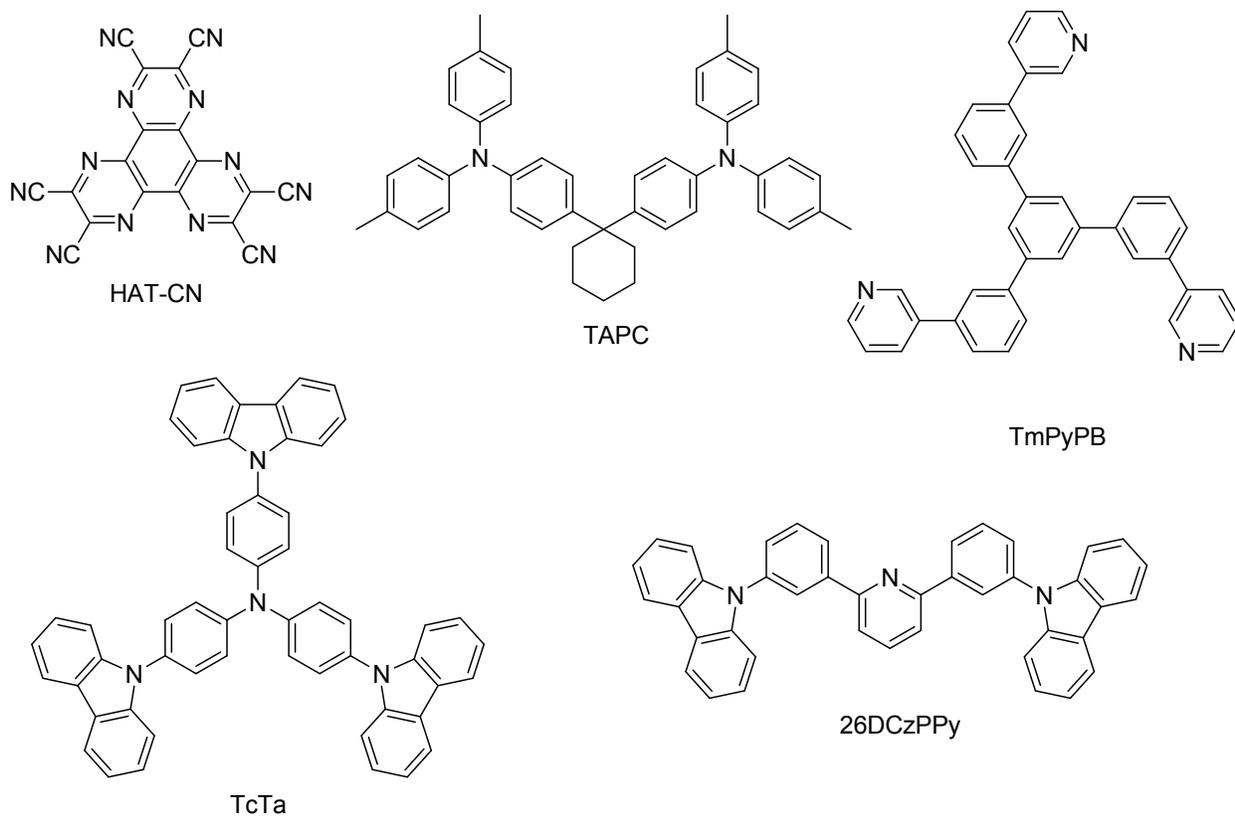


Supporting Information



Scheme S1. Chemical structures of emitting metal complexes and supporting organic materials used in this work.

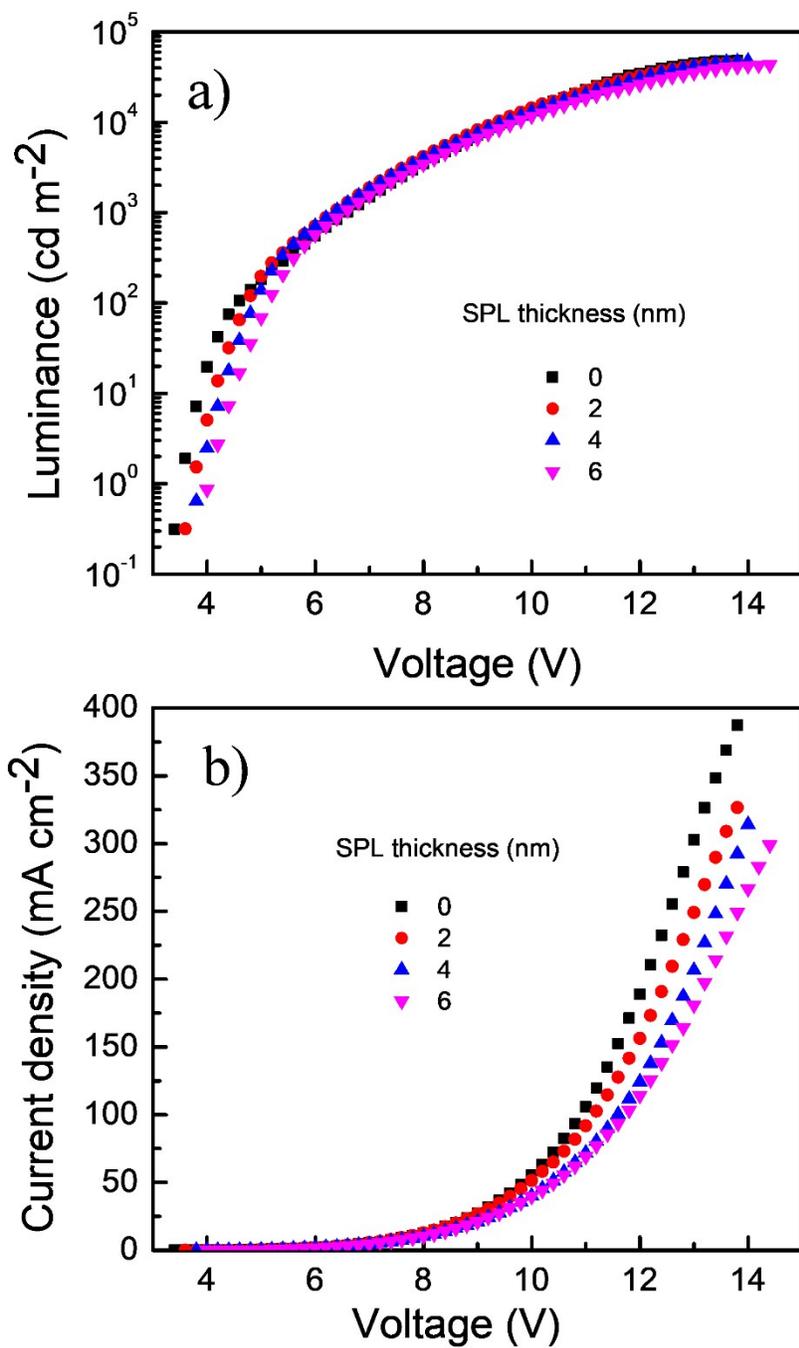


Figure S1. a) luminance-voltage and b) current density-voltage characteristics of WOLEDs with various thickness of SPL. Device structure: ITO/HAT-CN (6 nm)/TAPC (50 nm)/Pt-X-4 (8 wt%):TcTa (10 nm)/TcTa:26DCzPPy (1:1) (0, 2, 4, 6 nm)/FirPic (18 wt%):26DCzPPy (10 nm)/TmPyPB (50 nm)/LiF (1 nm)/Al (100 nm).

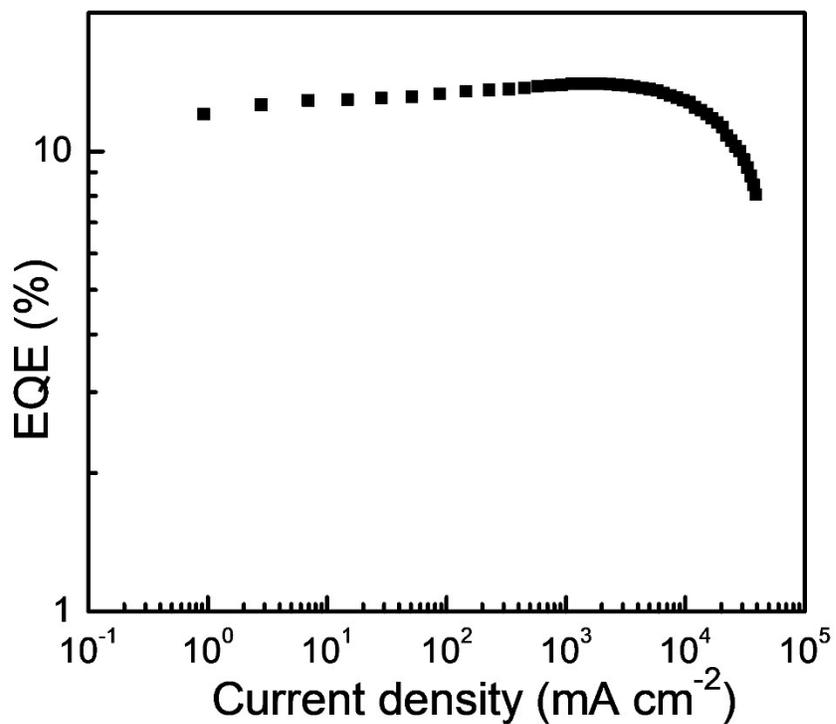


Figure S2. EQE-luminance characteristics of the single-host WOLED with 12 wt% **Pt-X-4**. Device structure: ITO/HAT-CN (6 nm)/TAPC (50 nm)/Pt-X-4 (12 wt%):TcTa (10 nm)/TcTa:26DCzPPy (1:1) (2 nm)/FirPic (18 wt%):26DCzPPy (10 nm)/TmPyPB (50 nm)/LiF (1 nm)/Al (100 nm)

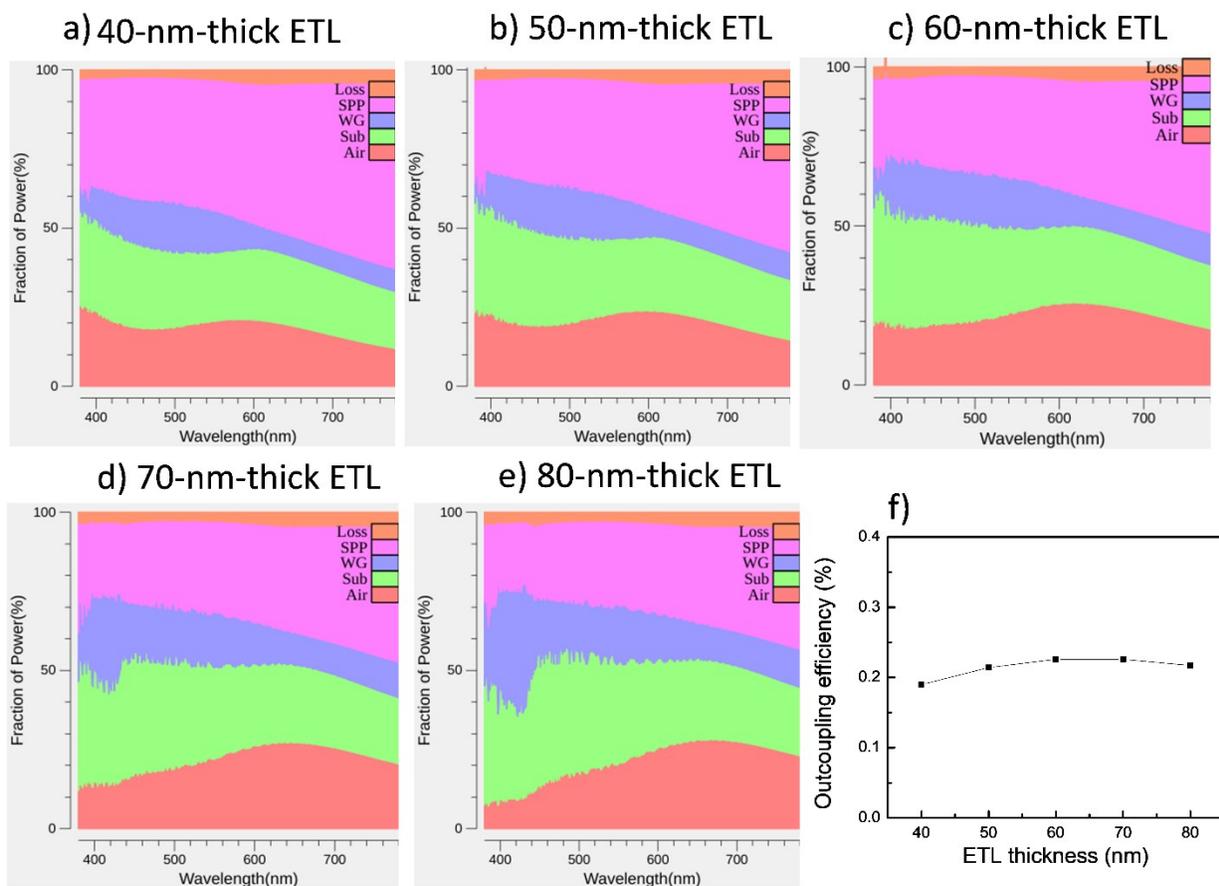


Figure S3. a-e) Simulated Optical transmission modes for WOLEDs with different ETL thicknesses. f) simulated outcoupling efficiency of WOLEDs with different ETL thicknesses. Device structure: ITO/HAT-CN (6 nm)/TAPC (50 nm)/FirPic (18 wt%):TcTa:26DCzPPy(1:1) (10 nm)/TcTa:26DCzPPy (1:1) (2 nm)/Pt-X-4 (12 wt%):TCTA:26DCzPPy(1:1) (10 nm)/TmPyPB (40, 50, 60, 70, 80 nm)/LiF (1 nm)/Al (100 nm)

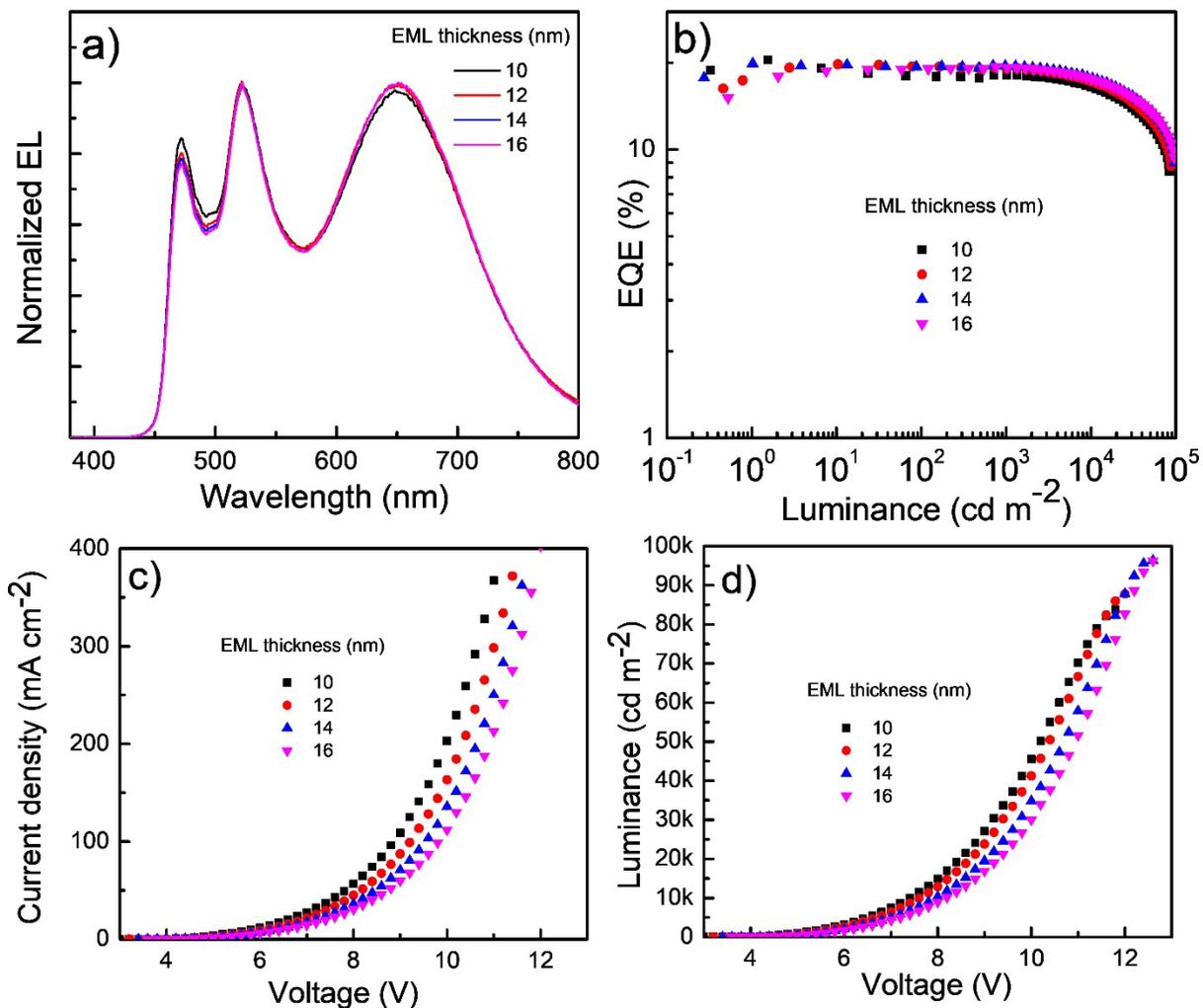


Figure S4. a) Normalized EL spectra, b) EQE-luminance, c) current density-voltage, and d) luminance-voltage characteristics of WOLEDs with various EML thickness. Device structure: ITO/HAT-CN (6 nm)/TAPC (50 nm)/FirPic (18 wt%):TcTa:26DCzPPy(1:1) (10 nm)/TcTa:26DCzPPy (1:1) (2 nm)/Pt-X-4 (12 wt%):TCTA:26DCzPPy(1:1) (10, 12, 14, 16 nm)/TmPyPB (60 nm)/LiF (1 nm)/Al (100 nm)