Supporting information

Efficient red organic LEDs via combination of exciplex host and micro-cavity

By *Jiao-Yang Li‡,[1] Ya-Kun Wang‡*,[1] Jun-Gui Zhou,[1] Wei He,[1] Xiao-Hao Dong,[1] Chuan Zhang,[3] Xiao-Bo Shi,[3] Liang-Sheng Liao*,[1,2,3] Man-Keung Fung*[1,2,3]*

Anodes Fabrication

To fabricate top-emitting OLED, three reflective anodes (ITO/Ag/ITO, IZO/Ag/IZO and AZO/Ag/AZO) were prepared with thicknesses of 10 nm/100 nm/10 nm. These anodes were prepared by magnetron sputtering at a vacuum of 1×10^{-3} Pa. ITO film was prepared under 20 sccm of Ar and 1.2 sccm of O_2 on a cleaned glass substrate at a DC power of 100 W and sputtering pressure of 0.5 Pa. IZO film was prepared under 20 sccm of Ar and 1.2 sccm of O_2 on a cleaned glass substrate at a DC power of 20 W and sputtering pressure of 0.5 Pa. AZO film was prepared under 30 sccm of Ar and 1.2 sccm of O_2 on a cleaned glass substrate at a DC power of 100 W and sputtering pressure of 0.5Pa. Ag film was prepared under 50 sccm of Ar on a cleaned glass substrate at a RF power of 200 W and sputtering pressure of 2 Pa.

Device Fabrication

In bottom-emitting OLED, the ITO glass was cleaned by Decon and then subjected to ultrasonic cleaning with deionized water and iso-Propyl alcohol for ten minutes, respectively. The ITO glass was dried in oven for 2-3 hours at a temperature of 100 degree Celsius and subjected to UV-ozone treatment for 15 minutes in prior to device fabrication. OLEDs were prepared under a vacuum of 4×10^{-6} Torr. The deposition rate of hole-injection layer and

electron-injection layer was 0.2 Å/s and the other organic layers was 2-4 Å/s. The deposition rate of metal electrodes was 4-6 Å/s. In top-emitting OLEDs, the deposition rate of hole-injection layer and electron-injection layer was 0.2 Å/s and the other organic layers was 2-4 Å/s. The deposition rates of Yb and Ag were 0.2 and 0.4 Å/s, respectively.

Characterizations

Device performance was conducted by Suzhou F-star Scientific Instrument. The photoluminescence spectra were obtained by Hitachi F-4600 fluorescence spectrophotometer. Perkin Elmer Lambda 750 spectrophotometer was used to test the reflectivity of anodes and transmittance of cathode. The sheet resistance of the cathode was measured by a Suzhou Jingge ST2258A four-point probe tester. The work function of anodes was measured by ELCALAB Xi^+ Ultraviolet Photoelectron Spectrometer.

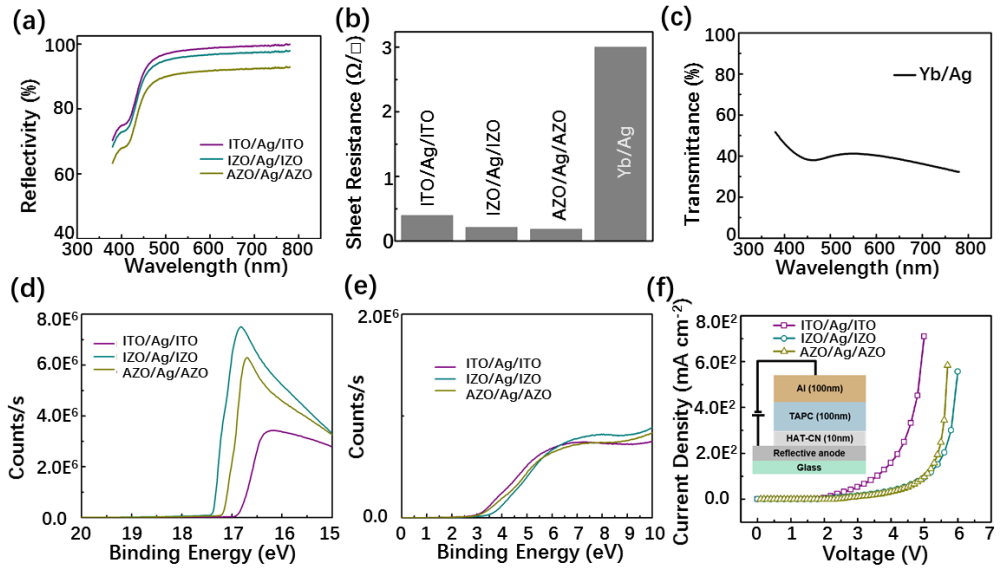

Figure S1. (a) Reflectivity of ITO/Ag/ITO, IZO/Ag/IZO and AZO/Ag/AZO. **(b)** Sheet resistance of ITO/Ag/ITO, IZO/Ag/IZO, AZO/Ag/AZO. **(c)** Transmittance of Yb/Ag. **(d) (e)** UPS spectra of ITO/Ag/ITO, IZO/Ag/IZO, AZO/Ag/AZO. **(f)** Hole-only device based on different anodes (ITO/Ag/ITO, IZO/Ag/IZO and AZO/Ag/AZO).

Table S1. Summary showing the reflectivity, sheet resistance and work function of ITO/Ag/ITO, IZO/Ag/IZO, AZO/Ag/AZO.

	Reflectivity @608nm	Sheet Resistance (Ω/□)	Work Function (eV)
ITO/Ag/ITO	98.7	0.39	4.8
IZO/Ag/IZO	96.6	0.21	3.8
AZO/Ag/AZO	91.7	0.18	4.5

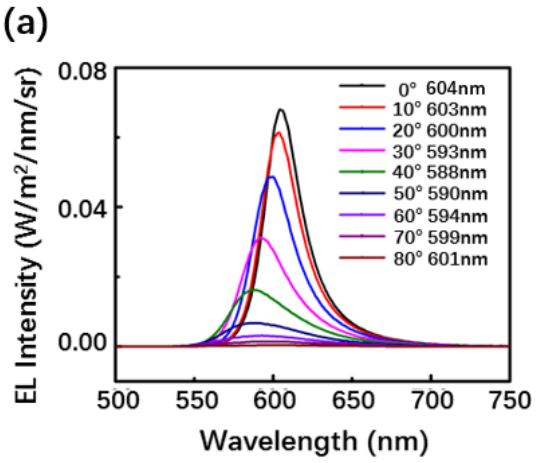

Figure S2. (a) EL spectra of Ex-Te with different viewing angles (0°-80°).