**Supplementary Material (SM) for**

**Sonochemical functionalization of MoS\textsubscript{2} by Zinc Phthalocyanine and its visible light induced photocatalytic activity**

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**Figure S1** Optical absorption spectra of MoS\textsubscript{2}-ZnTTBPc composite with varying ratio of MoS\textsubscript{2} and ZnTTBPc (A) 1:1, (B) 2:1, (C) 3:1, (D) 4:1, (E) 5:1. (F) A comparison of change in absorption after 300 min of sonication for the varying ratio of MoS\textsubscript{2} in the MoS\textsubscript{2}-ZnTTBPc composite.
Figure S2 Photoluminescence spectra of controlled-ZnTTBPc, and MoS$_2$-ZnTTBPc composite with varying ratio of MoS$_2$ and ZnTTBPc (A) 1:1, (B) 2:1, (C) 3:1, (D) 4:1, (E) 5:1. (F) Variation of quenching efficiency of the MoS$_2$-ZnTTBPc composite for different MoS$_2$ content in the composite after 300 min of sonication.

Figure S3 (A) AFM image of MoS$_2$-ZnTTBPc (3:1) composite films on a silicon wafer. (B) TEM image of MoS$_2$-ZnTTBPc (3:1) composite.
Figure S4 Lifetime transients of controlled-ZnTTBPc, MoS\textsubscript{2}-ZnTTBPc (1:1), MoS\textsubscript{2}-ZnTTBPc (2:1), MoS\textsubscript{2}-ZnTTBPc (3:1), MoS\textsubscript{2}-ZnTTBPc (4:1), MoS\textsubscript{2}-ZnTTBPc (5:1) composites along with the IRF.

Figure S5 UV-vis absorption spectra of 4-NP and NaBH\textsubscript{4} solution (A) without catalyst under dark and simulated solar light illumination for 1 h (B) with and without MoS\textsubscript{2}-ZnTTBPc (3:1) composite under dark.
Figure S6 UV–vis absorption spectra of 4-NP and NaBH₄ solution with (A) MoS₂-ZnTTBPc (3:1) composite, (B) controlled-ZnTTBPc, and (C) controlled-MoS₂ for different time of simulated solar light illumination.

Figure S7 Comparison of the photo degradation efficiency with varying ratio of MoS₂ and ZnTTBPc in the MoS₂-ZnTTBPc composite.
Figure S8 (A) Photodegradation efficiency of MoS$_2$-ZnTTBPc (3:1) composite for different cycle. (B) The XRD pattern of MoS$_2$-ZnTTBPc (3:1) composite after five cycles of reduction of 4-NP.