

Supporting Information

Facile synthesis of solution-processed MoS₂ nanosheet and its application for high-performance ultraviolet organic light-emitting diodes

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Table S1 Summarization of some reported visible OLEDs with HILs of MoS₂ and its composites, and comparison with similar candidates

HIL	Emissive layer	Maximum LE (cd/A)	Maximum PE (lm/W)	Maximum luminance (cd/m ²)	Reference
MoS ₂ +PEDOT:PSS	Alq ₃	8.1	5.7	24064	This work
MoS ₂ -UVO	Alq ₃	7.5	3.5	23203	This work
MoS ₂ -UVO	Alq ₃ :C545T	14.7	4.3	23300	Ref. 38
MoS ₂ -UVO	Alq ₃ :C545T	12.01	3.43	18900	Ref. 36
MoS ₂ -UVO	Alq ₃ :C545T	9.44	2.53	16700	Ref. 18
MoS ₂ -GO	Alq ₃ :C545T	11.22	3.77	20300	Ref. 29
MoS ₂ /MoO ₃	Alq ₃	4.36@100mA	2.1 @100mA	-	Ref. 41
Rubbing/ion-beam treated MoS ₂	F8BT	2.6	-	5700	Ref. 40
O ₂ -plasma treated MoS ₂	polyfluorene	7.3 @1000 cd/m ²	9.6 @1000 cd/m ²	-	Ref. S1 [#]
CN _x H _y	Alq ₃	8.3	4.3	16922	Ref. 28
MoO _x	Alq ₃	8.1	5.0	8475	Ref. 20

[#]S1 G. L. Frey, K. J. Reynolds and R. H. Friend, *Adv. Mater.* 2002, **14**, 265.

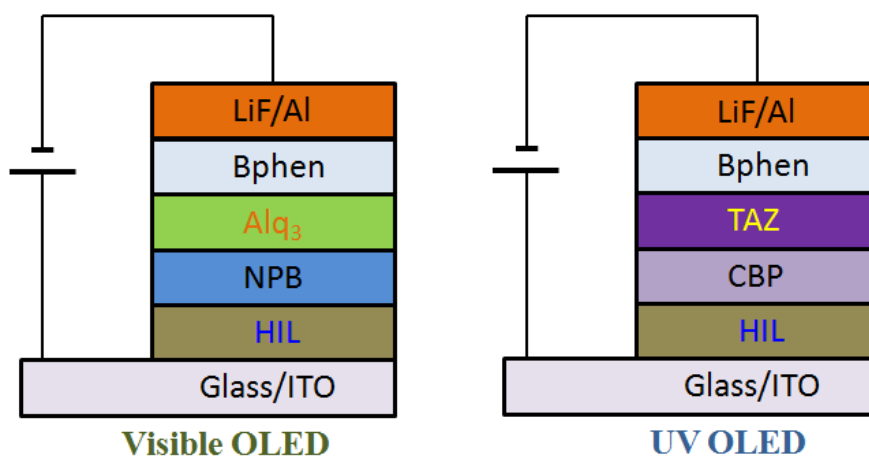


Fig. S1 Schematic device structures of visible and UV OLEDs.

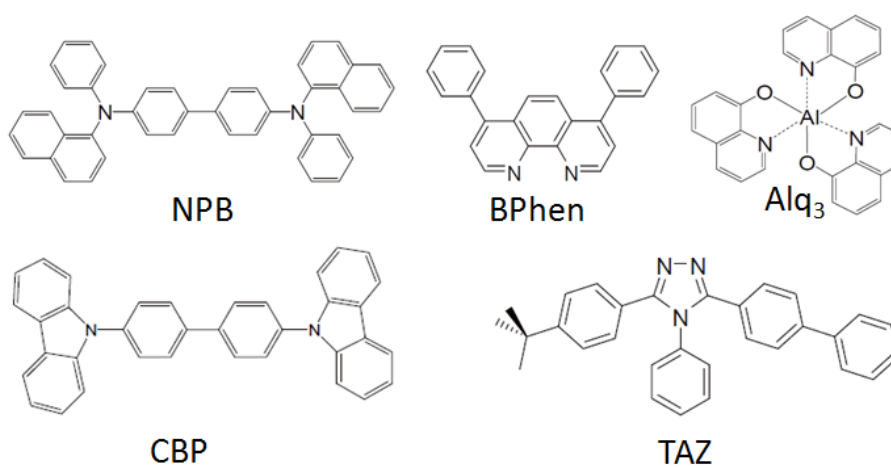


Fig. S2 Molecular structures of NPB, BPhen, Alq₃, CBP and TAZ.

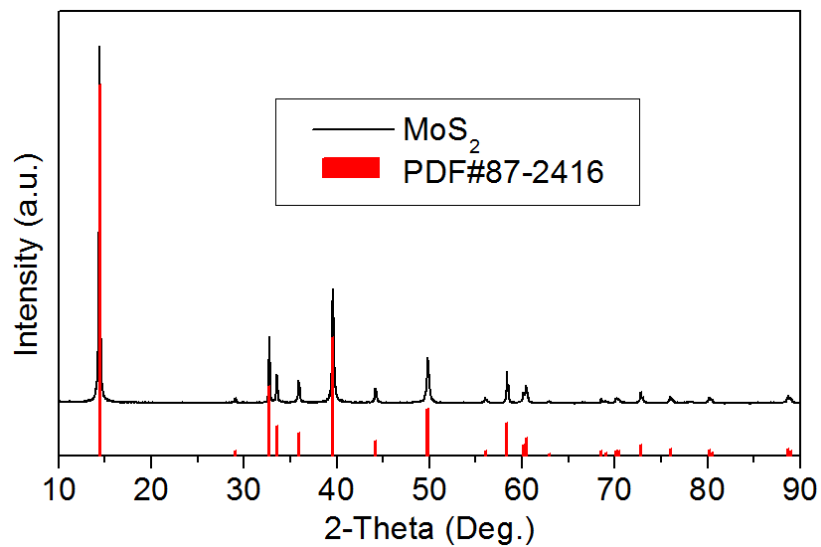


Fig. S3 XRD pattern of pristine MoS₂ powders and comparison with standard PDF card (No. #87-2416).

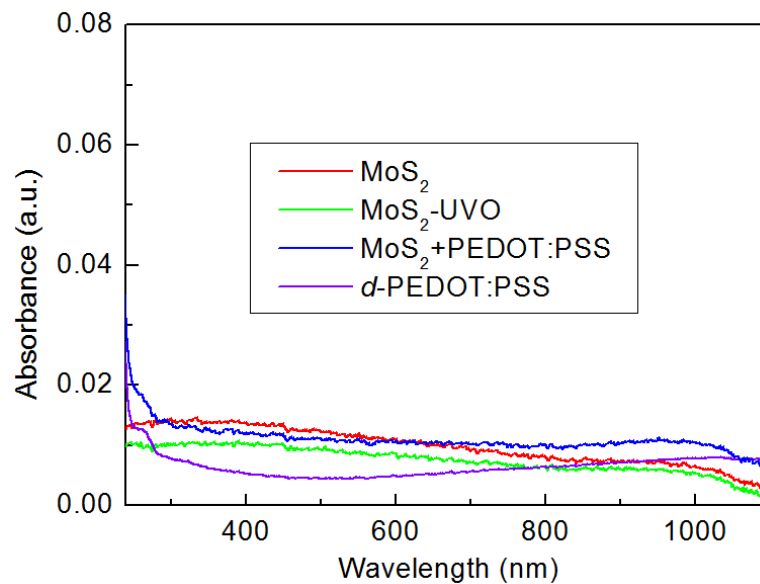


Fig. S4 UV-visible absorption spectra of MoS₂ (0.3 mg/mL), MoS₂-UVO (5 s), MoS₂+PEDOT:PSS (2:1) and *d*-PEDOT:PSS films within the range of 300-1100 nm.

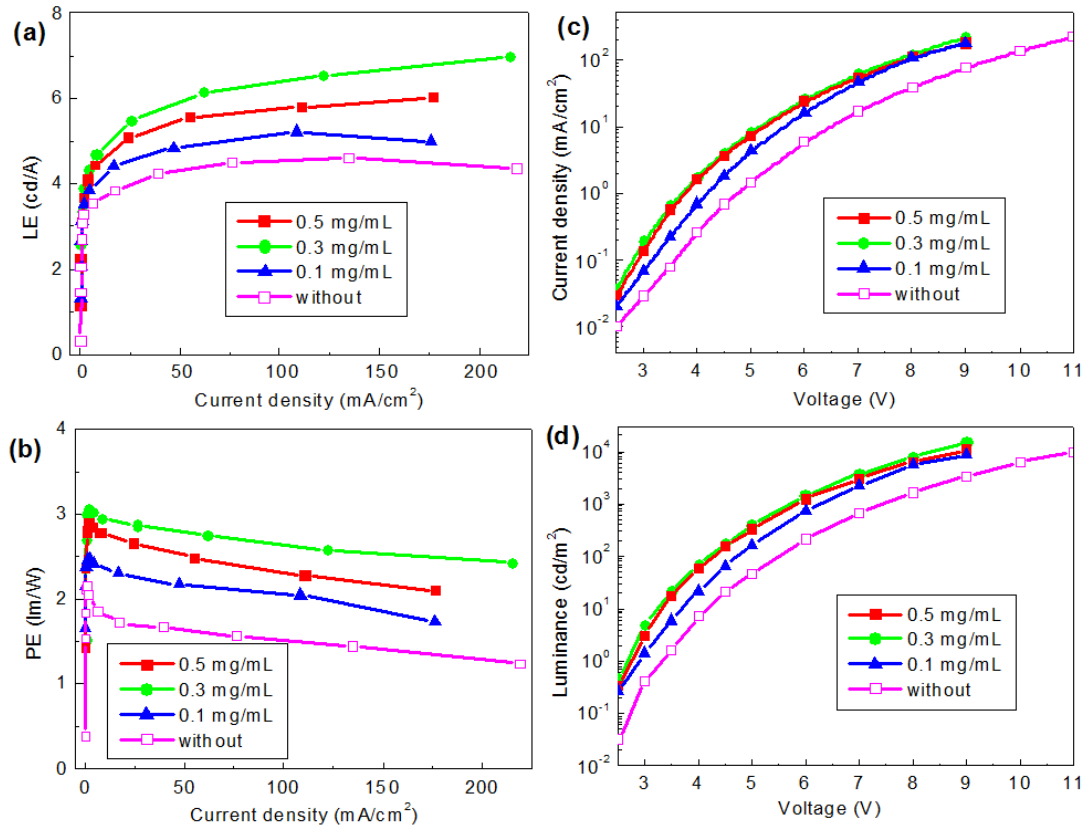


Fig. S5 Device efficiencies and J - V - L characteristics of visible OLEDs with MoS₂ HILs having different concentrations (Device A₁: 0.5 mg/mL, Device A₂: 0.3 mg/mL, Device A₃: 0.1 mg/mL), and comparison with the reference (Device A₀) without any

HIL.

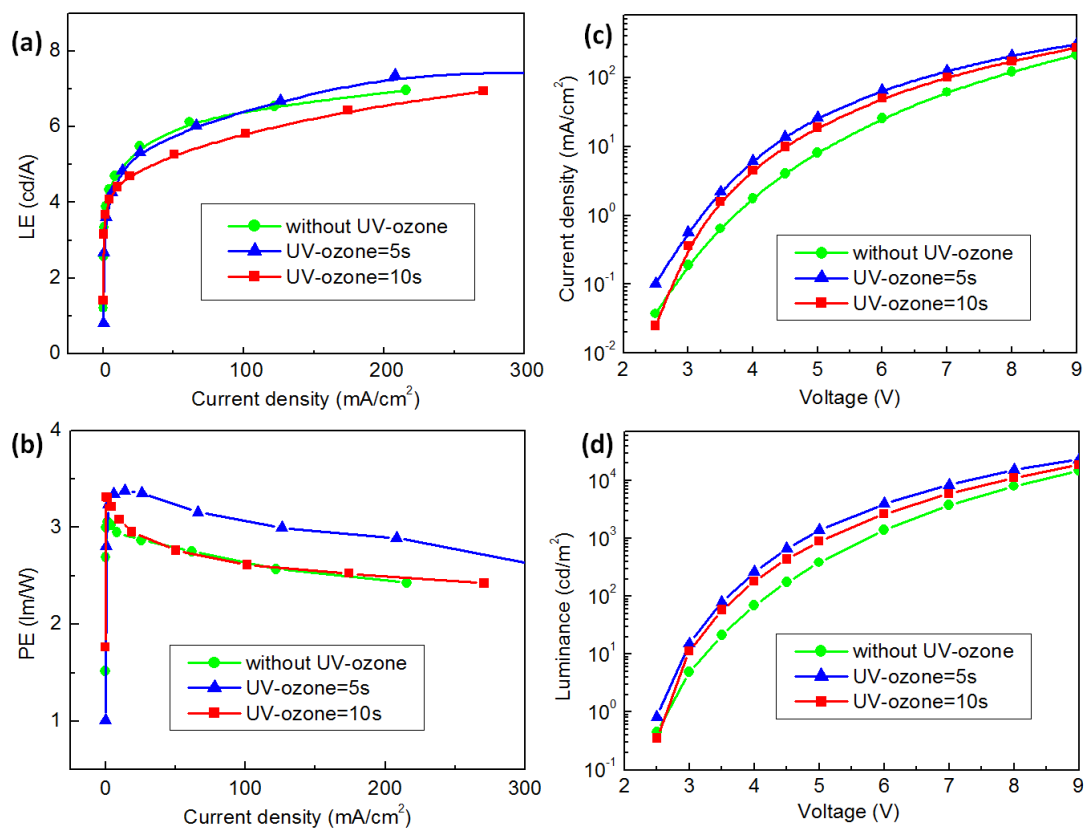


Fig. S6 Device efficiencies and J - V - L characteristics of visible OLEDs having HILs of MoS₂ (0.3 mg/mL) which is treated under UV-ozone irradiation with different time

(Device A₂: without UV-ozone treatment, Device B: UV-ozone=5 s, Device C:

UV-ozone=10 s).

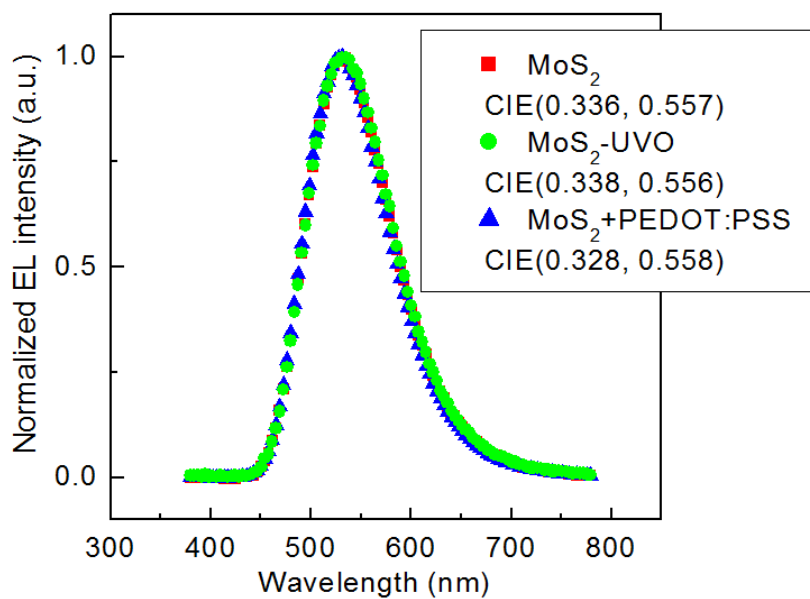


Fig. S7 EL spectra of Devices A₂, B and E with HILs of MoS₂ (0.3 mg/mL), MoS₂-UVO (5 s) and MoS₂+PEDOT:PSS (2:1), respectively. The corresponding 1931 Commission Internationale de L'Eclairage (CIE) color coordinates are also incorporated in the figure.

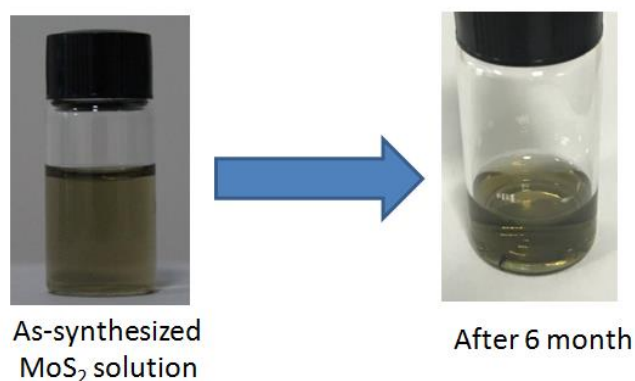


Fig. S8 As-synthesized MoS₂ aqueous solution and the change after remaining stationary for six month.