Electronic Supplementary Information

[Ir(ppy)$_2$pyim]PF$_6$ dielectric mixed with PMMA for area emission transistors

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Experimental section

Device Fabrication: First, ZTO layer (40 nm) was formed on the ITO substrate by the way published.\textsuperscript{1} The channel length and width are 35 \(\mu\text{m}\) and 1000 \(\mu\text{m}\), respectively. [Ir(ppy)\textsubscript{2}pyim]PF\textsubscript{6} was mixed with different mass concentration ratios of PMMA: 25\% (device A), 33\% (device B) and 66\% (device C). The total concentration was 25 mg mL\textsuperscript{-1} (in CH\textsubscript{2}Cl\textsubscript{2}). Then, the mixed solutions were spin-coated at 1500 rpm and baked at 80 °C for 20 minutes. Finally, Ag electrode of 80 nm was evaporated at an evaporating rate of 0.5~1 A\textsuperscript{−}s\textsuperscript{−1}.

Electrical and electroluminescent measurements: Measurements were all carried out in ambient conditions. The Keithley 4200 semiconductor characterization system was used to measure the electrical properties. The Photo Research PR705 spectrophotometer was used to collect the electroluminescent spectrum.

![Figure S1. The capacitance information of mixed films from which the dielectric constants are calculated by the following expressions:](image)

\(C_j = \frac{C_p}{S}\)

\(C_i = \frac{\varepsilon_0 \varepsilon_r}{d}\)
(d: the thickness of film; \(\varepsilon_0\): permittivity of vacuum)

**Figure S2.** Transistor characteristics: (a) the output curves of the Device A; (b) the transfer curves of the Device A; (c) the output curves of the Device C; (d) the transfer curves of the Device C.

**Figure S3.** EL peak showed almost no shift when a) \(V_{DS}\) and b) \(V_{GS}\) varied
Figure S4. Control of emission via $V_{DS}$ and $V_{GS}$ for Device A (a) and Device C (b).

References:

(1) Y. L. Zhao, L. Duan, G. Dong, D. Q. Zhang, J. Qiao, L. Wang and Y. Qiu, 