

Supporting information

**Thermal Imprinting and Vapor Annealing of Interfacial Layers
for High-Performance Organic Light-Emitting Diodes**

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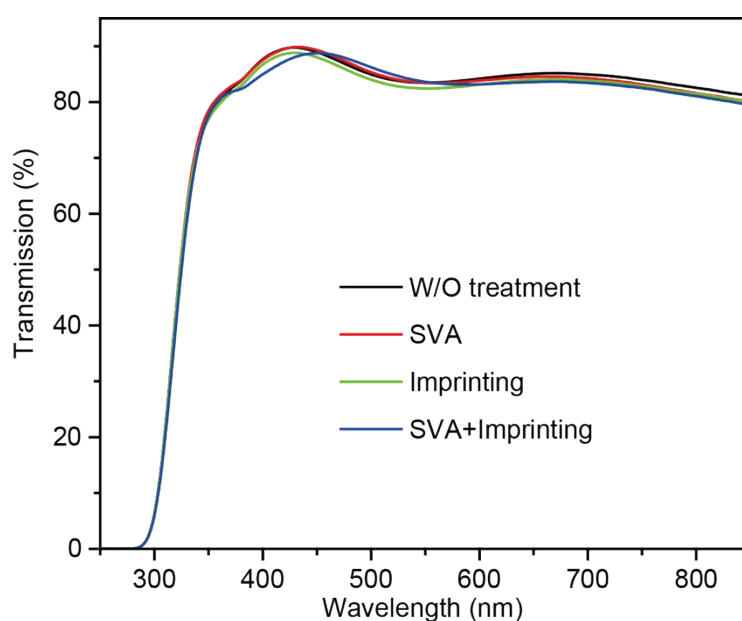


Figure S1. Transmission spectra of the PEDOT:PSS layers without and with different post-treatments.

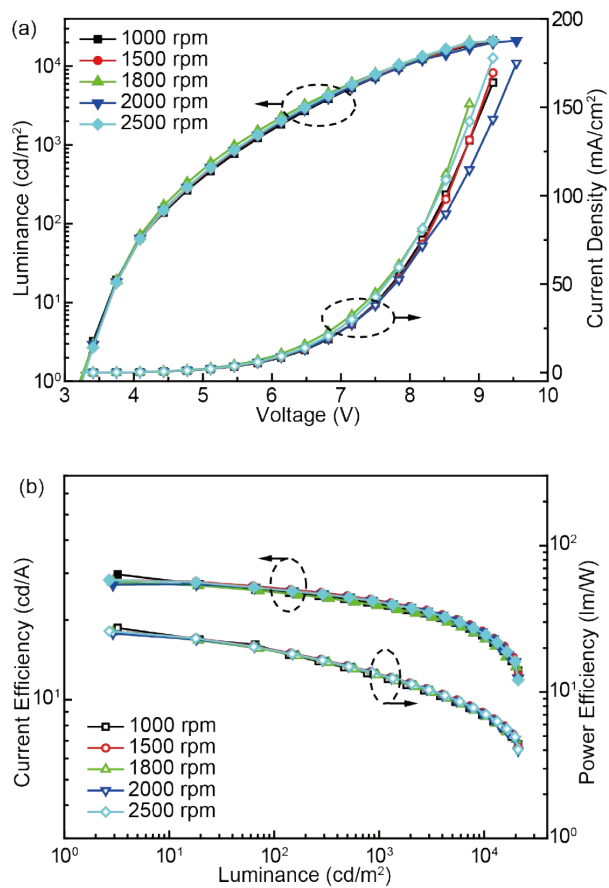


Figure S2. (a) Current density/luminance versus voltage (J - V - L) characteristics, and (b) current efficiency (CE)/power efficiency (PE) versus luminance characteristics of OLEDs fabricated using PEDOT:PSS layers with different thickness.

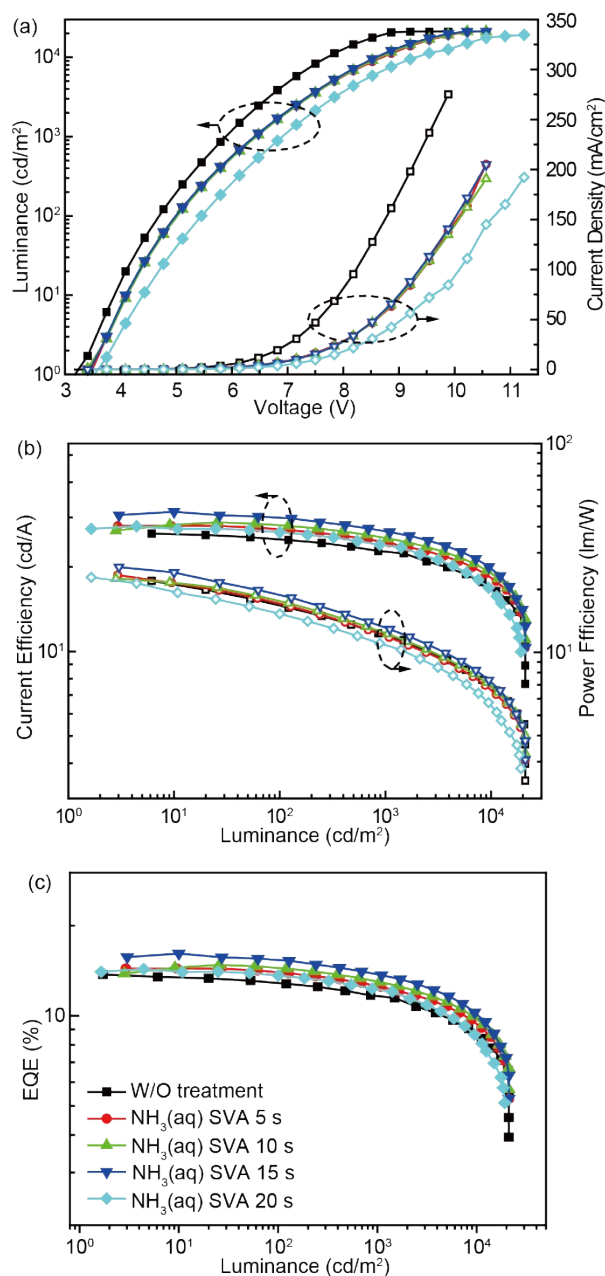


Figure S3. (a) Current density/luminance versus voltage (J - V - L) characteristics, (b) CE/ PE/EQE versus luminance characteristics of OLEDs fabricated with $\text{NH}_3(\text{aq})$ SVA-treated PEDOT:PSS layers.

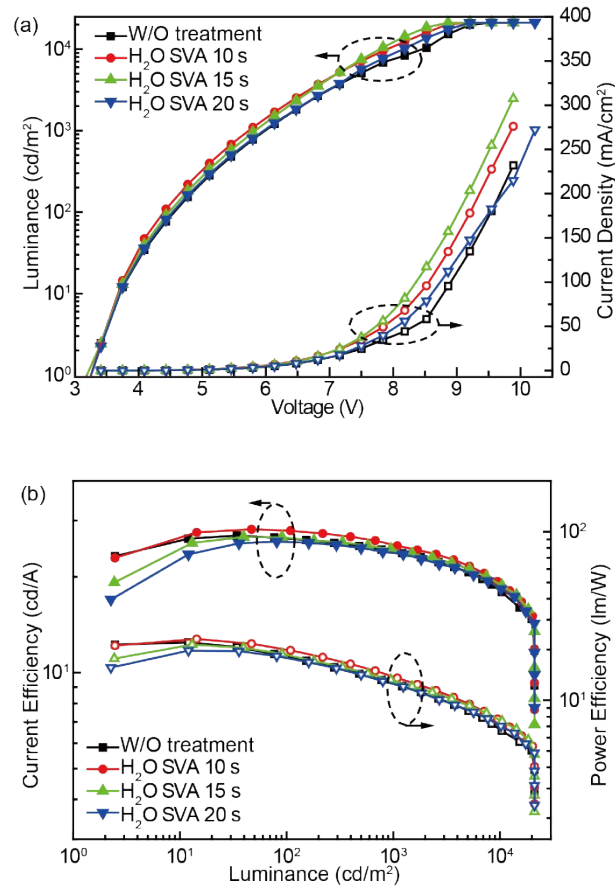


Figure S4. (a) Current density/luminance versus voltage (*J-V-L*) characteristics, and (b) CE/PE versus luminance characteristics of OLEDs fabricated with H₂O SVA-treated PEDOT:PSS layers.

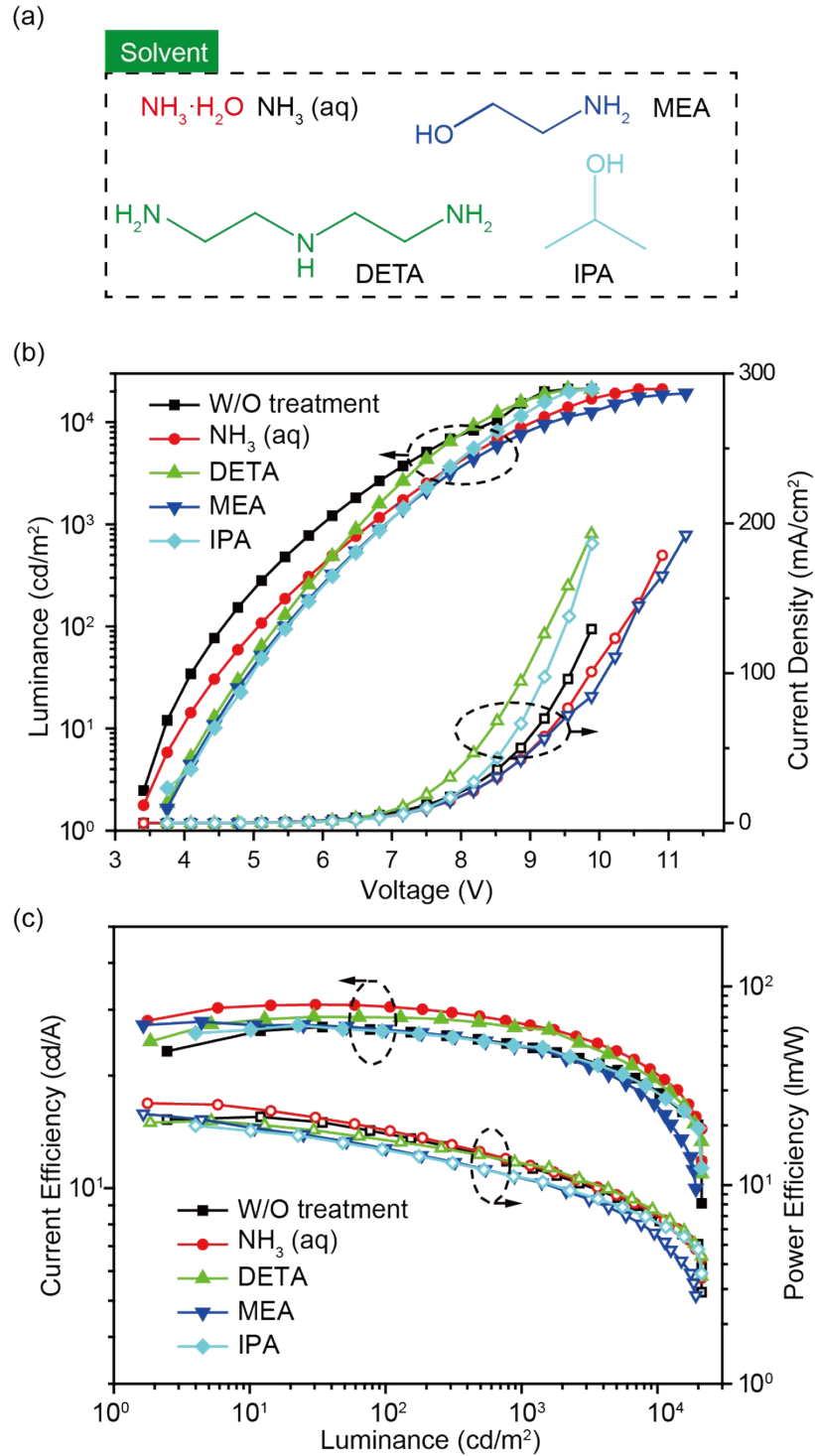


Figure S5. (a) Molecular structures of various solvents used for solvent vapor annealing (SVA), (b) Current density-luminance-voltage (J - V - L) characteristics and CE/PE versus luminance curves of the PhOLEDs based on different SVA-treated PEDOT:PSS layers.

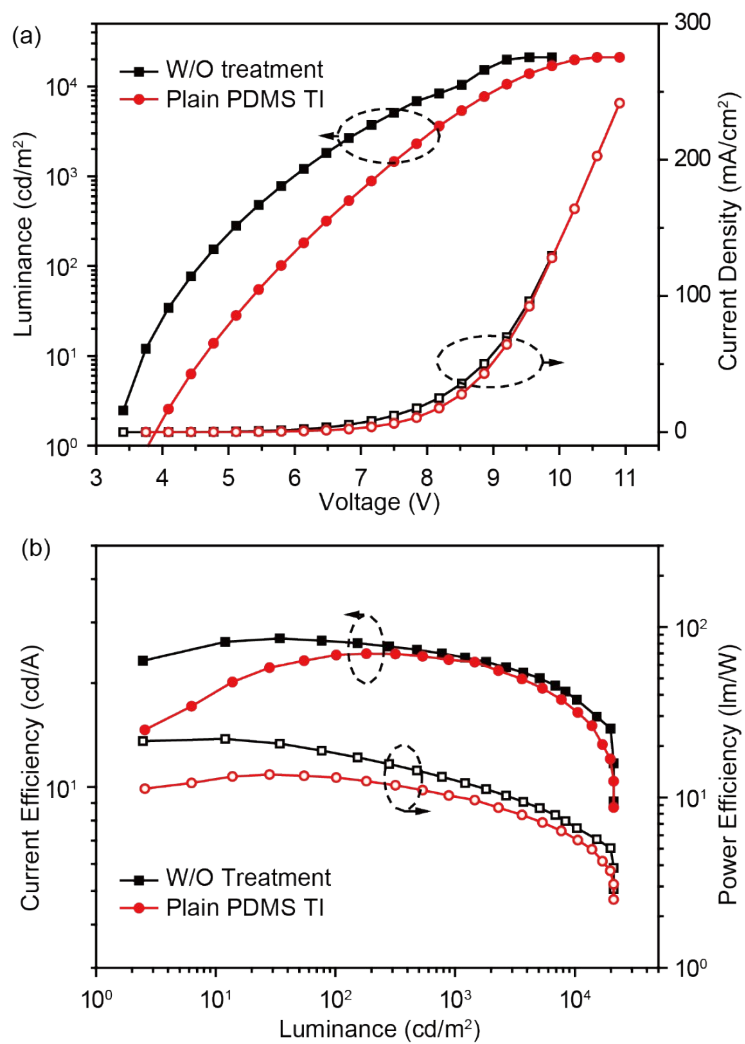


Figure S6. (a) Current density-luminance-voltage ($J-V-L$) characteristics and CE/PE versus luminance curves of the PhOLEDs based on pristine and plain PDMS TI-treated PEDOT:PSS layers.

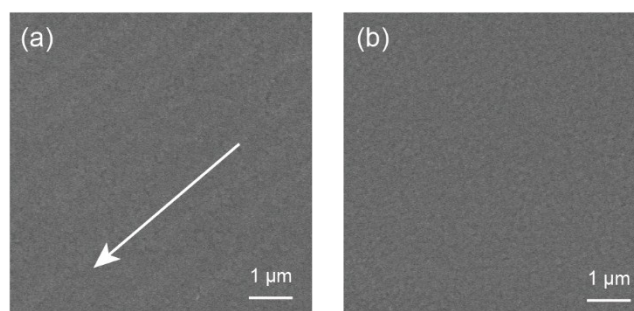


Figure S7. SEM images of patterned PEDOT:PSS layers fabricated by imprinting (a) before and (b) after being employed to NH_3 vapor. The PDMS template has been peeled off during $\text{NH}_3(\text{aq})$ SVA treatment.

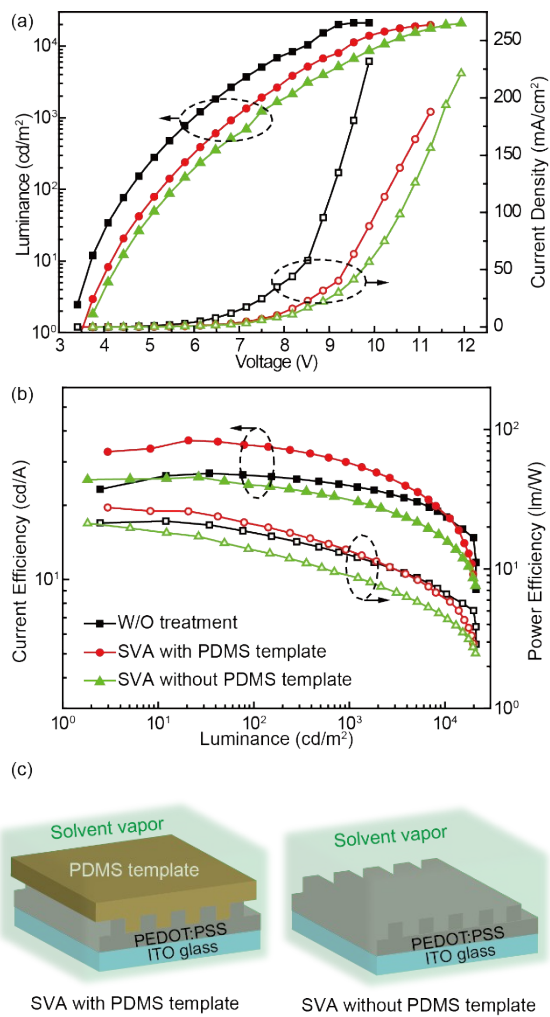


Figure S8. (a) Current density/luminance versus voltage (J - V - L) characteristics, and (b) CE/PE versus luminance characteristics of OLEDs fabricated with $\text{NH}_3(\text{aq})$ SVA-treated patterned PEDOT:PSS layers. (c) Schematic diagram of $\text{NH}_3(\text{aq})$ SVA treatment of PEDOT:PSS layer when the PDMS template is still located on the upper surface or the PDMS template has been removed.

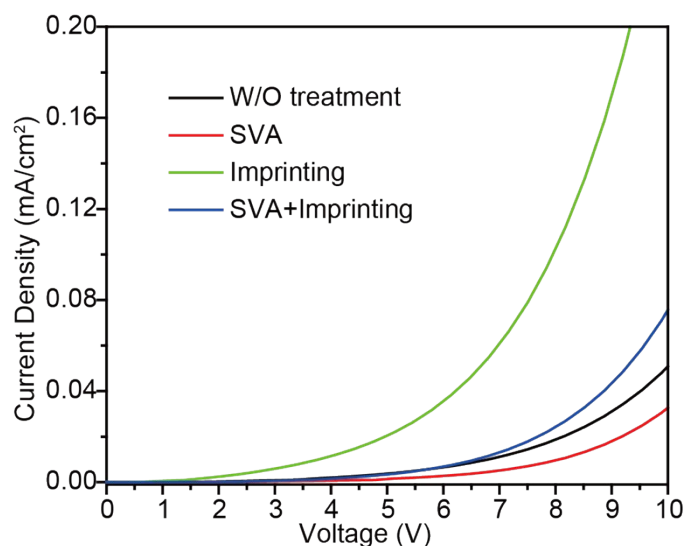


Figure S9. Current density versus voltage plot of hole-only device with the structure of ITO/PEDOT:PSS (100 nm)/TAPC(20 nm)/mCP(100 nm)/MoO₃(10 nm)/Al(100 nm), where the PEDOT:PSS layer was treated under different conditions.

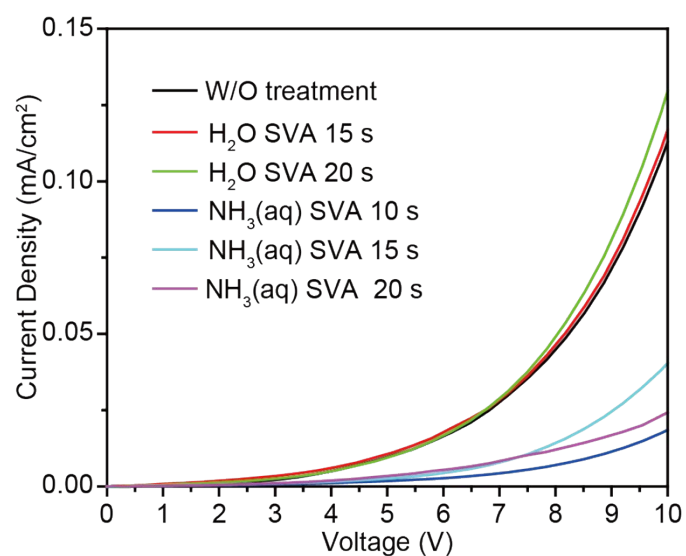


Figure S10. Current density versus voltage plot of hole-only device with the structure of ITO/PEDOT:PSS (100 nm)/TAPC(20 nm)/mCP(100 nm)/MoO₃(10 nm)/Al(100 nm), where the PEDOT:PSS layer was treated by NH₃(aq) or H₂O vapor.

Table S1. Summary of the device performance for phosphorescent OLEDs fabricated using PEDOT:PSS layers with different preparation conditions.

Preparation of PEDOT:PSS	$V_{on}(V)$	Luminance(cd/m^2)	CE(cd/A)	PE(lm/W)
1000 rpm, 40 s	3.23	21116	29.73	27.38
1500 rpm, 40 s	3.23	21125	28.28	26.05
1800 rpm, 40 s	3.23	20250	27.87	25.67
2000 rpm, 40 s	3.14	21126	27.30	25.06
2500 rpm, 40 s	3.23	21127	28.30	26.07

Table S2. Summary of the device performance for phosphorescent OLEDs fabricated with $NH_3(aq)$ SVA-treated PEDOT:PSS layers.

SVA treatment	$V_{on}(V)$	Luminance(cd/m^2)	CE(cd/A)	PE(lm/W)	EQE(%)
W/O treatment	3.17	21093	26.26	21.98	13.73
$NH_3(aq)$ SVA 5 s	3.45	21109	28.00	23.45	14.38
$NH_3(aq)$ SVA 10 s	3.38	21108	28.78	22.55	14.79
$NH_3(aq)$ SVA 15 s	3.40	21112	31.41	25.58	16.13
$NH_3(aq)$ SVA 20 s	3.53	19177	27.87	22.86	14.31

Table S3. Summary of the device performance for phosphorescent OLEDs fabricated with H_2O SVA-treated PEDOT:PSS layers.

SVA treatment	$V_{on}(V)$	Luminance(cd/m^2)	CE(cd/A)	PE(lm/W)
W/O treatment	3.25	21135	26.95	22.05
H_2O SVA 10 s	3.25	21137	28.20	23.09
H_2O SVA 15 s	3.20	21141	26.67	21.38
H_2O SVA 20 s	3.25	21144	25.79	19.70

Table S4. Summary of the device performance for phosphorescent OLEDs fabricated with different SVA-treated PEDOT:PSS layers.

Vapor Type	$V_{on}(V)$	Luminance (cd/m^2)	CE (cd/A)	PE (lm/W)
W/O treatment	3.27	21135	26.95	22.05
$NH_3 \cdot H_2O$	3.59	21100	30.66	21.61
DETA	3.56	21095	28.71	21.05
MEA	3.55	19960	27.87	22.86
IPA	3.56	21094	27.25	19.91

Table S5. Summary of the device performance for phosphorescent OLEDs fabricated with $\text{NH}_3(\text{aq})$ SVA-treated sub-micron patterned PEDOT:PSS layers.

SVA treatment	$V_{\text{on}}(\text{V})$	Luminance(cd/m^2)	CE(cd/A)	PE(lm/W)
W/O treatment	3.25	21135	26.95	22.05
SVA with PDMS template	3.48	19721	36.62	27.60
SVA without PDMS template	3.66	20876	26.00	21.38