

Supplementary Information

Nomenclature

Symbols

ϵ : Absorption coefficient, $\text{cm}^{-1}\text{M}^{-1}$

θ : Bragg angle

β = Full width at half maximum intensity (FWHM, radians)

λ : Wavelength, nm

A_{246} : Absorbance of MB expressed as at $\lambda = 246$ nm at time t

A_{292} : Absorbance of MB expressed as at $\lambda = 292$ nm at time t

A_{664} : Absorbance of MB expressed as at $\lambda = 664$ nm at time t

$A_{246,0}$: Initial absorbance of MB expressed as at $\lambda = 246$ nm

$A_{292,0}$: Initial absorbance of MB expressed as at $\lambda = 292$ nm

$A_{664,0}$: Initial absorbance of MB expressed as at $\lambda = 664$ nm

k : Pseudo first order reaction rate constant, min^{-1}

R : Pseudo first order rate, $\text{cm}^{-1}\text{min}^{-1}$

t : Irradiation time, min

$t_{1/2}$: Half-life, min

Abbreviations

ANI: Aniline

APS: Ammonium persulfate

BLF: Black light fluorescent lamp

D : Crystallite size, nm

E_{bg} : Band gap energy

EDAX: Energy dispersive X-ray analysis unit

FT-IR: Fourier Transform Infrared

MB: Methylene blue

PANI: Polyaniline

PANI-ES: Polyaniline emeraldine salt form

PANI-EB: Polyaniline emeraldine base form

PANI-ZnO: Polyaniline modified zinc oxide

PZI: Composites prepared by in-situ polymerization method

PZI-1: PZI composite with weight percentage (wt%) of ANI/ZnO:1/1

PZI-3: PZI composite with weight percentage (wt%) of ANI/ZnO:3/1

PZI-6: PZI composite with weight percentage (wt%) of ANI/ZnO:6/1

PZI-9: PZI composite with weight percentage (wt%) of ANI/ZnO:9/1

PZS: Composites prepared by hybridization method

PZS-1: PZS composite with weight percentage (wt%) of PANI-EB/ZnO:1/1

PZS-3: PZS composite with weight percentage (wt%) of PANI-EB/ZnO:3/1

PZS-6: PZS composite with weight percentage (wt%) of PANI-EB/ZnO:6/1

PZS-9: PZS composite with weight percentage (wt%) of PANI-EB/ZnO:9/1

SEM: Scanning electron microscopy

UV-vis: Ultraviolet–visible

XRD: X-Ray Diffraction

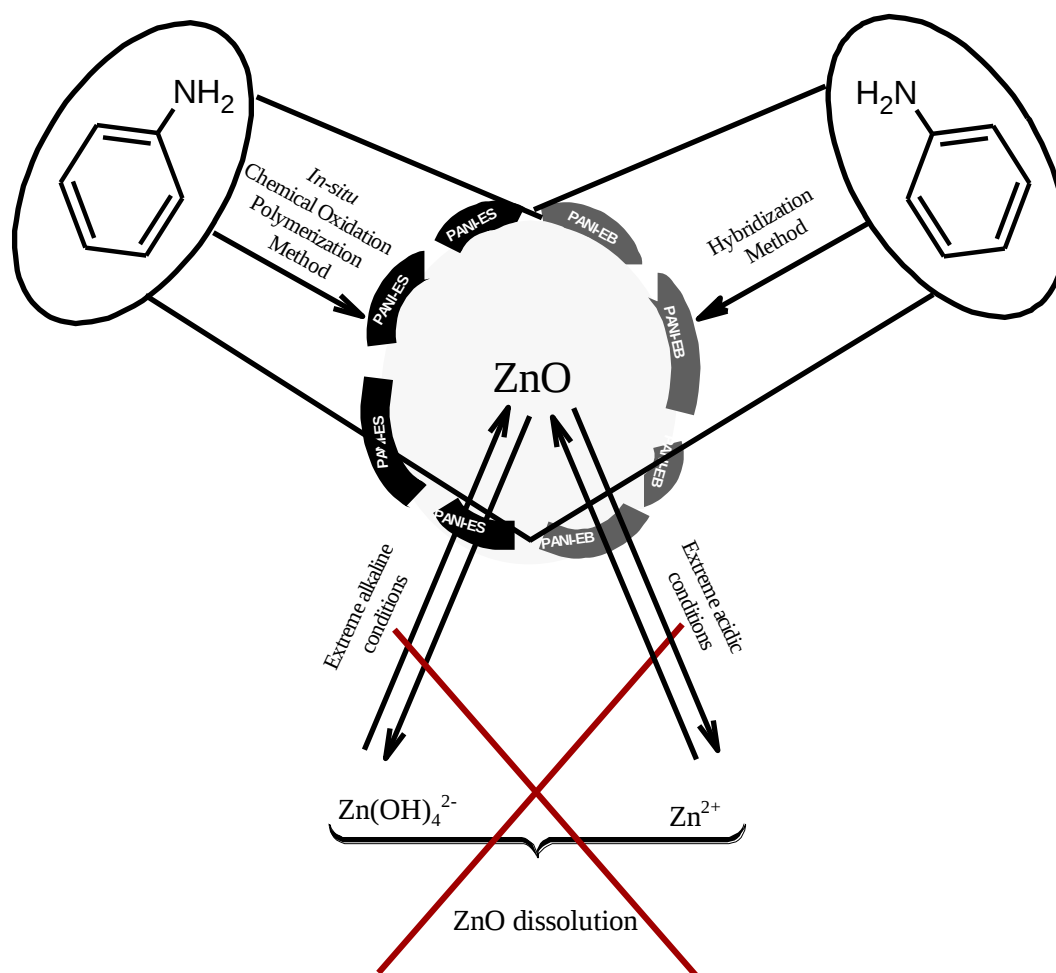


Figure S1. A schematic of PANI-ZnO preparation method including the ways preventing ZnO dissolution composites.

Part I. Preliminary Experiments

Photolysis of MB Upon Irradiation

UV-vis spectral features of sole MB (10 mg/L) under irradiation in comparison to BLF lamp spectra.

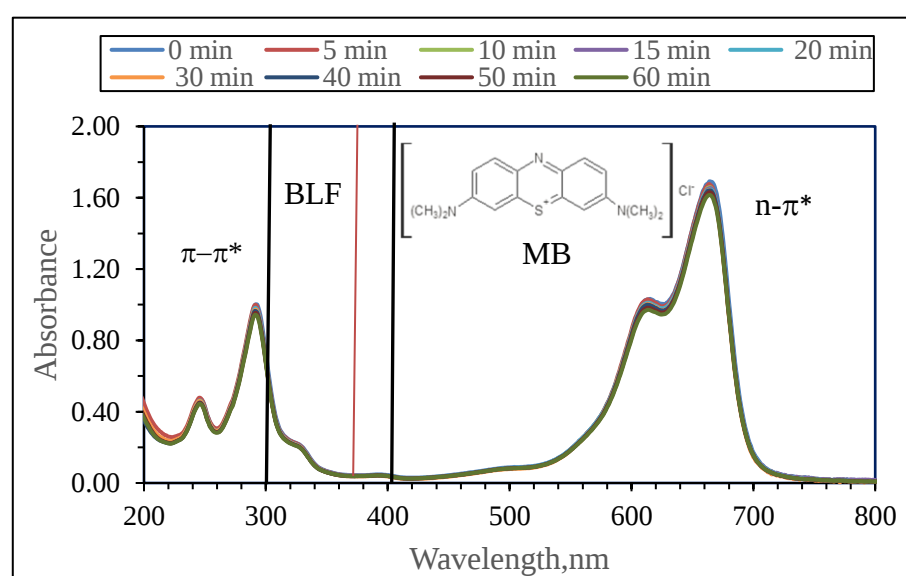


Figure S2. Time dependent UV-vis spectra of MB under irradiation and BLF lamp output spectra.

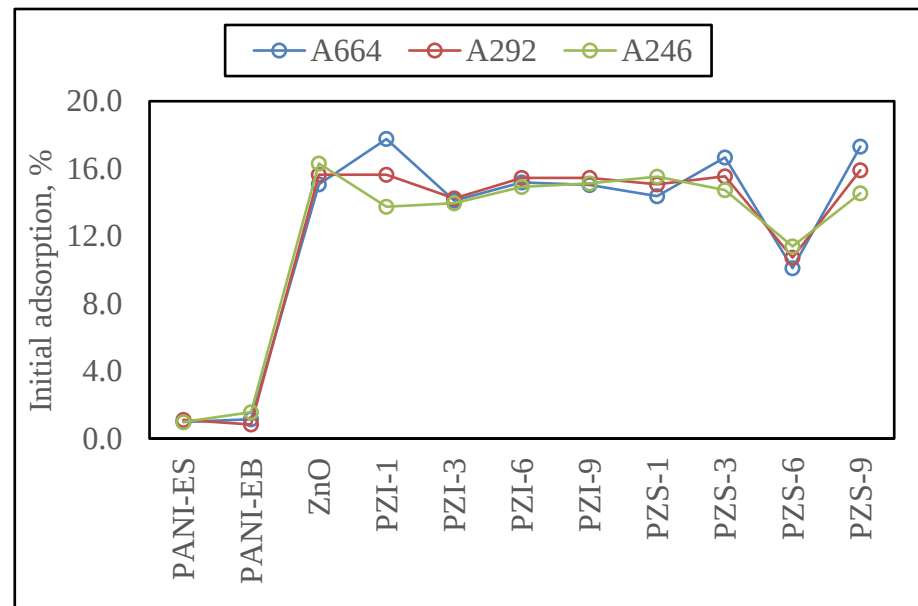
Dark Interactions:

Figure S3. Dark interactions between MB and photocatalyst specimens.

Chemical Structures of Methylene Blue, and Related Compounds

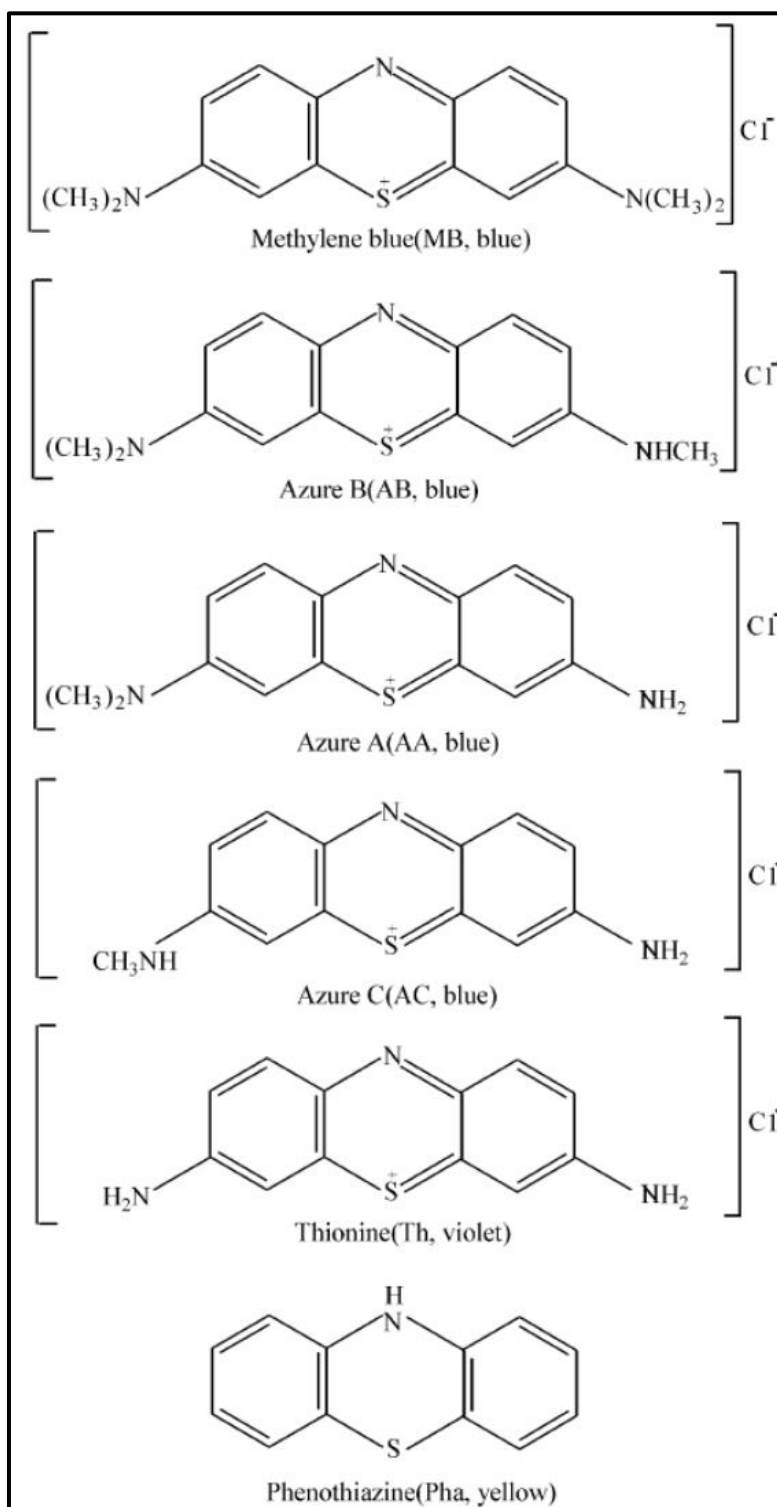


Figure S4. Chemical structures of MB and related compounds.

Part II. Photocatalytic Degradation

Behavior of MB Under Irradiation in the Presence of PANI-ES and PANI-EB in Comparison to Sole MB.

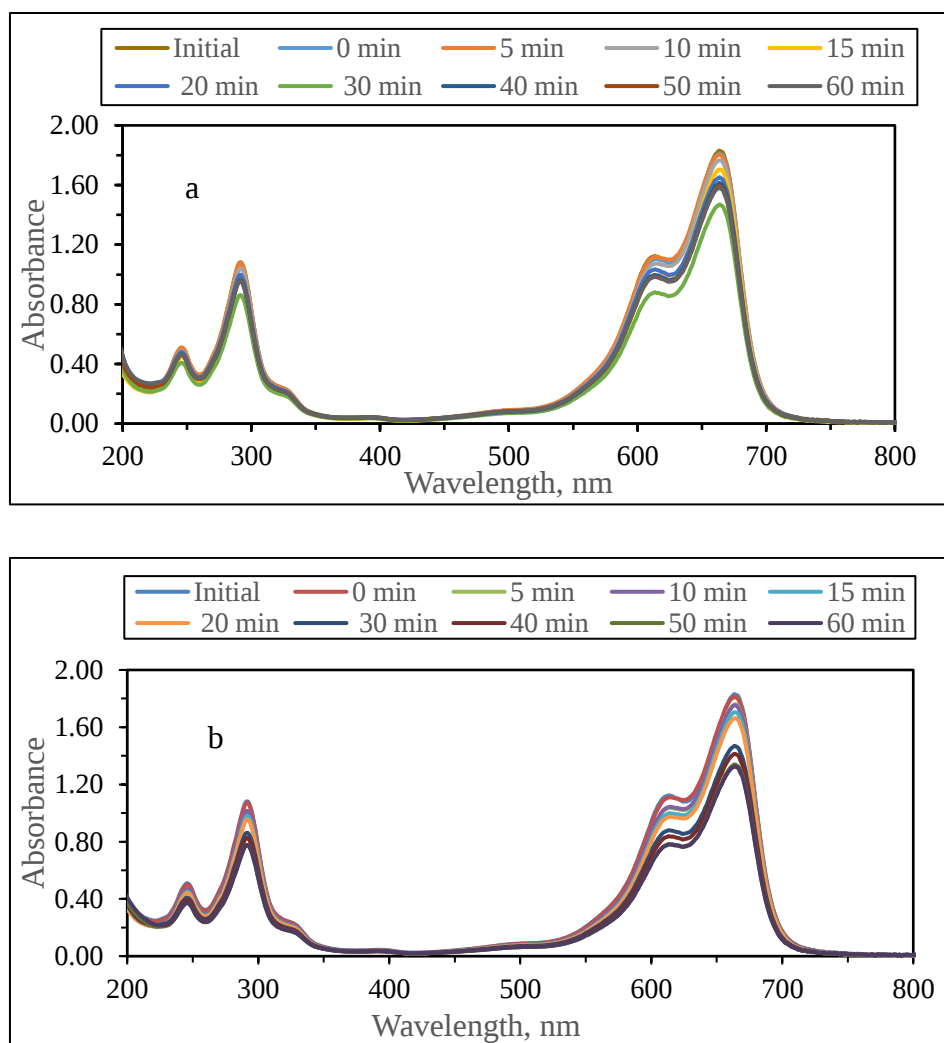
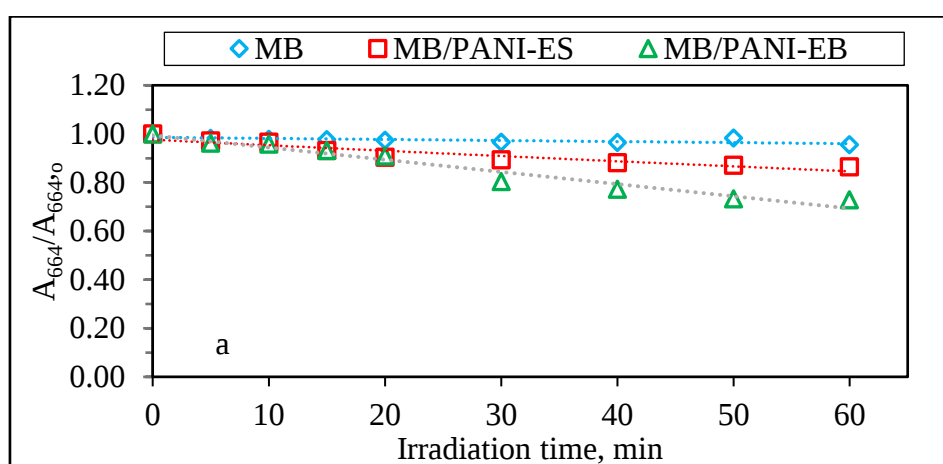


Figure S5. Irradiation time dependent UV-vis absorption spectra of MB using (a) PANI-ES and (b) PANI-EB.



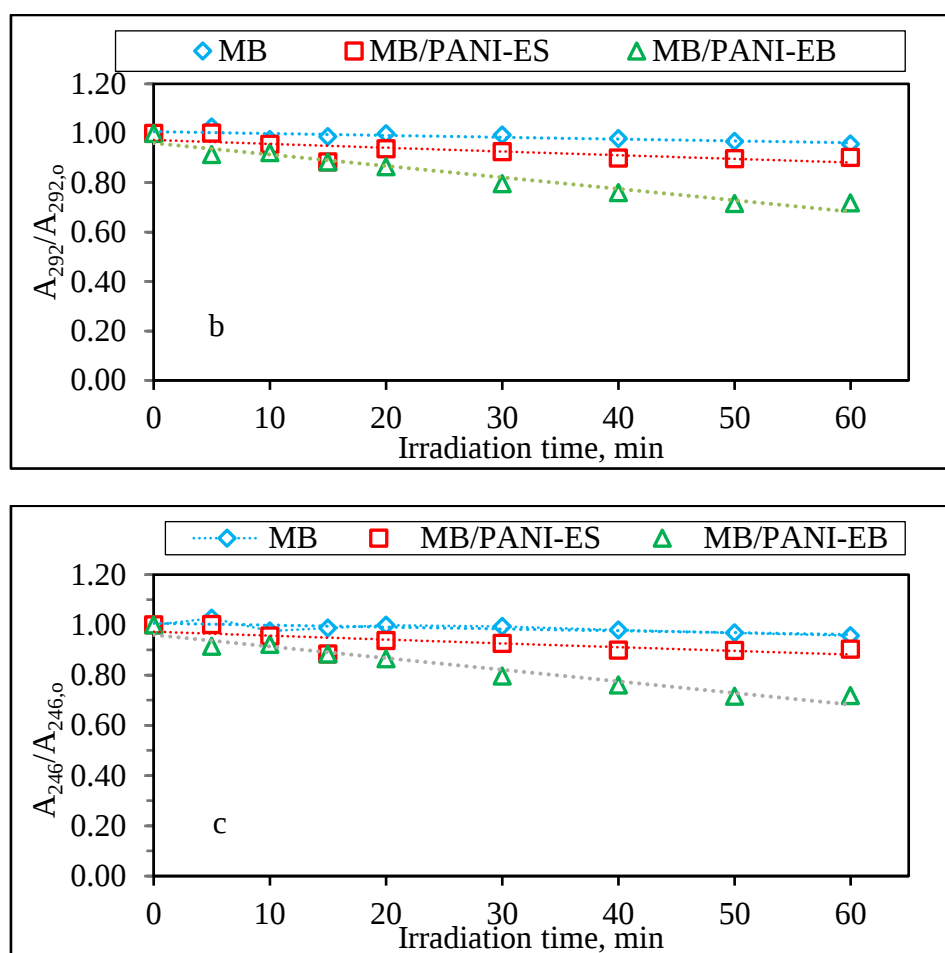
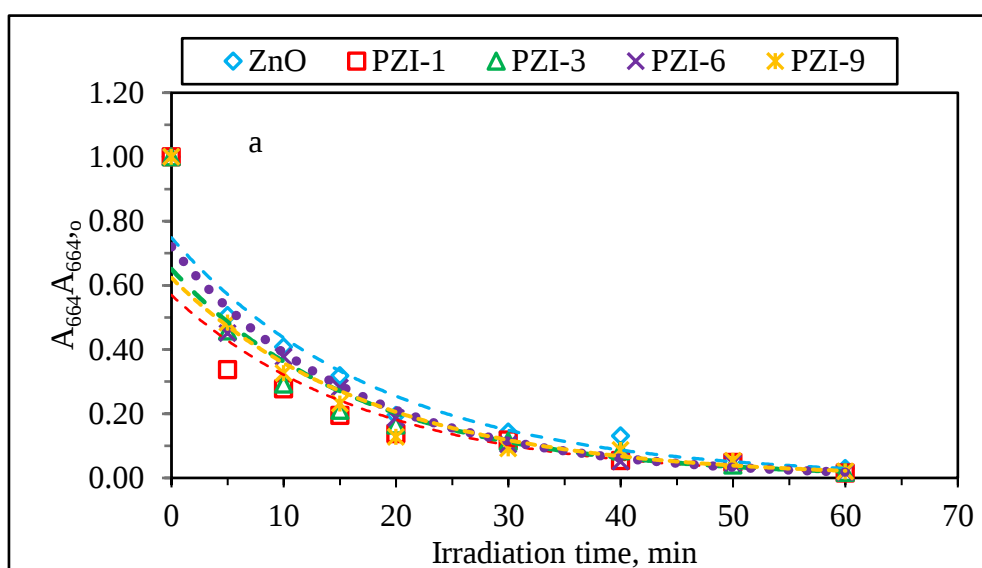


Figure S6. Photocatalytic degradation of MB in the presence of PANI-ES and PANI-EB in comparison to photolysis of MB. (a) A_{664} , (b) A_{292} , and (c) A_{246} .

Kinetics of Photocatalytic MB Degradation



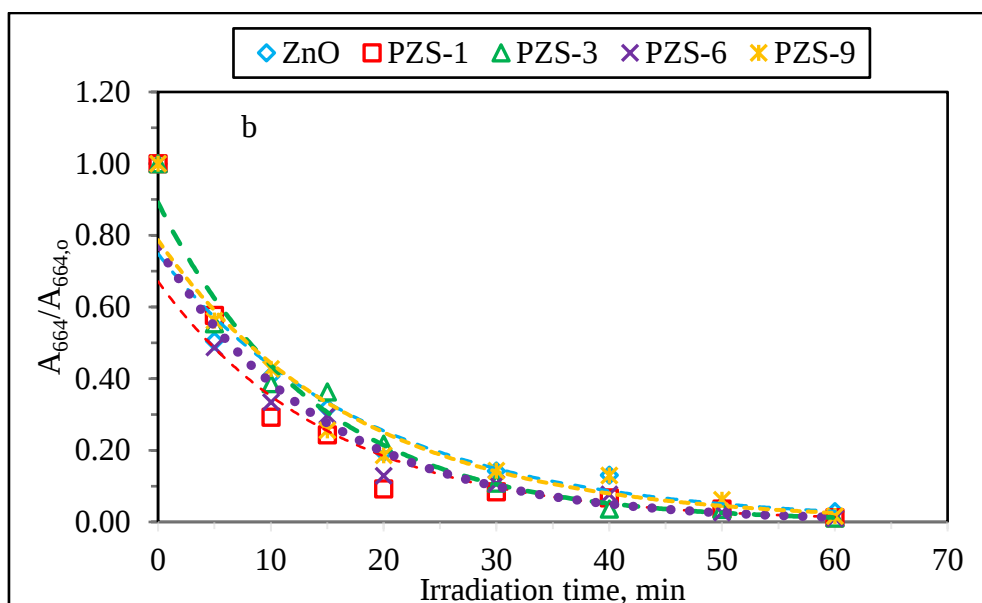


Figure S7. Decolorization A_{664} kinetic plots of MB for (a) ZnO and PZI composites, and (b) ZnO and PZS composites.

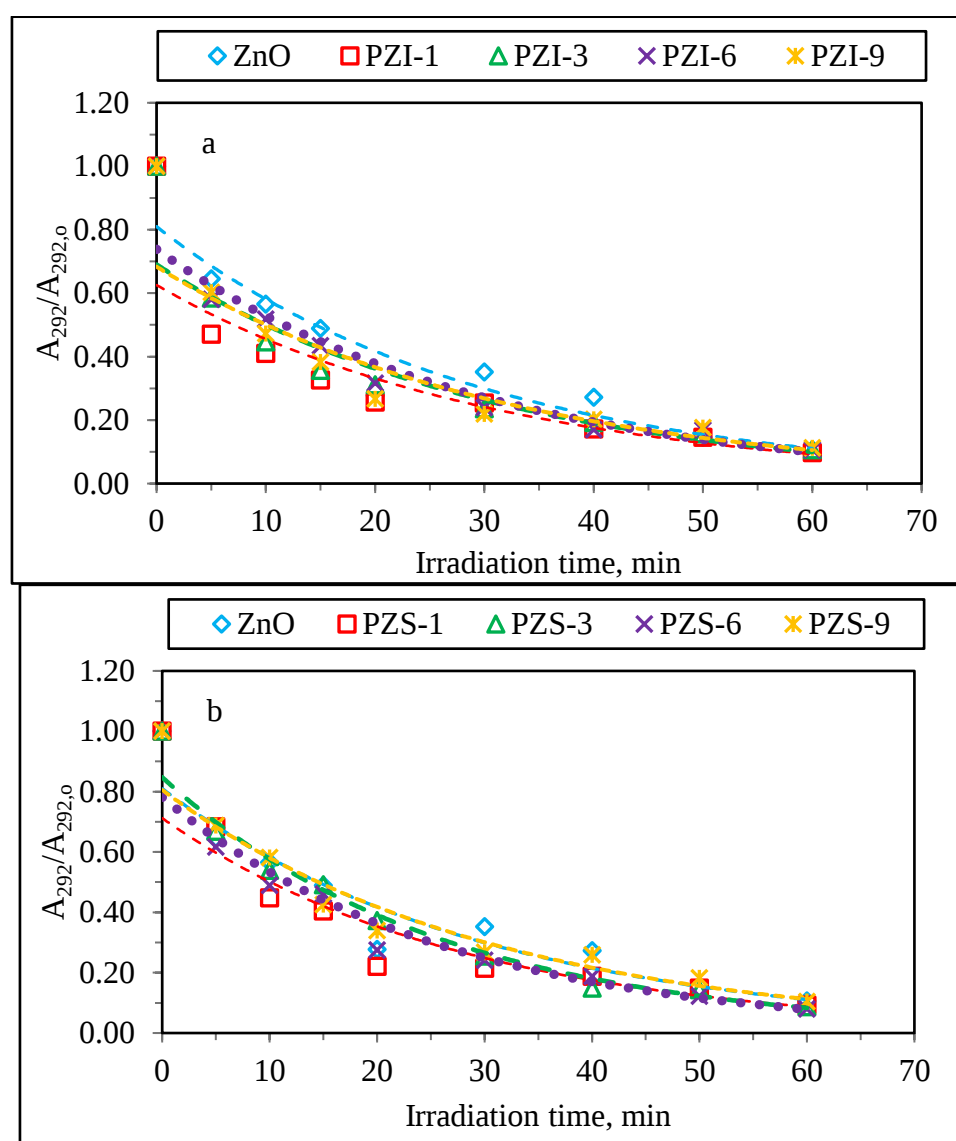


Figure S8. Decolorization A_{292} kinetic plots of MB for (a) ZnO and PZI composites, and (b) ZnO and PZS composites.

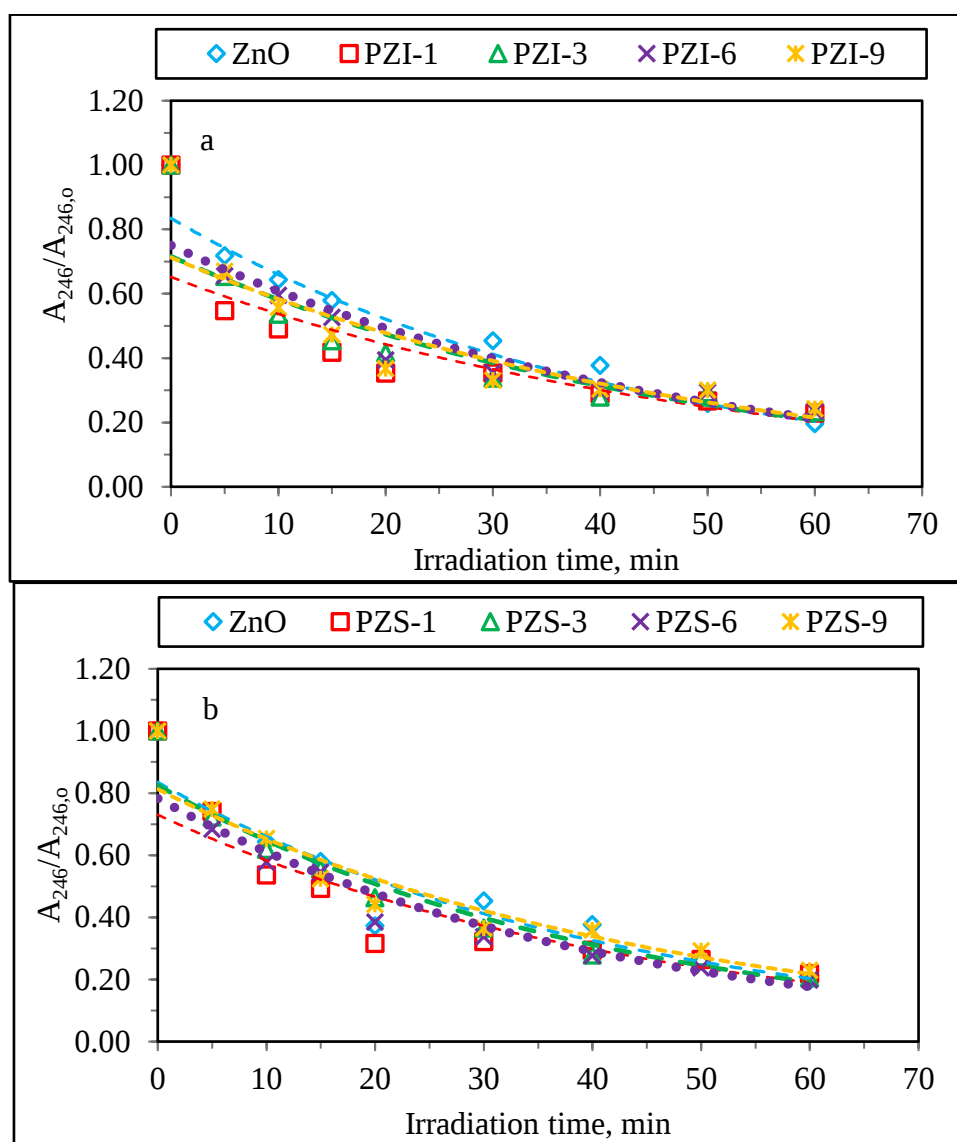


Figure S9. Decolorization A_{246} kinetic plots of MB for (a) ZnO and PZI composites, and (b) ZnO and PZS composites.