Electronic Supplementary Information

Experimental

Methods and instrumentation

ESI mass spectrometry was performed with Thermo Electron Corporation Finnigan LTQ. $^1$H-NMR and $^{19}$F-NMR spectra were recorded on a JOEL JNM-ECA600 NMR spectrometer. Single-crystal X-ray characterization was performed on a Bruker SMART APEX charge-coupled device (CCD) diffractometer equipped with graphite monochromatized Mo $K_{\alpha}$ radiation. The absorption and photoluminescence (PL) spectra were performed with a UV-vis spectrophotometer (Agilent 8453) and a fluorospectrophotometer (Jobin Yvon, FluoroMax-3), respectively. The excited state lifetimes were measured on a transient spectrofluorimeter (Edinburgh Instruments, FLSp920) with time-correlated single-photon counting technique at the peak emitting wavelength. Photoluminescent quantum yields (PLQYs) in degassed acetonitrile solution (1×10$^{-5}$ M) were calculated with [Ru(bpy)$_3$]Cl$_2$ ($\phi = 4.0\%$ in non-degassed water) as the reference. PLQYs in neat film were measured at the excitation wavelength of 400 nm, using a Quantaurus-QY C11347-11. Cyclic voltammetry was performed on a Princeton Applied Research potentiostat/ galvanostat model 283 voltammetric analyzer in degassed N,N-dimethyl formamide (DMF) solution (1×10$^{-3}$ M) at a scan rate of 100 mV s$^{-1}$ with a platinum plate as the working electrode, a silver wire as the pseudo-reference electrode and a platinum wire as the counter electrode. The supporting electrolyte was tetrabutylammonium perchlorate (0.04 g mL$^{-1}$) and ferrocene was selected as the internal standard.

Device fabrication and characterization

OLEDs were fabricated on cleaned and ultraviolet-ozone-treated glass substrates precoated with an indium tin oxide (ITO) anode with a sheet resistance of ca. 20 $\Omega$ per sq. Then all the layers were fabricated in the vacuum chamber under a low pressure of about 1×10$^{-4}$ Pa. The current density-voltage-luminance ($J-V-L$) characteristics of the devices were measured with Keithley 4200 semiconductor system, and EL spectra were collected with a Photo Research PR705 spectrophotometer in ambient atmosphere without further encapsulations.
Supplementary Scheme and Figures.

Scheme S1. Synthetic routes of the pop ligand, 1 and 2.
Figure S1. (a-b) Absorption and (c-d) photoluminescence spectra of 1 and 2 in acetonitrile solution ($10^{-5}$ M) under UV irradiation ($\rho_e = 500$ W, $\lambda = 365$ nm).
Figure S2. Photoluminescence spectra of (a) 1 and (b) 2 in solid states under UV irradiation ($P_e = 500$ W, $\lambda = 365$ nm).
**Figure S3.** (a-b) Thermal gravimetric analysis (TGA) and (c-d) differential scanning calorimetry (DSC) curves of 1 and 2 under a dry nitrogen gas flow at a heating rate of 10 °C min⁻¹. First time heat the materials up to 290 °C (black square), then cool to room temperature (red circle), and second time heat up to 290 °C (blue triangle).
Figure S4. Cyclic voltammogram of (a) 1 and (b) 2 in degassed N, N-dimethyl formamide (DMF) solution (1×10^{-3} M). Potentials were recorded versus the ferrocenium/ferrocence (Fc^+/Fc) couple.
**Figure S5.** $^1$H NMR spectra of 1 in the pristine state and after sublimation.

In the pristine state

![NMR谱图](image1)

Chemical Shift (ppm)

After sublimation

![NMR谱图](image2)

Chemical Shift (ppm)

**Figure S6.** $^{19}$F NMR spectra of 1 in the pristine state and after sublimation.

In the pristine state

![NMR谱图](image3)

Chemical Shift (ppm)

After sublimation

![NMR谱图](image4)

Chemical Shift (ppm)
**Figure S7.** $^1$H NMR spectra of 2 in the pristine state and after sublimation.

**In the pristine state**

![H NMR spectrum in the pristine state](image)

**Chemical Shift (ppm)**

**After sublimation**

![H NMR spectrum after sublimation](image)

**Chemical Shift (ppm)**

**Figure S8.** $^{19}$F NMR spectra of 2 in the pristine state and after sublimation.

**In the pristine state**

![F NMR spectrum in the pristine state](image)

**Chemical Shift (ppm)**

**After sublimation**

![F NMR spectrum after sublimation](image)

**Chemical Shift (ppm)**