Supporting Information

Increasing the operating lifetime of green phosphorescent organic light emitting diodes by reducing charge accumulation at interface

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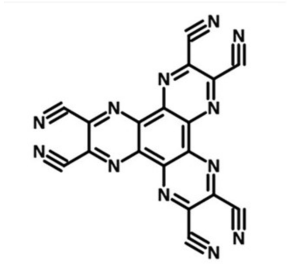
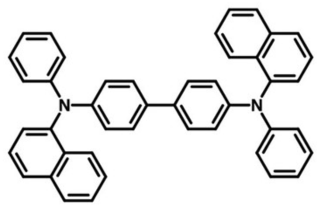
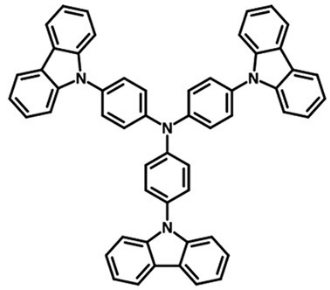


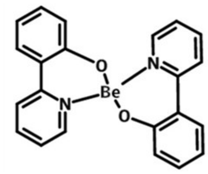
HAT-CN



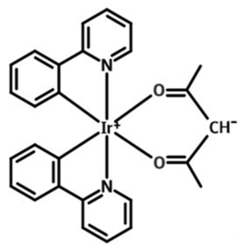
NPB



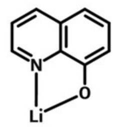
TCTA



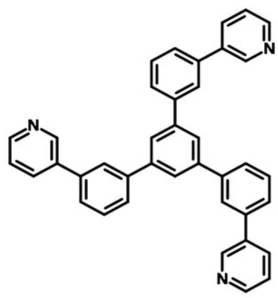
Bepp$_2$



Ir(ppy)$_2$(acac)



Liq



TmPyPB

Fig. S1 Chemical structures of the organic materials used in this work.

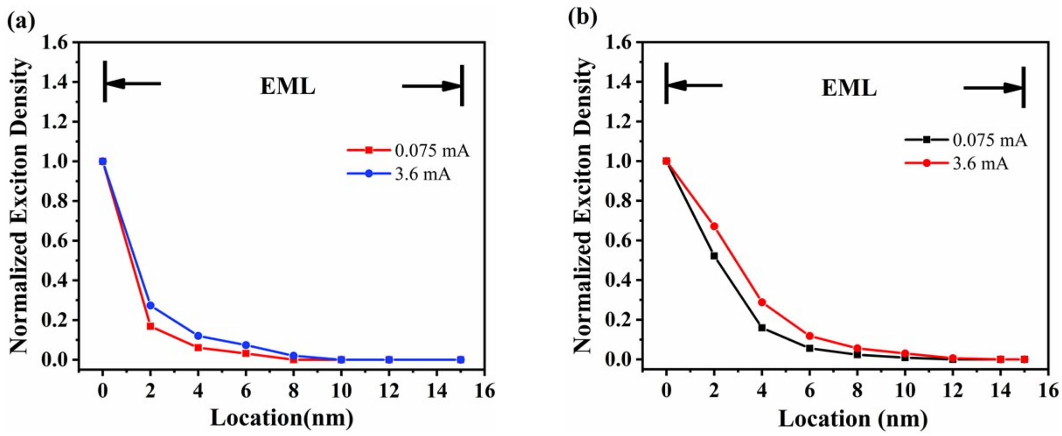


Fig. S2 (a) Relative exciton density distributions in the EML of the pristine phosphorescent green OLEDs at the current densities of 0.075 mA and 3.6 mA, respectively. (b) Relative exciton density distributions in the EML of the optimized green phosphorescent OLEDs inserted a TCTA thin film at the current densities of 0.075 mA and 3.6 mA, respectively.

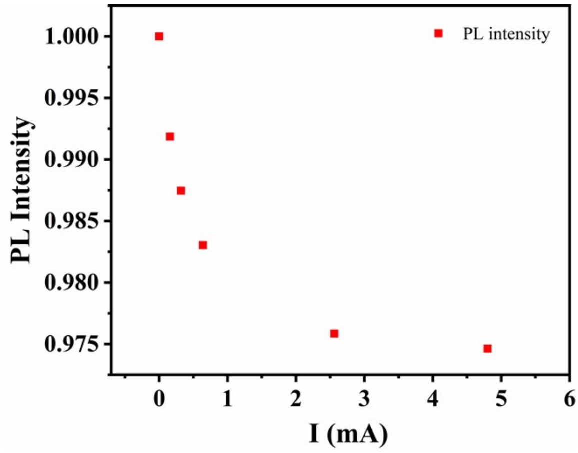


Fig. S3 PL intensity from EML in the hole-only OLEDs at different currents. The device structure is ITO / HAT-CN (15 nm) / NPB (60 nm) / TCTA (5 nm) / $Bepp_2$: $Ir(ppy)_2(acac)$ (8%, 15 nm) / MoO_3 (10 nm) / Al. The PL intensity decreases as applied current increases.

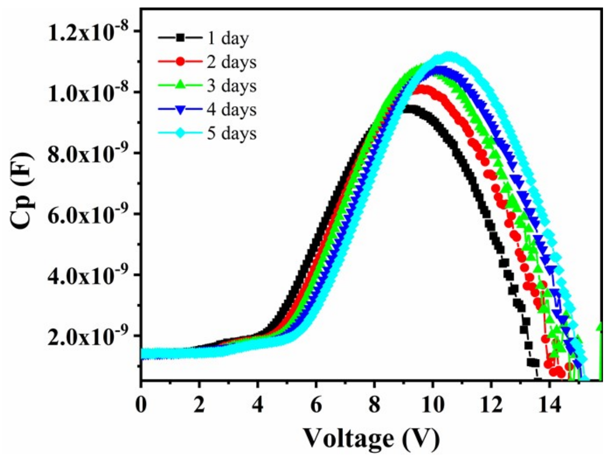


Fig. S4 Capacitance-voltage characteristics of the OLEDs with 150 nm thick ETL after aging for 1 day, 2 days, 3 days, 4 days and 5 days, respectively.

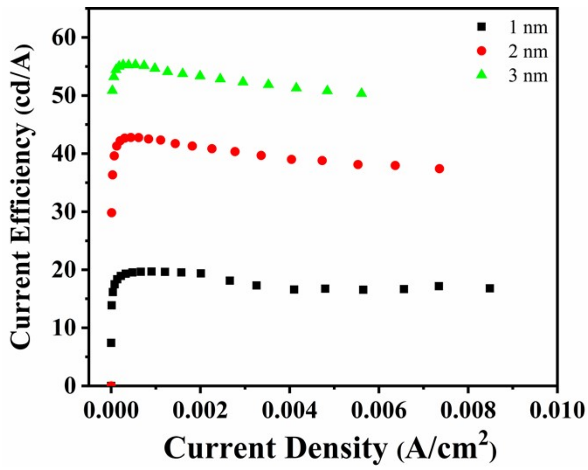


Fig. S5 CE–J characteristics of the OLEDs inserted a 1, 2 and 3 nm TCTA thin layer, respectively. The OLED inserted a 3 nm TCTA layer has the highest CE.

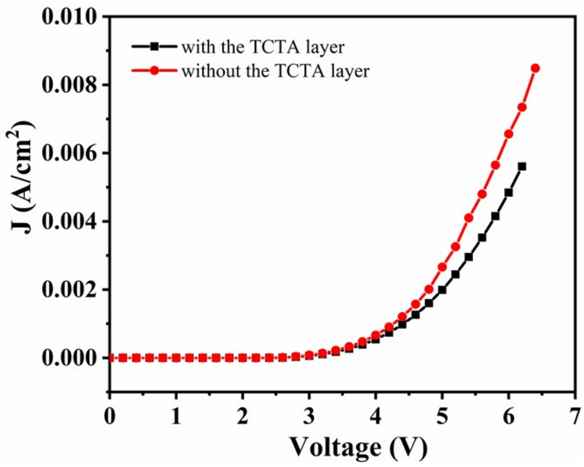


Fig. S6 J-V characteristics of the OLEDs with and without a TCTA layer before aging.

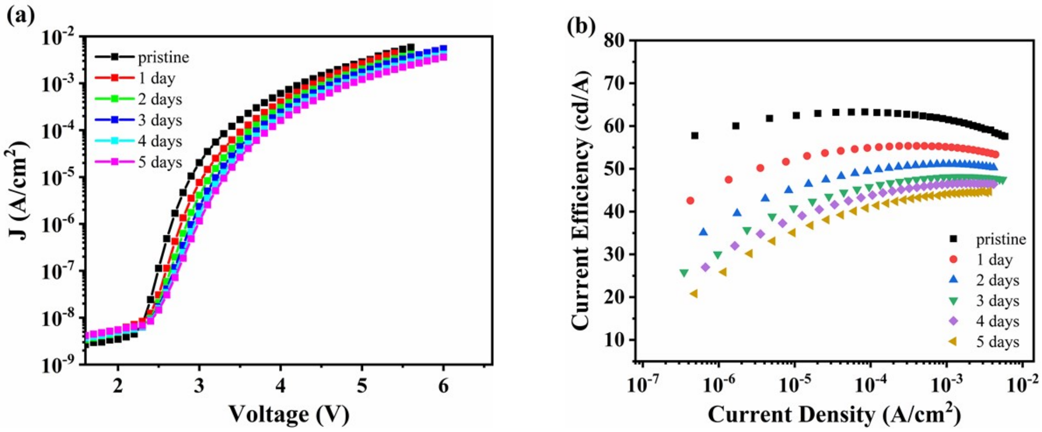


Fig. S7 (a) J–V characteristics of the optimized OLEDs with a TCTA thin layer after different times of aging. (b) CE–J characteristics of the optimized OLEDs with a TCTA thin layer after different times of aging.

Table S1 Summary of the EL performances of the optimzied phosphorescent green OLEDs with a thin TCTA layer.

Von[a] (V)	EQE[b] (%)	CE[b] (cd/A)	PE[b] (lm/W)	Peak wavelength (nm)
2.7	18.8	63.3	69.8	524

[a] Turn-on voltage at the luminance of 1 cd/m^2; [b] Maximum current efficiency, maximum power efficiency, and maximum external quantum efficiency.