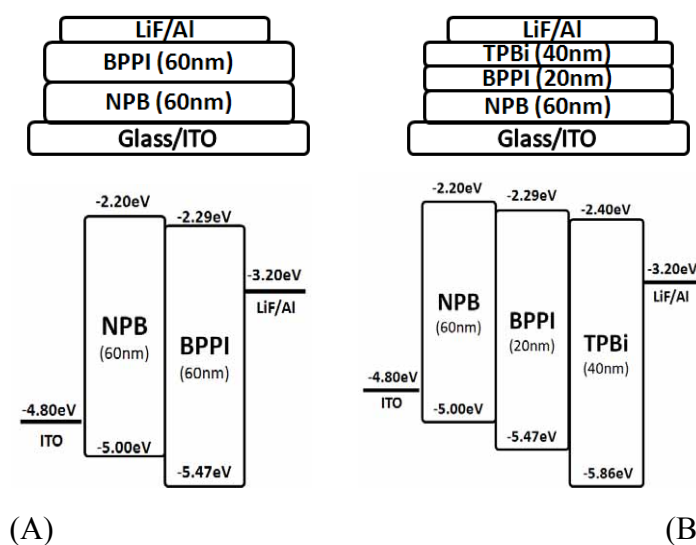


Figure S2. The device structures of device A (left) and device B (right).

To investigate the EL properties of the multifunctional materials, we fabricated the simple double-layered device. The result is summarized in Table S1.

Table S1. The device performance data of the oligomers.

Device	CIE [x, y]	Voltage ^a [V]	EQE _{Max} [%]	LE _{Max} [cd/A]	PE _{Max} [lm/W]	L _{Max} [cd/m ²]	Device performance at 1000 cd/m ²			
							Voltage [V]	EQE [%]	LE [cd/A]	PE [lm/W]
PPI(A)	0.16,0.17	5.7	0.7	1.08	0.51	827	--	--	--	--
BPPI(A)	0.16,0.21	2.8	4.0	6.87	6.2	39818	4.8	3.9	6.74	4.4
TPPI(A)	0.30,0.39	6.0	0.6	1.52	0.66	1460	12.6	0.52	1.33	0.33
BPPI(B)	0.16,0.23	3.8	3.6	6.62	4.1	34394	6.4	3.6	6.56	3.2

a. The turn-on voltage (L>1cd/m²)