Supporting Information

# Efficient Defect Healing of Transition Metal Dichalcogenides by Metallophthalocyanine

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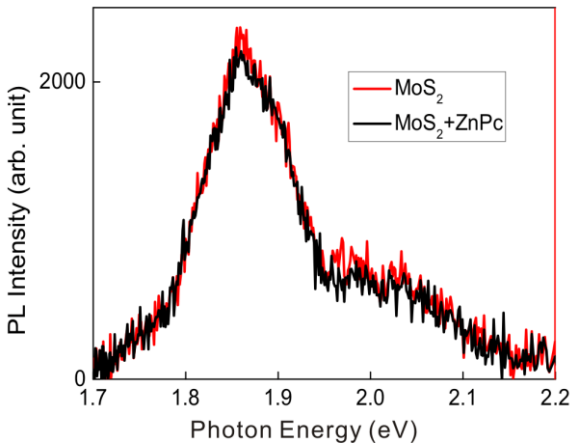


**Figure S1.** PL spectra of CVD-grown monolayer $MoS_2$ before and after functionalization with ZnPc measured at room temperature. Broad two peaks are related to the spin-orbit split B-exciton. Due to unfavorable charge transfer from $MoS_2$, the PL signal remains nearly unchanged after MPc functionalization.

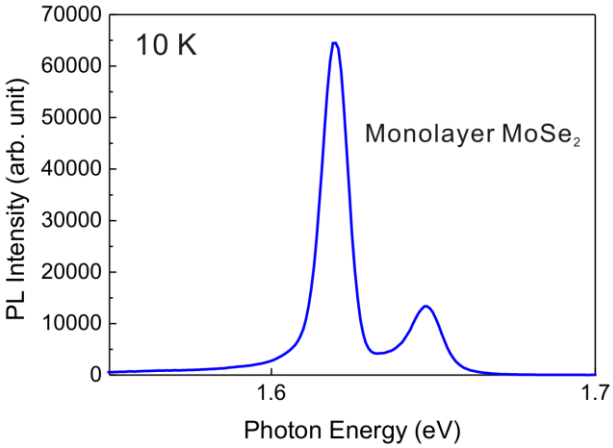


**Figure S2.** PL spectrum of mechanically exfoliated monolayer $MoSe_2$ measured at 10 K. Narrow and well-separated trion and exciton peaks can be observed. Details of exfoliation and transfer process can be found in Ref. [1].

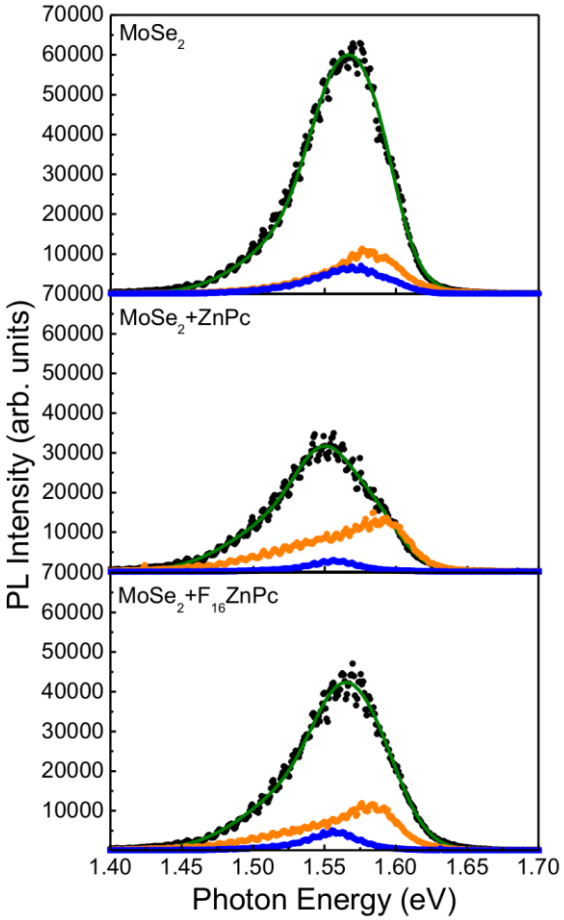


**Figure S3.** PL spectra of as-grown $MoSe_2$, $MoSe_2$+ZnPc, and $MoSe_2$+$F_{16}$ZnPc measured at 10 K (black dots), 60K (orange dots), and 200 K (blue dots). Although the PL quenching rate is different, thermal evolution of PL of trions and excitons are very similar for $MoSe_2$+ZnPc and $MoSe_2$+$F_{16}$ZnPc.

References

[1] Desai, S. B.; Madhvapathy, S. R.; Amani, M.; Kiriya, D.; Hettick, M.; Tosun, M.; Zhou, Y.; Dubey, M.; Ager III, J. W.; Chrzan, D.; Javey, A. Gold-Mediated Exfoliation of Ultralarge Optoelectronically-Perfect Monolayers, *Adv. Mater.* **2016**, *28*, 4053–4058.