Supplementary material:

Dual Function of SiO_2@TiO_2 Photonic Crystals for Dazzling Structural Colors and Enhanced Photocatalytic Activity

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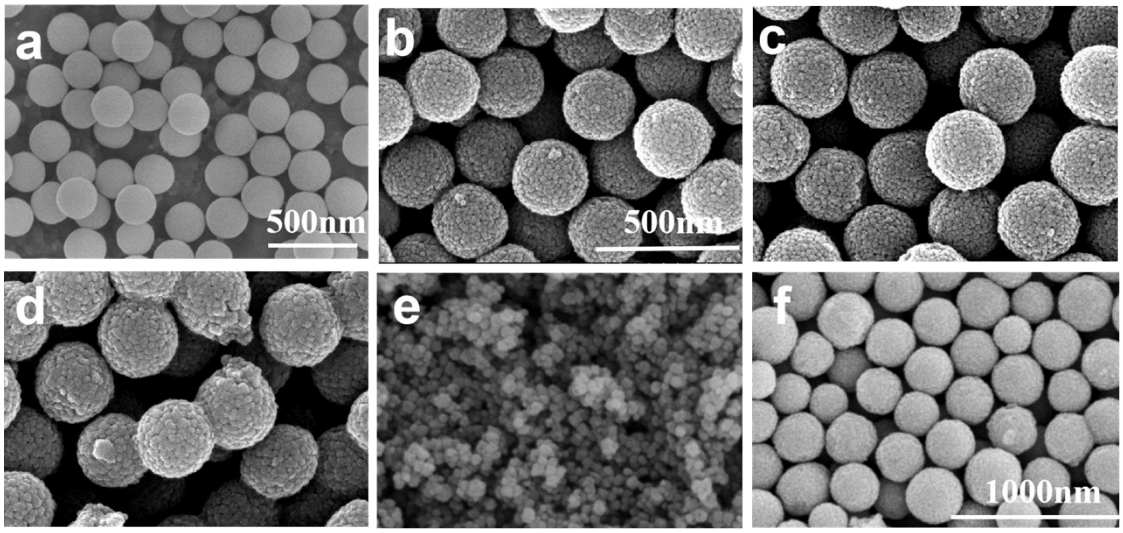

Fig. S1. SEM of images of (a) 240nm SiO_2 and (b) ST-30; (c) ST-50 and (d) ST-60; (e) P25 and T1(f).

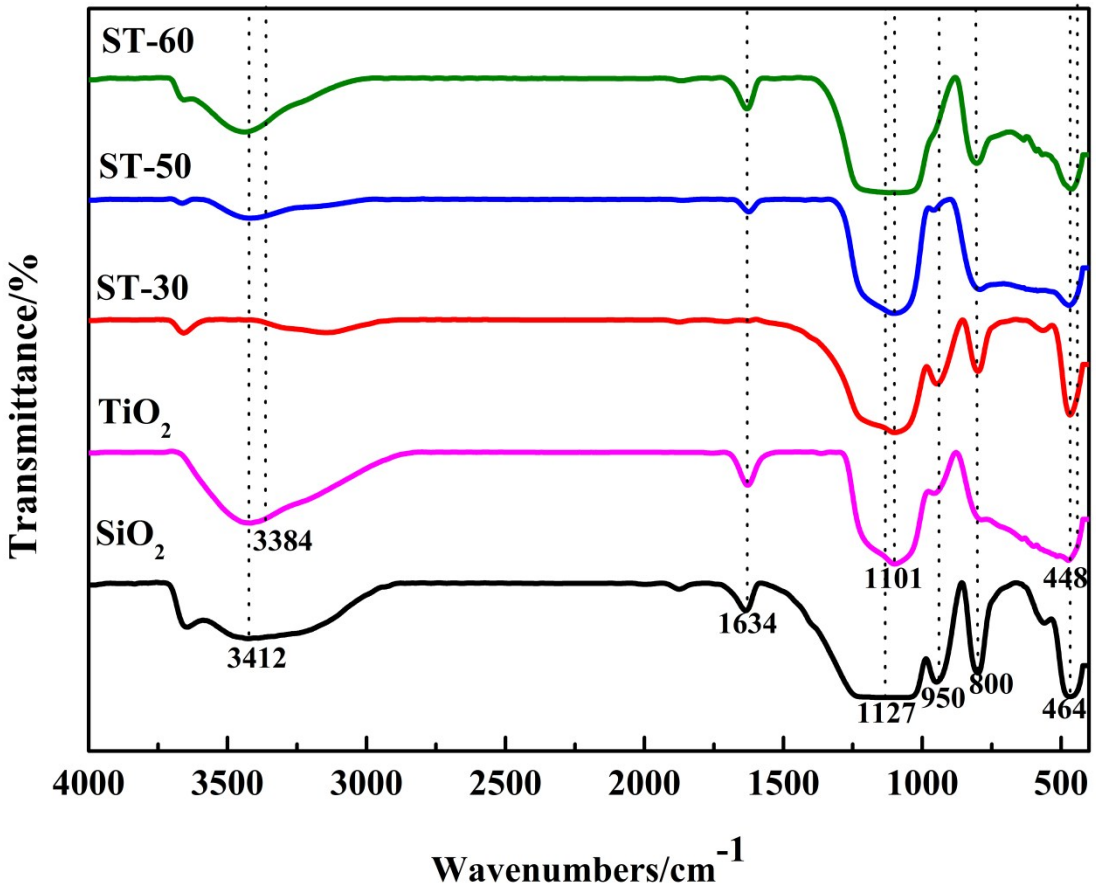

Fig. S2. FT-IR spectra of SiO_2, TiO_2 and SiO_2@TiO_2 photonic crystals.

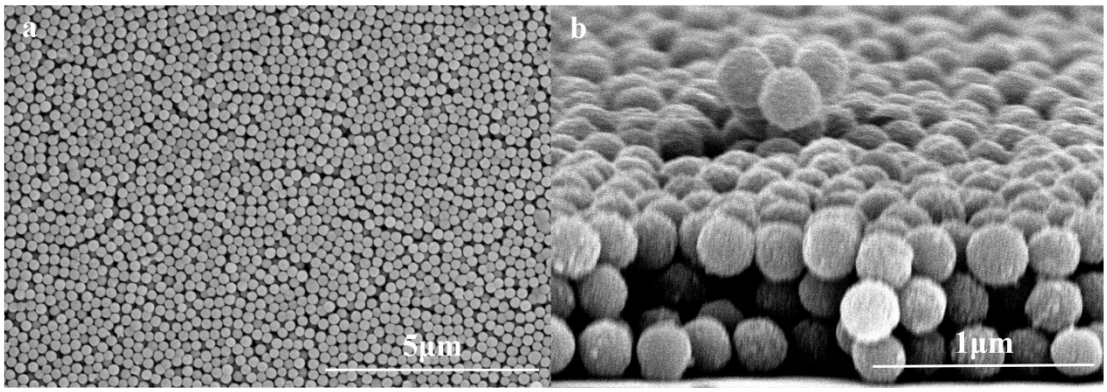

Fig. S3. The cross-sectional (a) and top (b) SEM of the SiO_2@TiO_2 photonic crystals.

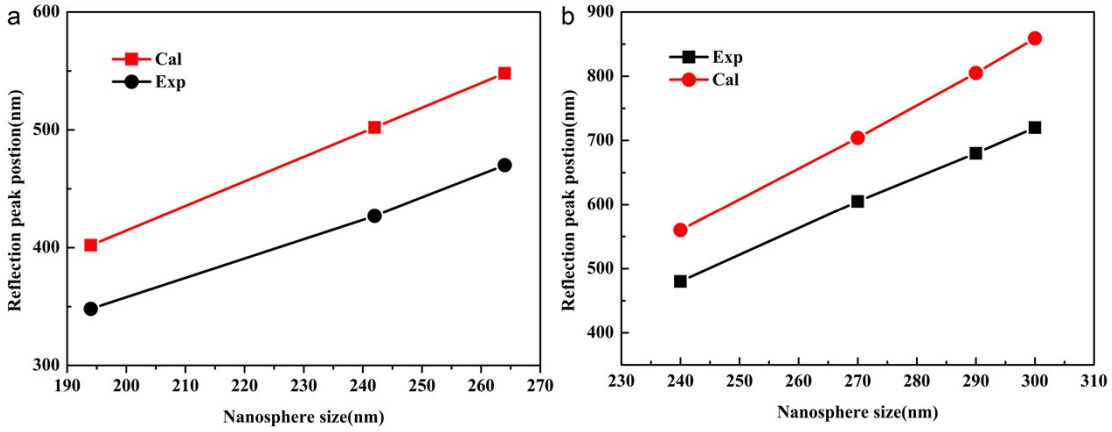

Fig S4 The experimental (exp) reflection positions and calculated (cal) of a) SiO_2 PCs and b) SiO_2@TiO_2 PCs.

Table 1 Diameters of composition SiO_2@TiO_2 nanospheres

D-SiO_2 (nm)	Ref peak (cal)	Ref peak (exp)	D-ST (nm)	Shell Thickness	Ref peak (cal)	Ref peak (exp)
194	348	402	271	29	704	605
242	427	502	286	44	805	680
264	470	548	304	62	859	705

Table 2 Diameters and reflection peaks of SiO_2 and SiO_2@TiO_2 nanospheres

Simple	SiO_2(g)	TBOT(mmol)	(%)TiO_2(wt)	Parcitle size(nm)
Silica	--	--	0	242
ST-30	0.3	2.93	31.57	271
ST-50	0.3	5.68	50.11	286
ST-60	0.3	8.51	63.05	304
T1	--	8.51	100	10

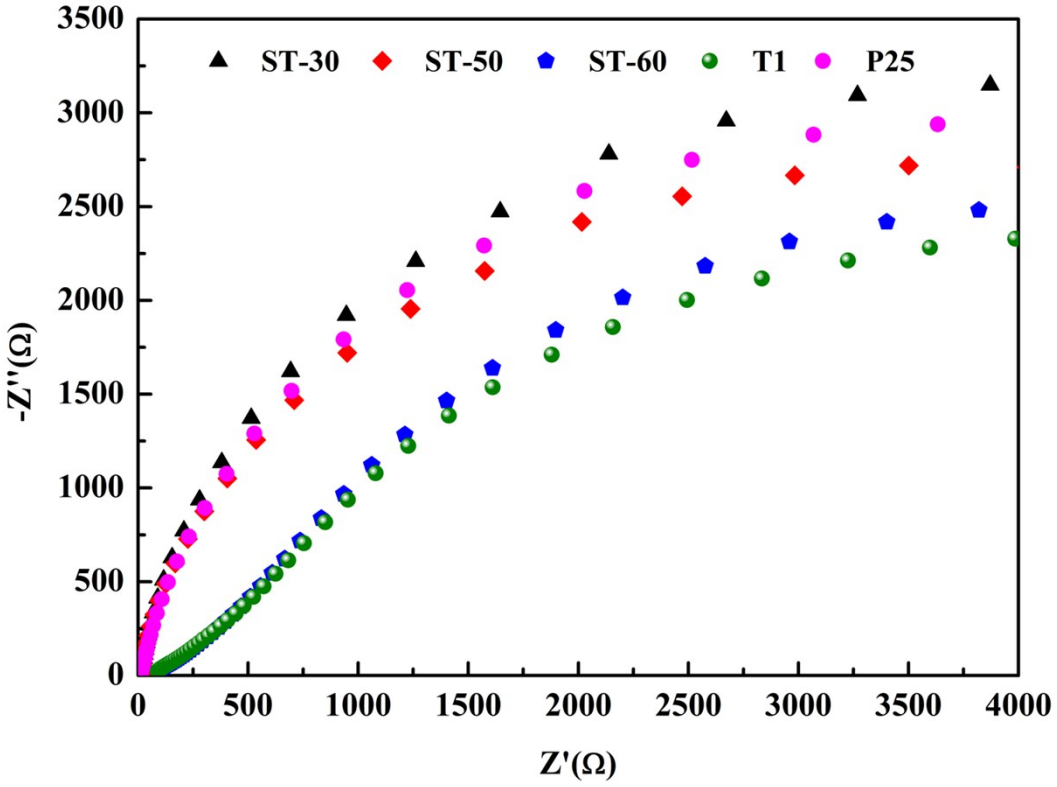

Fig. S5. EIS plots of the samples.

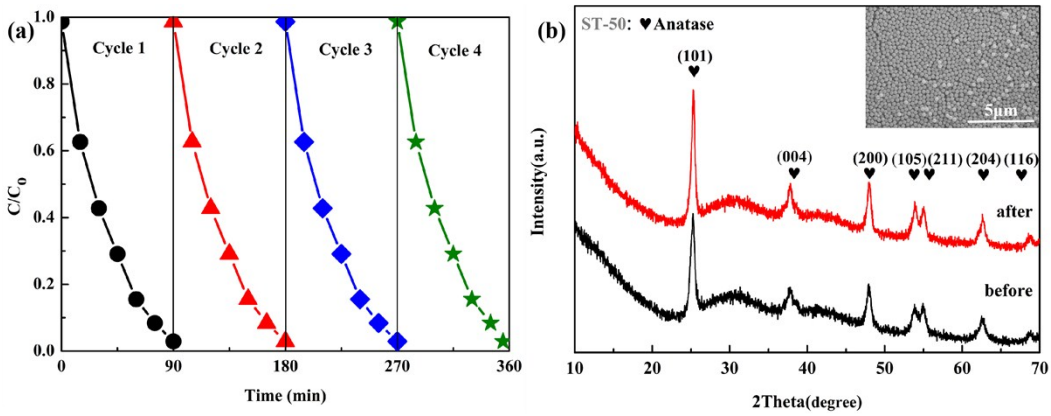

Fig S6. Photodegradation of RhB by recovered ST-50 showed recyclability in the repeated photocatalytic cycle. (b) XRD patterns of ST-50 before and after 4th run cycle photocatalytic experiments, (the inset is the SEM image after 4th repeated irradiation).

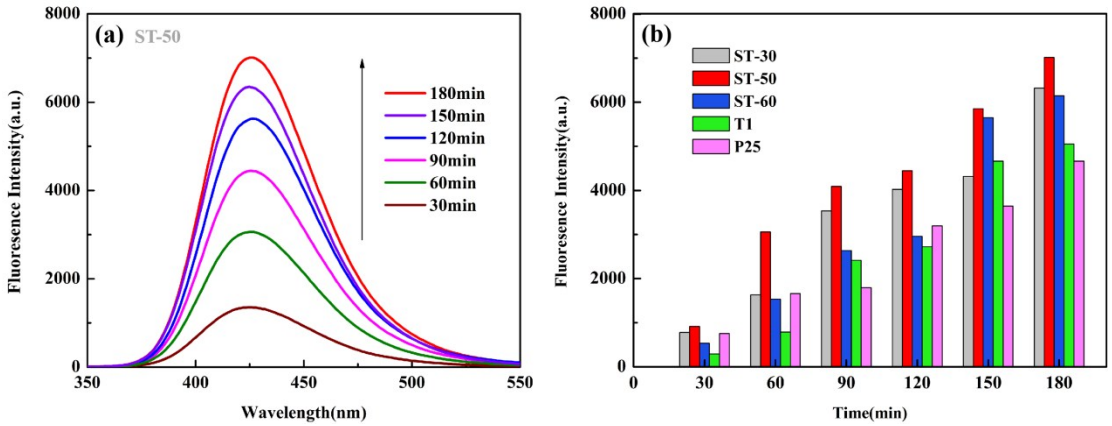

Fig. S7. Photo-luminescence spectra of ST-50 at excitation wavelength of 315nm (a) and photo-luminescence intensity against irradiation time for samples at the emission wavelength of 425nm (b).