Supporting Information for

Ferroelectric Oxide Nanocomposites with Trimodal Pore Structure for High Photocatalytic Performance

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Supplementary Figures and Tables

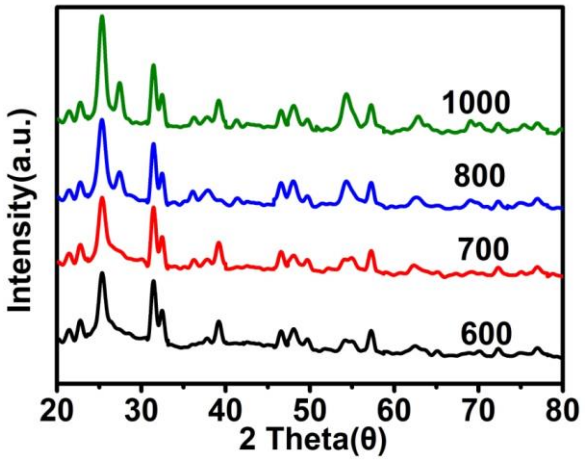

Fig. S1 XRD diffraction patterns of PTC samples annealed at different temperatures (PTC-600, 700, 800, and 1000)

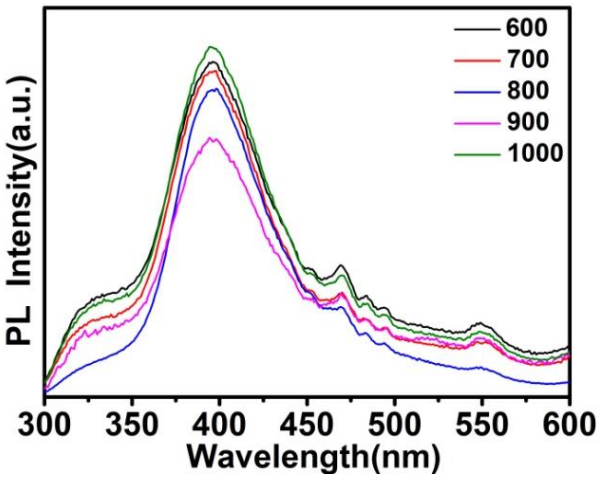

Fig. S2 PL emission spectra of PTC samples annealed at different temperatures

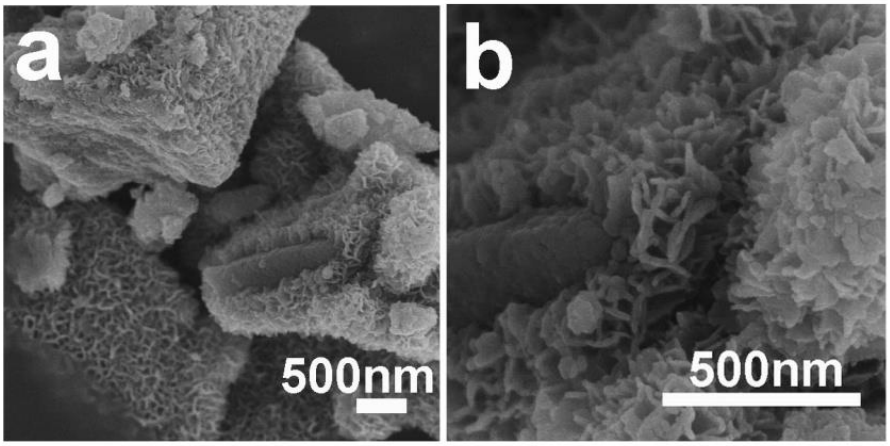

Fig. S3 SEM images of **a** $PbTiO_3/TiO_2$ and **b** TiO_2

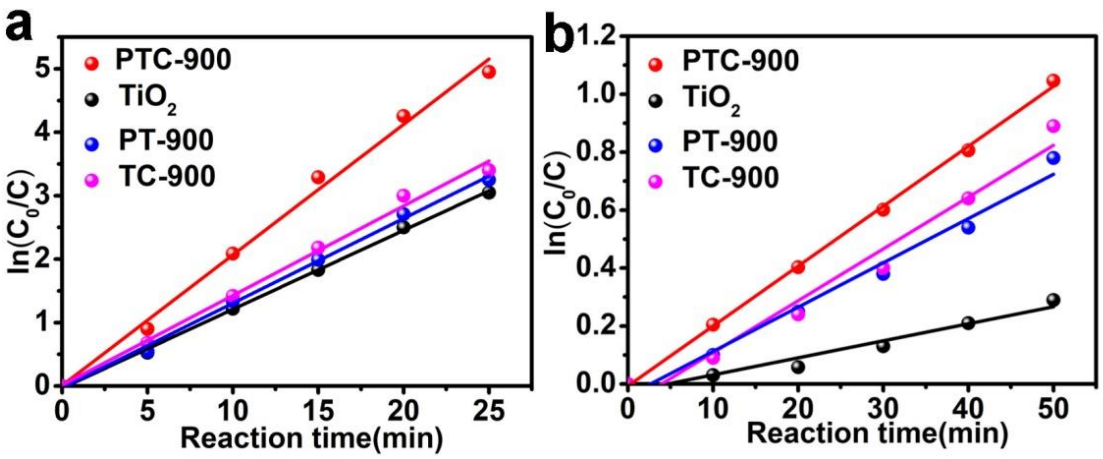

Fig. S4 Photocatalytic MB degradation of PTC-900, TiO_2, PT-900, TC-900 annealed at 900 °C under **a** UV and **b** visible light irradiation

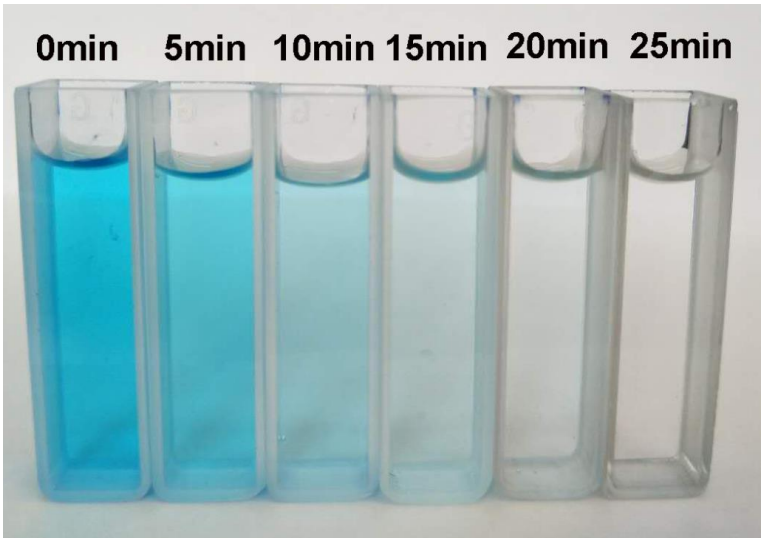

Fig. S5 The optical image of MB degradation with PTC-900 under UV exposure to illustrate the photocatalytic organic dye degradation

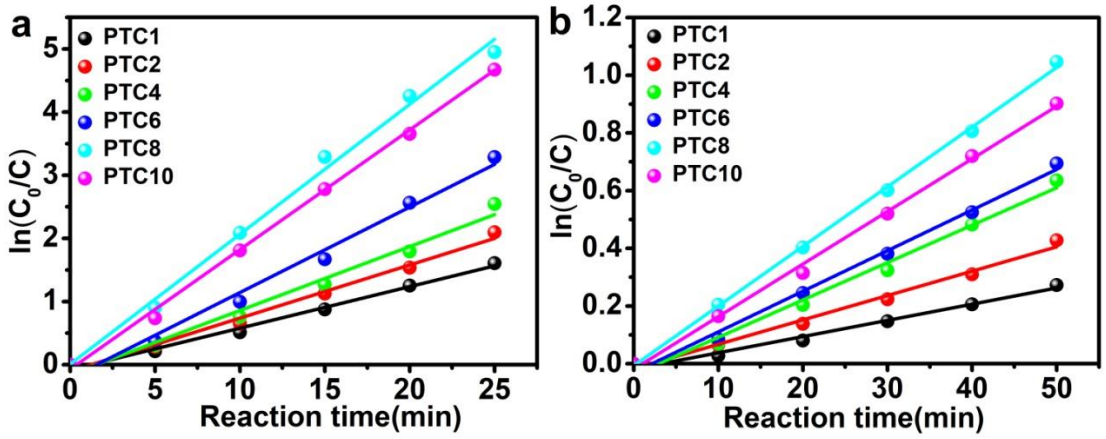

Fig. S6 Photocatalytic MB degradation of PTC samples with different ratios of $PbTiO_3$ to TiO_2 under **a** UV and **b** visible light irradiations

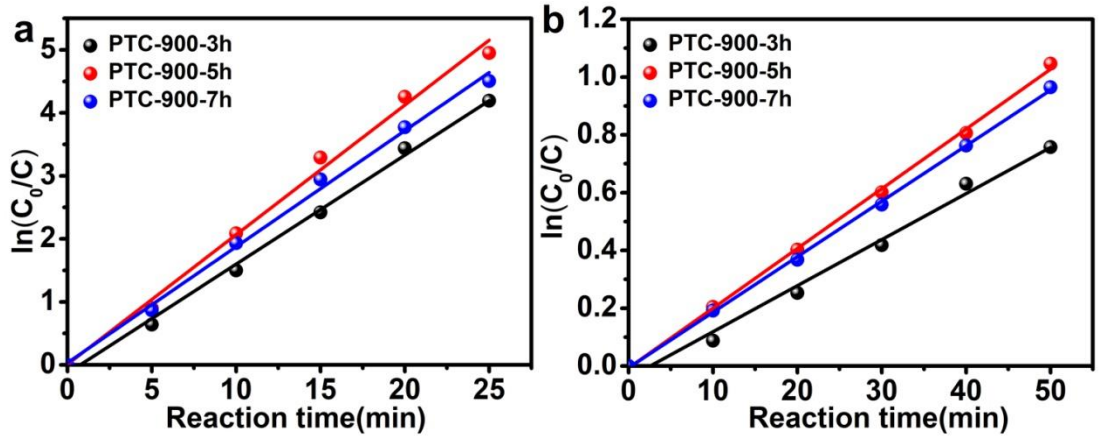

Fig. S7 Photocatalytic MB degradation of PTC nanocomposites annealed at 900 °C for different time under **a** UV and **b** visible light irradiation

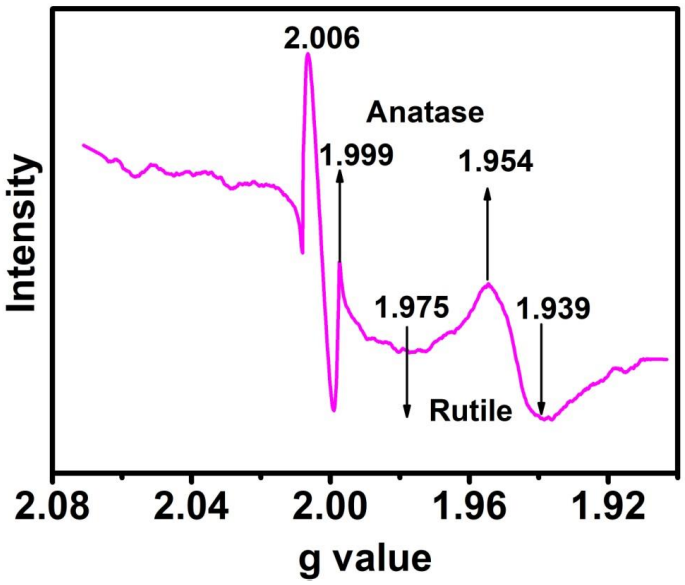

Fig. S8 EPR spectrum of PTC-900 with the detailed g value marked

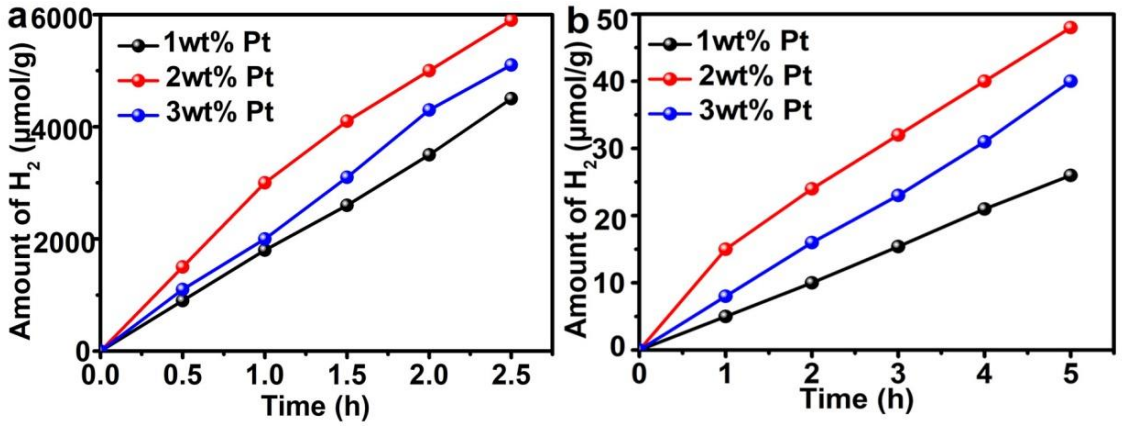

Fig. S9 Photocatalytic hydrogen production of PTC-900 loaded with 1%-3% Pt as co-catalyst under **a** UV and **b** visible light irradiation

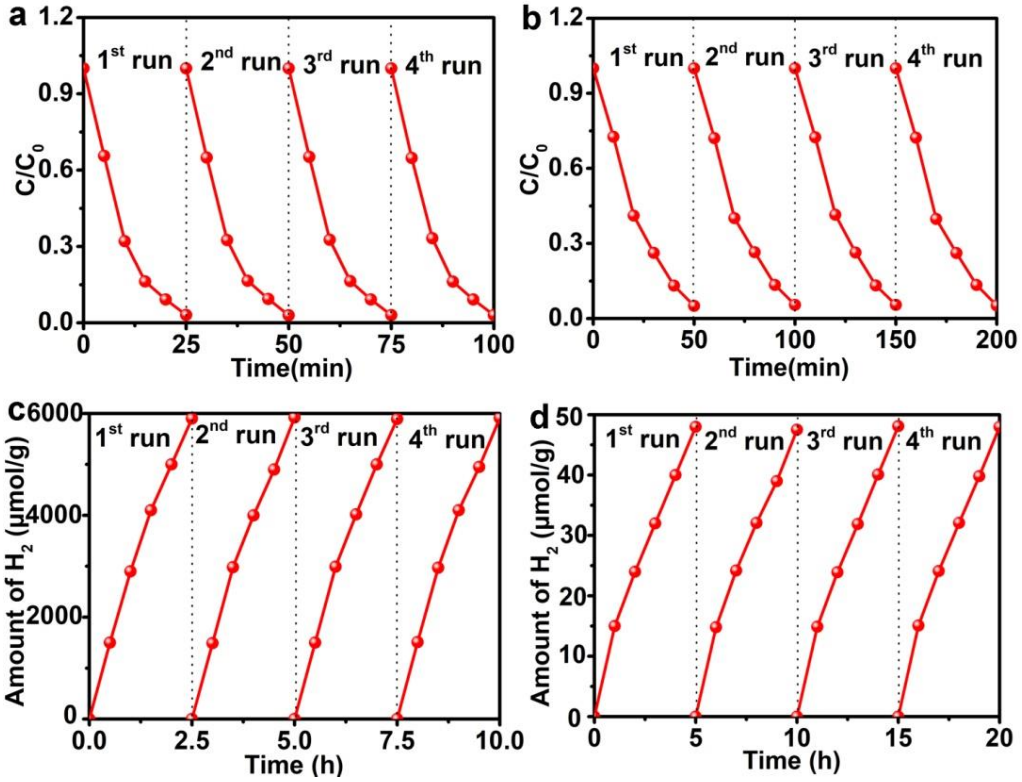

Fig. S10 Photocatalytic stability of PTC-900 for **a, b** MB degradation and **c, d** hydrogen production (loaded with Pt as co-catalyst)

Table S1 *K* values of PTCx nanocomposites annealed at 900 °C for 5 h with different molar ratios of $PbTiO_3$ to TiO_2 for MB degradation under UV and visible light irradiation

Slope (min^{-1})	K_{UV}	K_{vis}
PTC1	0.06576	0.00562
PTC2	0.08417	0.00845
PTC4	0.10121	0.01296
PTC6	0.13532	0.01408
PTC8	0.20577	0.02068
PTC10	0.18907	0.01823

Table S2 *K* values of PTC nanocomposites with 1:8 mole ratio of $PbTiO_3$ to TiO_2 annealed for 5 h at different temperatures for MB degradation under UV, visible light irradiation and ultrasonic assisted visible light irradiation

Slope (min^{-1})	K_{UV}	K_{vis}	K_{vis} (US)
1000	0.16096	0.00851	0.01981
900	0.20577	0.02068	0.02827
800	0.17481	0.01809	0.02559
700	0.13978	0.01655	0.02424
600	0.13107	0.01463	0.02208
P25	0.12040	0.00393	-
$PbTiO_3$	0.04249	0.00701	-

Table S3 *K* values of PTC nanocomposites annealed at 900 °C for different annealing time for MB degradation under UV and visible light irradiation

Slope(min^{-1})	K_{UV}	K_{vis}
PTC-3h	0.17298	0.01594
PTC-5h	0.20577	0.02068
PTC-7h	0.18428	0.01922