Supporting Information

Prolonged lifetime in nanocrystal light-emitting diodes incorporating MoS_2-based conjugated polyelectrolyte interfacial layer as alternative to PEDOT:PSS

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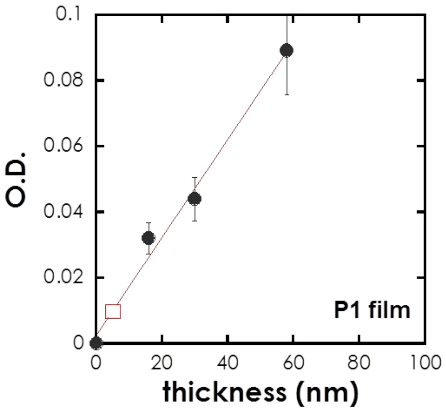

Figure S1. Optical density vs thickness (measured by profilometer) of P1 film on glass. The thickness of 10 nm P1 film was derived by measuring its optical density and by fitting data with Lambert-Beer law.

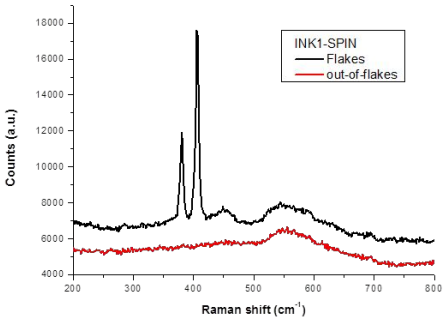

Figure S2. MoS_2-centered on and out-of flakes Raman spectra of ink1 film

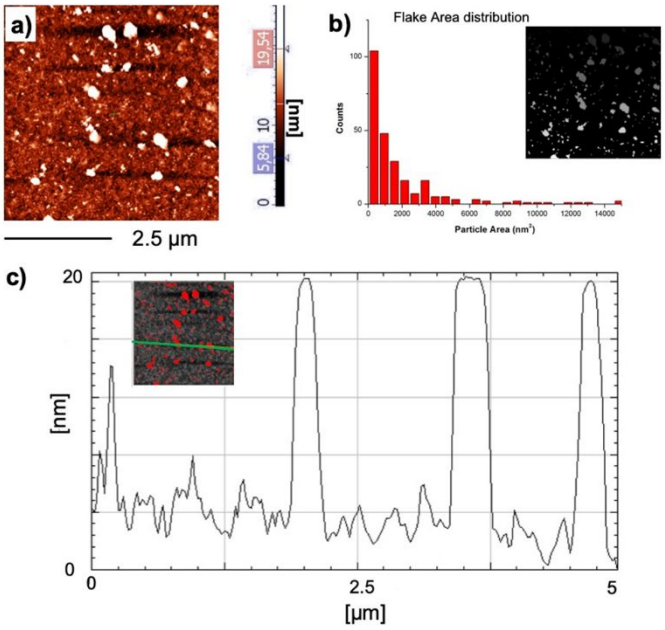

Figure S3. AFM topographic image of MoS_2 spin-coated film (a), flakes size distribution analysis (b), and section profile (c). The histogram shows that the 95% of the total population of flakes has an area below 6000 nm^2. As a results, taking a circle as approximate flake shape, we can derive a maximum flake size ~86 nm. Furthermore, from the section profile analysis (c), the flakes exhibit a maximum thickness of about 20 nm.

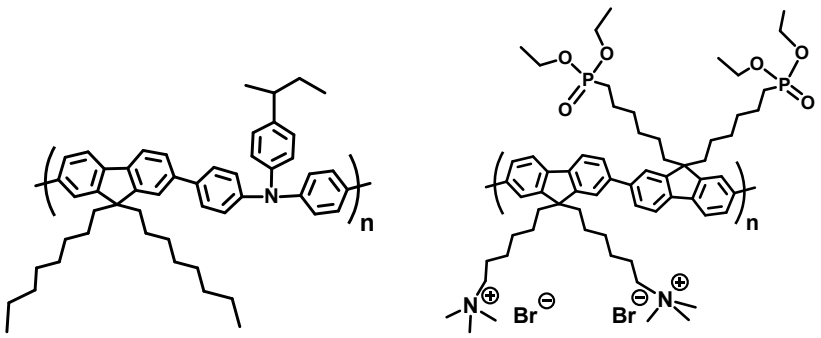

Figure S4. (a) Poly[(9,9-dioctylfluorenyl-2,7-diyl)-co-(4,4′-(N-(4-sec-butylphenyl)diphenyl-amine)] (TFB) (P1) and (b) Poly[(2,7-(9,9′-bis(6′-diethoxylphosphorylhexyl)-fluorene)-alt-(2,7-(9,9′-bis(6″-trimethylammonium bromide)hexyl)-fluorene) (P2).

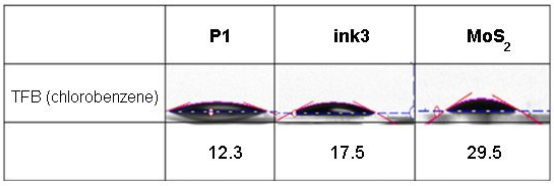

Figure S5. Wettability of the different HTLs with TFB chlorobenzene solutions

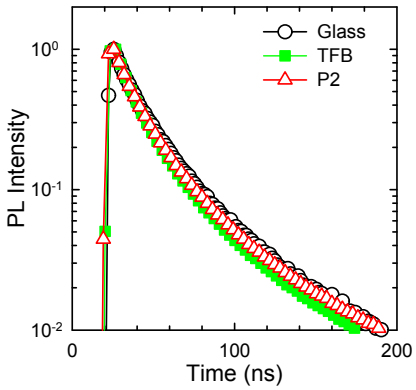

Figure S6. PL dynamics of thin NPL film at 660 nm deposited onto glass, TFB or P2 substrates.

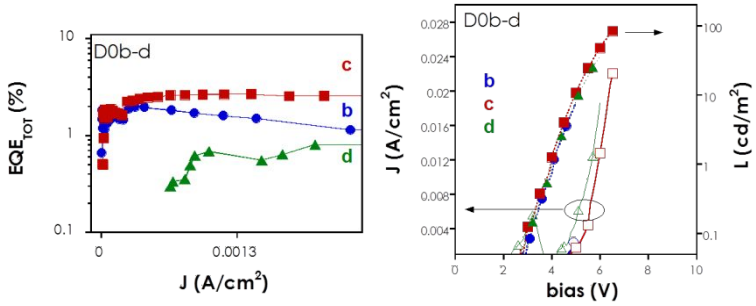

Figure S7. External quantum efficiency (EQE, %) and Current-density(J)- Luminance(L)-Voltage(V) characteristics of D0b-d.

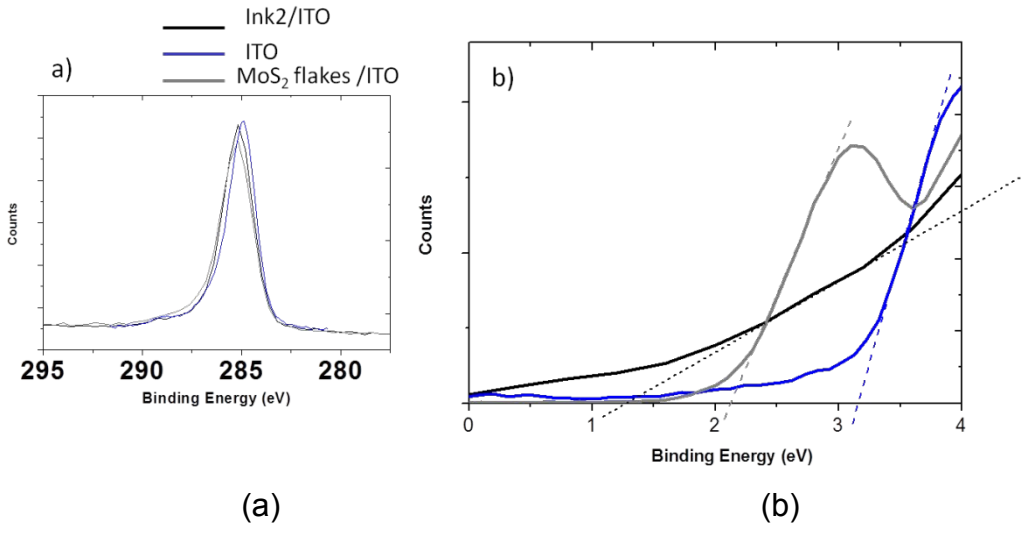

Figure S8. Comparative (monochromatic) XPS study of the valence band spectrum by matching the MoS_2:P1 mixtures used in our study (denoted as ink2/ITO) with the corresponding bare substrate (ITO) and with mechanically exfoliated MoS_2 flakes on ITO. Measurements are all referenced to the conventional positioning of the C 1s core level line (a) at a binding energy of 285.0 eV.

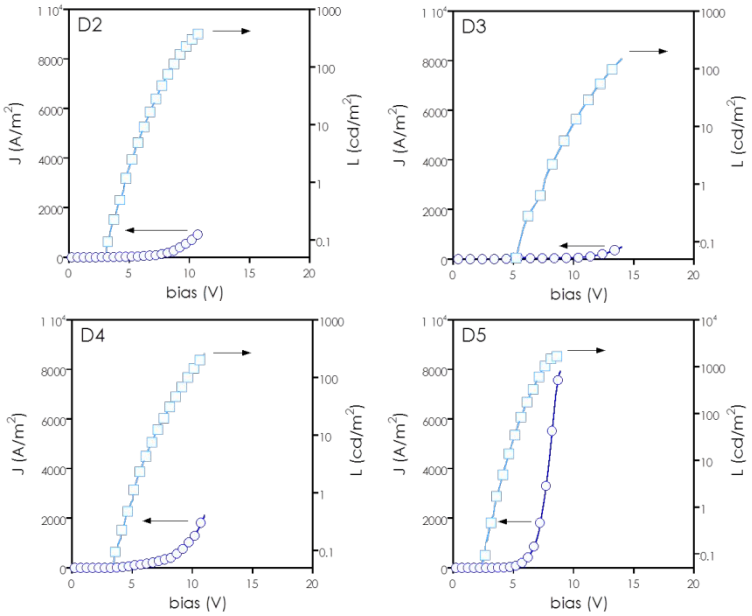

Figure S9. JLV characteristics of, D2, D3, D4 and control D5.

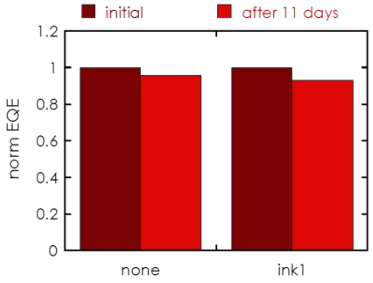

Figure S10. Normalized EQEs of pristine HT-free devices (with just TFB layer directly deposited on ITO) and the ink1-based LEDs, and after 11 days of exposure to air.