3D Macroporous TiO_2 Inverse Opal Binary and Ternary Composite Materials and Their Photocatalytic Activity

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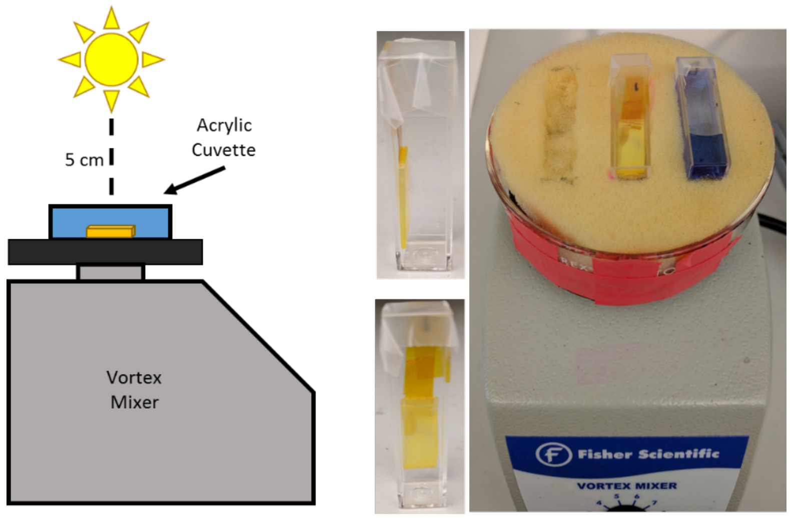


Figure S1. Thin film reactor setup. Cuvettes containing 1 slide and 3 mL 20 μM TB were placed in a custom-made sample holder cushion attached to a vortex mixer for solution agitation. The edge of the cuvette was placed 5 cm from the light source.

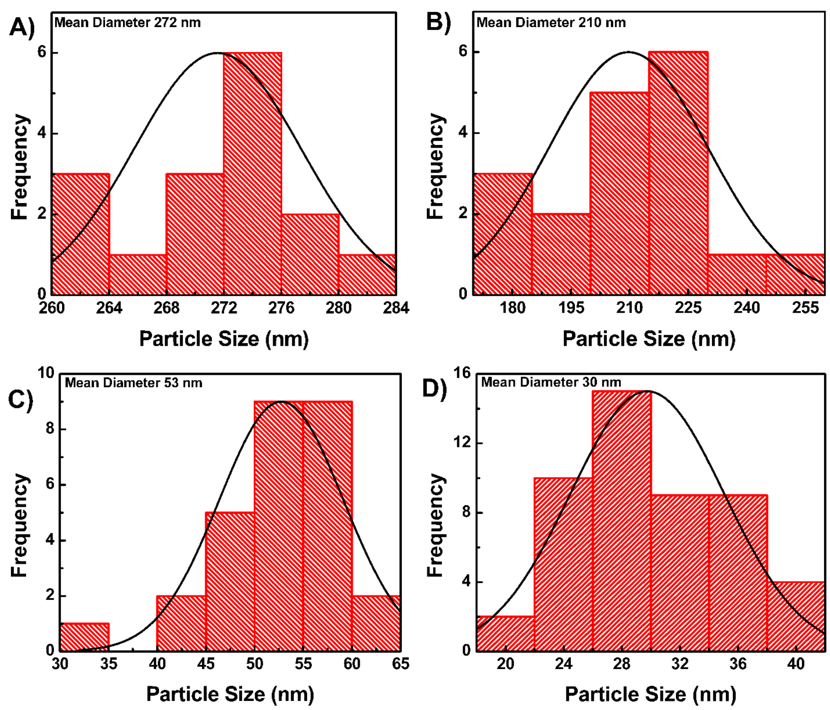


Figure S2. Size distribution histograms for polystyrene nanospheres (A), TiO_2 inverse opals (B), gold nanoparticles (C), and CdS quantum dots (D). Mean diameters were determined to be 272 ±

6 nm, 210 ± 20 nm, 53 ± 6 nm, and 30 ± 5 nm respectively. Measurements taken on SEM images using imageJ software.

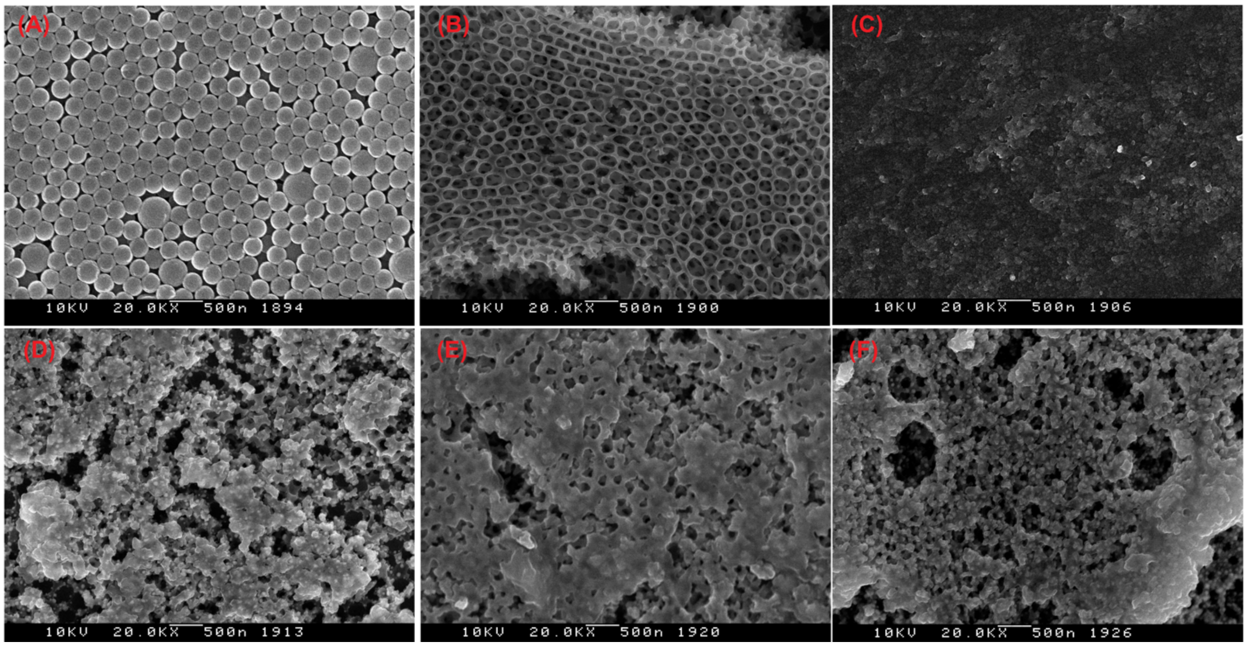


Figure S3. SEM images of PS film (a), IO-TiO_2 (b), CdS (c), IO-TiO_2-AuNPs (d), IO-TiO_2-CdS (e), and IO-TiO_2-AuNPs-CdS (f) are shown (scale bar is 500 nm). Images were taken with Topcon DS150 Field Emission Scanning Electron Microscope.

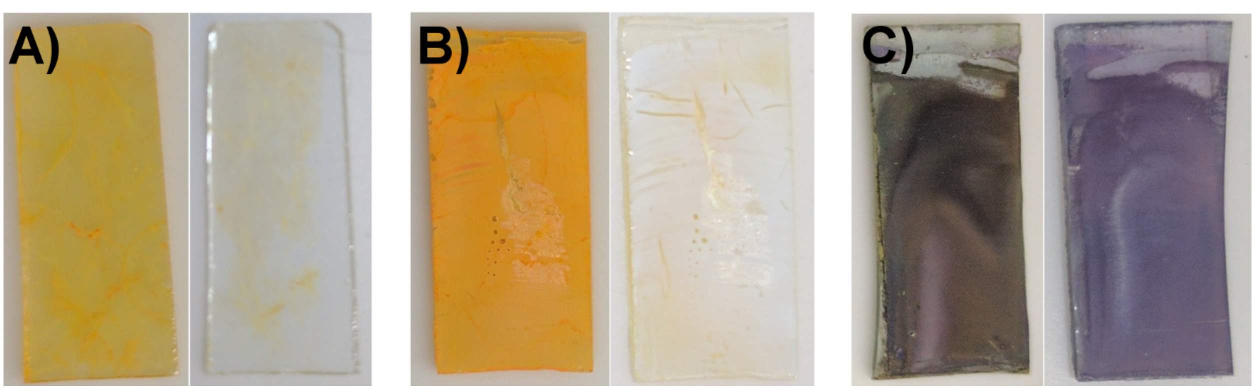


Figure S4. Observed loss of CdS due to photocorrosion for (A) CdS thin film, (B) binary IO-TiO_2-CdS, and (C) ternary IO-TiO_2-AuNPs-CdS systems.

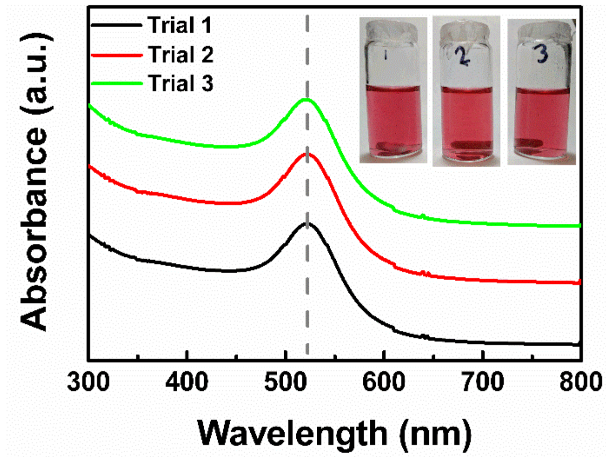


Figure S5. UV-visible absorption spectra for the residual gold colloid solutions after *in-situ* synthesis on the surface of the slides. The local surface plasmon resonance (LSPR) peak was centered at λ = 521 ± 1 nm.

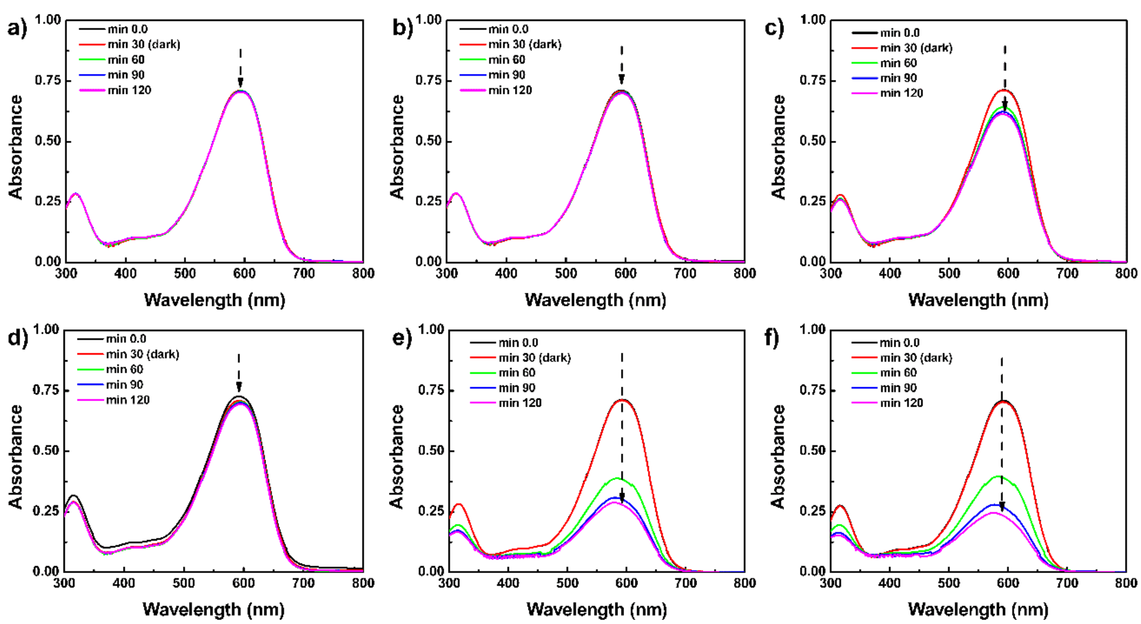


Figure S6. UV-visible absorption spectra for the photocatalytic degradation of 20 µM Trypan Blue under visible LED light for a blank (a), IO-TiO_2 (b), CdS (c), IO-TiO_2-AuNPs (d), IO-TiO_2-CdS (e), and IO-TiO_2-AuNPs-CdS (f).

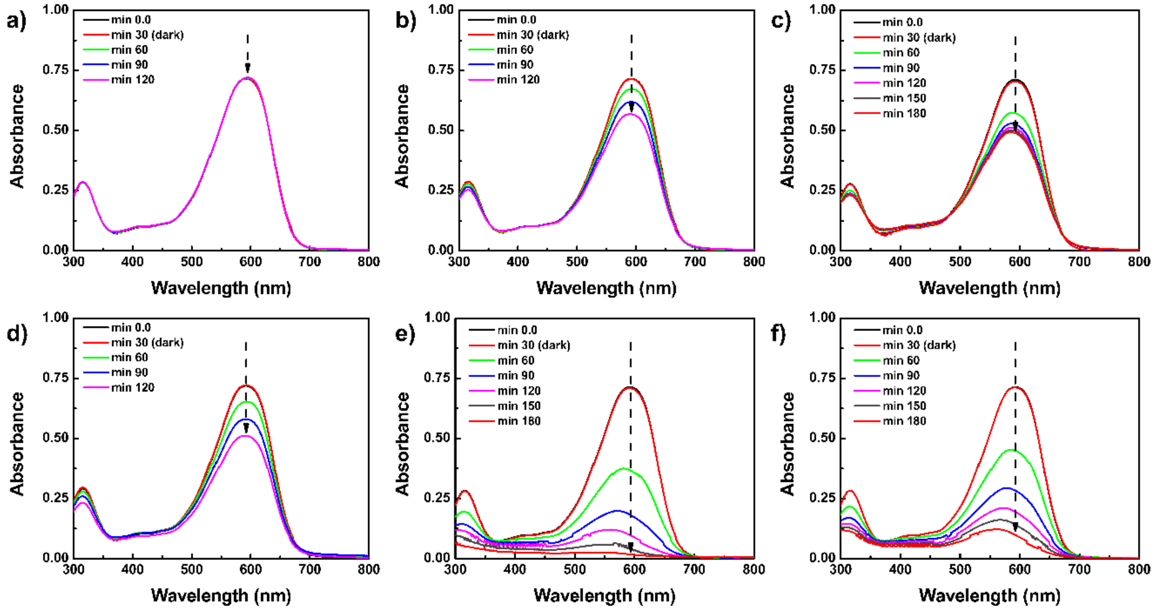
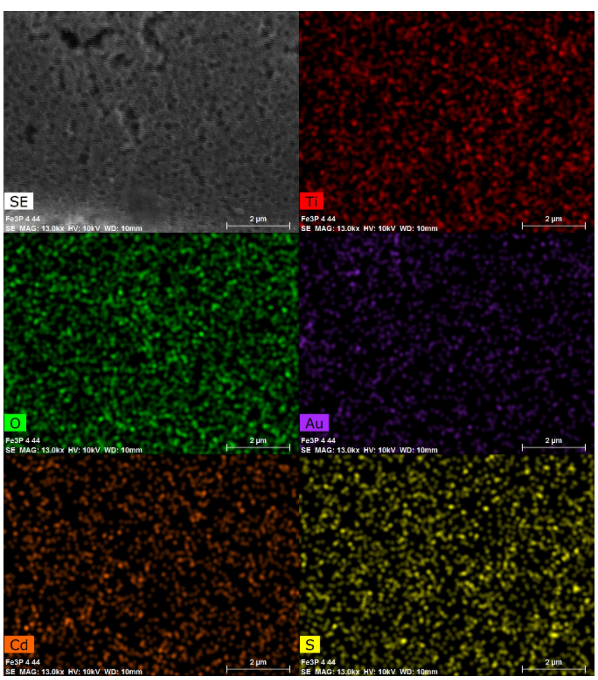


Figure S7. UV-visible absorption spectra for the photocatalytic degradation of 20 μM Trypan Blue under UV light for a blank (a), IO-TiO_2 (b), CdS (c), IO-TiO_2-AuNPs (d), IO-TiO_2-CdS (e), and IO-TiO_2-AuNPs-CdS (sf).



Element	Energy (keV)	Normalized Weight %	Normalized Atomic %
Oxygen	0.53	30.29	61.12
Titanium	4.49	41.21	27.78
Sulfur	2.30	5.05	5.09
Cadmium	3.14	17.62	5.06
Gold	2.13	5.83	0.96

Figure S8. EDX mapping and normalized weight and atomic percentages for the elemental components of the ternary IO-TiO_2-AuNPs-CdS system.

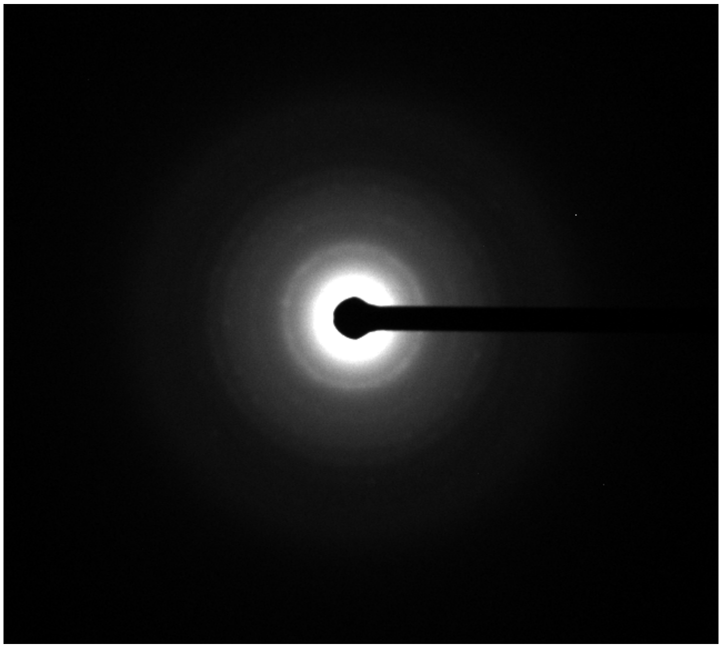


Figure S9. The Selected area electron diffraction (SAED) pattern of IO-TiO_2-CdS indicates the nanocrystalline forms of TiO_2 and CdS.