Supporting Information for

Improve Photocatalytic Activity by Utilizing Internal Electric Field of Polar Semiconductors:

A Case Study of Self-Assembled $NaNbO_3$ Oriented Nanostructures

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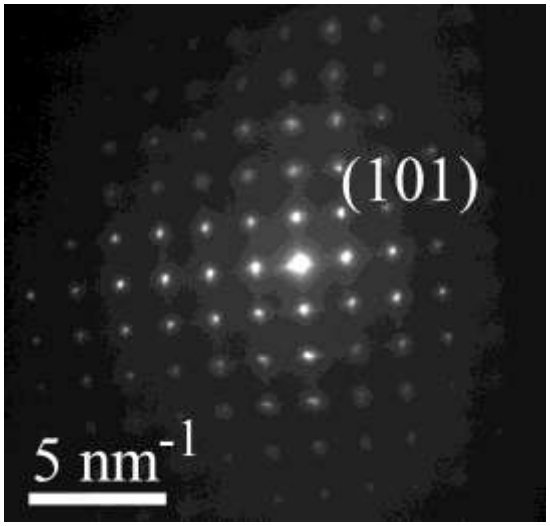

Fig. S1 ED pattern of a $NaNbO_3$ nanocuboid (NNB-1 sample).

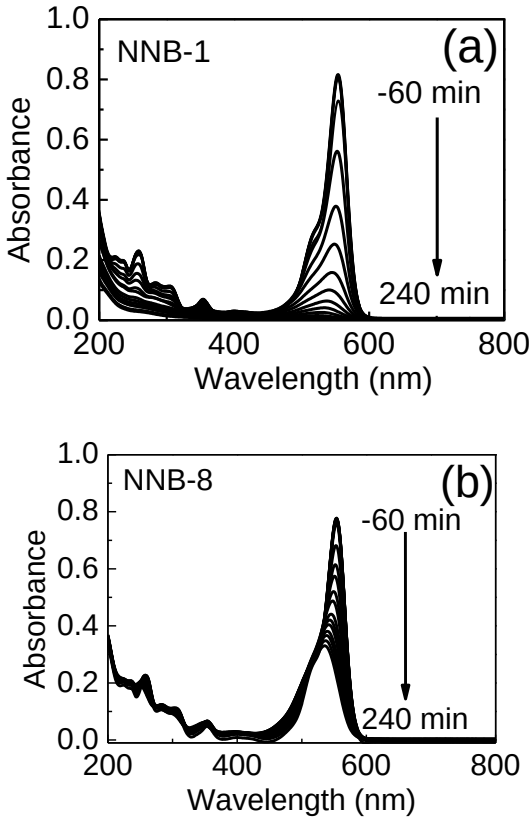

Fig. S2 UV-vis spectral changes of RhB as a function of irradiation time catalyzed by (a) the ordered NNB-1 and (b) the disordered NNB-8 samples.

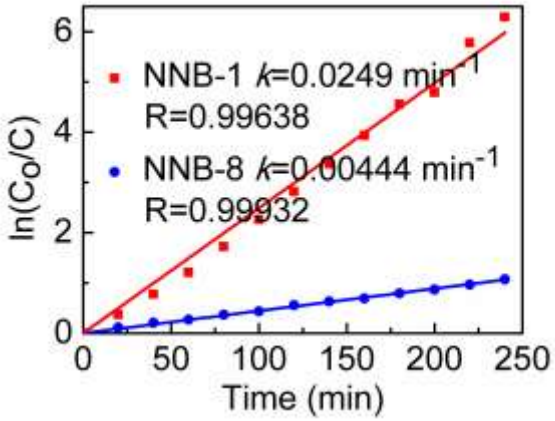

Fig. S3 Kinetics of RhB photodegradation upon the NNB-1 and NNB-8 samples respectively

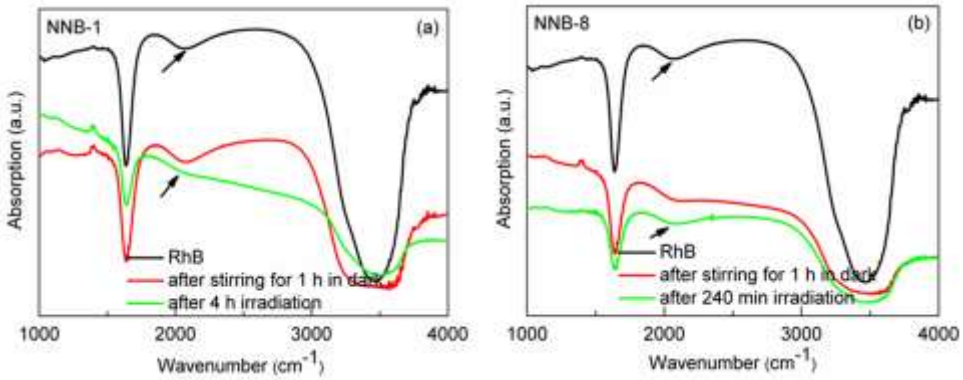

Fig. S4 (a) FTIR spectra of RhB reference solution (black line), the supernatant of the mixed solution of RhB and NNB-1 after 1 h stirring in the dark (red line), and the supernatant after 4 h irradiation (Olivine line); (b) FTIR spectra of blank RhB (black line), the supernatant of the mixed solution of RhB and NNB-8 after stirring for 1 h in the dark (red line), and the supernatant after 4 h irradiation (Olivine line).

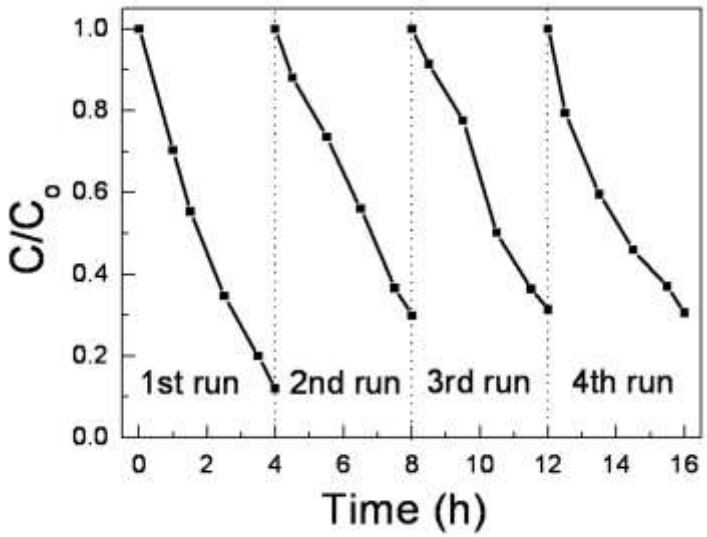

Fig. S5 Recycling test for the photocatalytic degradation of RhB on the ordered NNB-1 under sunlight.

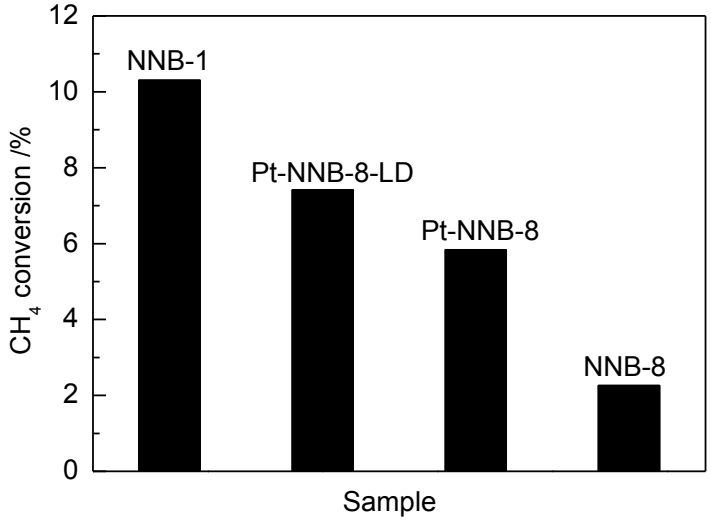

Fig. S6 CH_4 conversion efficiency upon different samples after seven hours illumination of simulated sunlight.

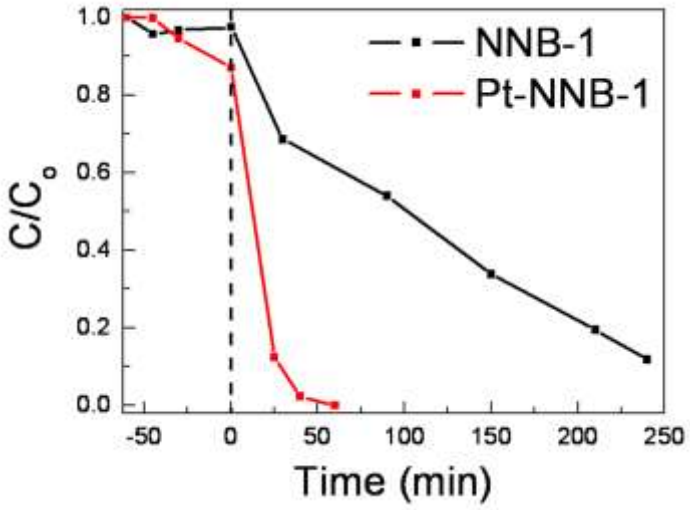

Fig. S7. Photodegradation of RhB upon the ordered NNB-1 and Pt-NNB-1 samples under sunlight

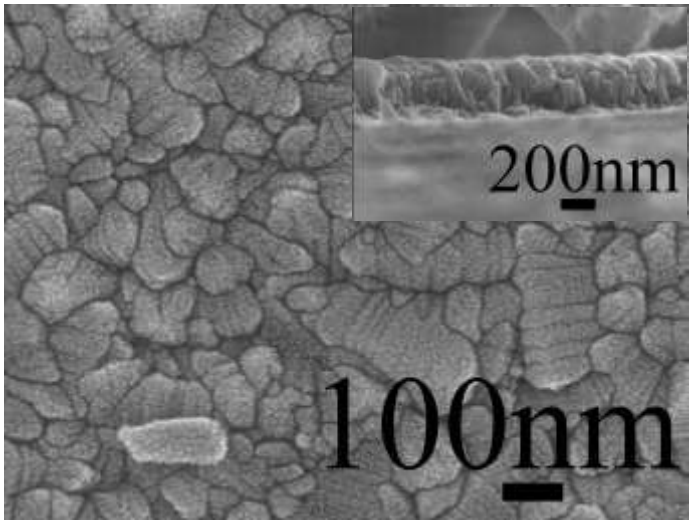

Fig. S8 SEM images of the thin film prepared by ordered NNB-1.

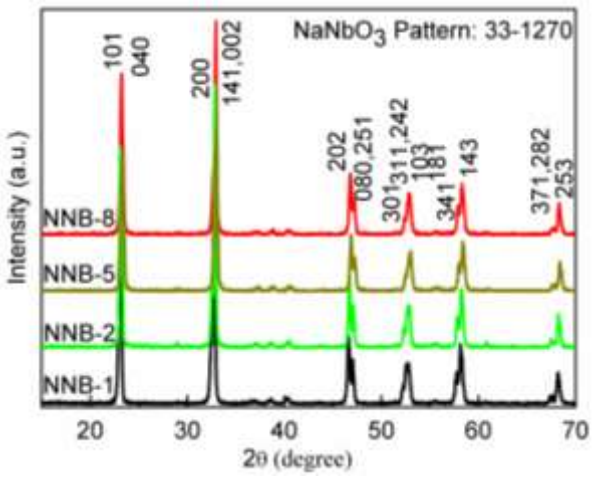

Fig. S9 XRD patterns of the $NaNbO_3$ samples obtained after dwelling at 200 ^{o}C for 24 h under various NaOH concentration.

Table S1 Fabrication conditions as well as some basic physical parameters of the $NaNbO_3$ samples in Figure S6.

Sample	Synthesis conditions	Lattice parameters	Band gap (eV)
NNB-1	[NaOH]=1 M, 200 ^{o}C, 24 h	a=5.473 Å b=15.553 Å c=5.537 Å	3.26
NNB-2	[NaOH]=2.5 M, 200 ^{o}C, 24 h	a=5.563 Å b=15.536 Å c=5.511 Å	3.26
NNB-5	[NaOH]=5 M, 200 ^{o}C, 24 h	a=5.683 Å b=15.493 Å c=5.489 Å	3.26
NNB-8	[NaOH]=8 M, 200 ^{o}C, 24 h	a=5.535 Å b=15.527 Å c=5.508 Å	3.26

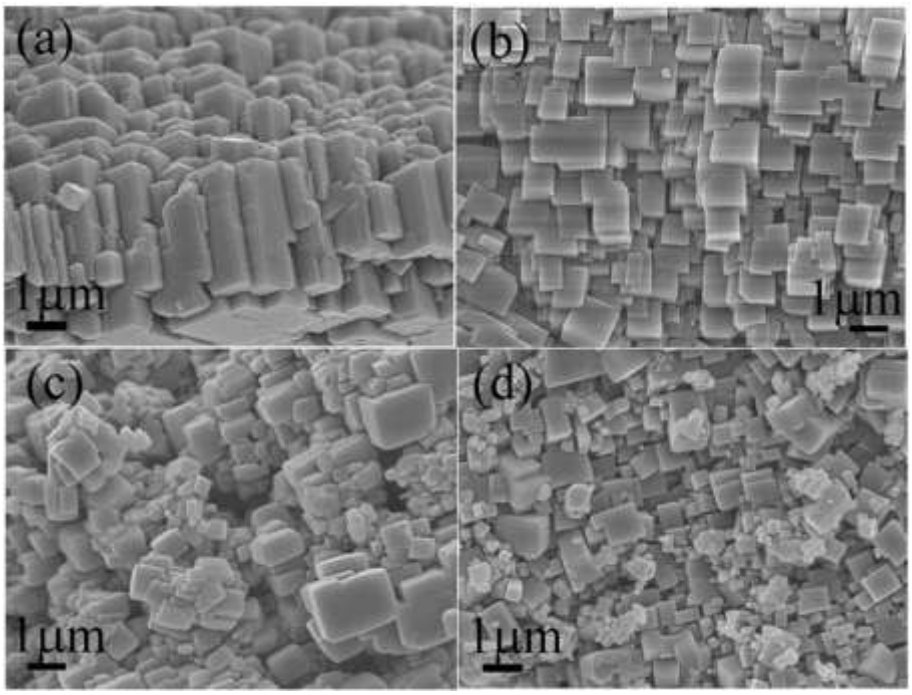

Fig. S10 SEM images of the $NaNbO_3$ samples obtained after dwelling at 200 ^oC for 24 h with different NaOH concentration: (a) NNB-1 ([NaOH] = 1 M) , (b) NNB-2 ([NaOH] = 2.5 M), (c) NNB-5 ([NaOH] = 5 M) and NNB-8 ([NaOH] = 8 M).

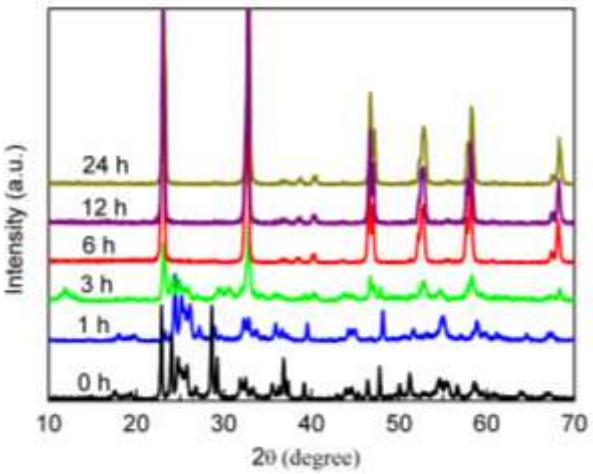

Fig. S11 XRD patterns of the as-prepared samples obtained after dwelling at 200 ^oC for different time with [NaOH]=1 M.

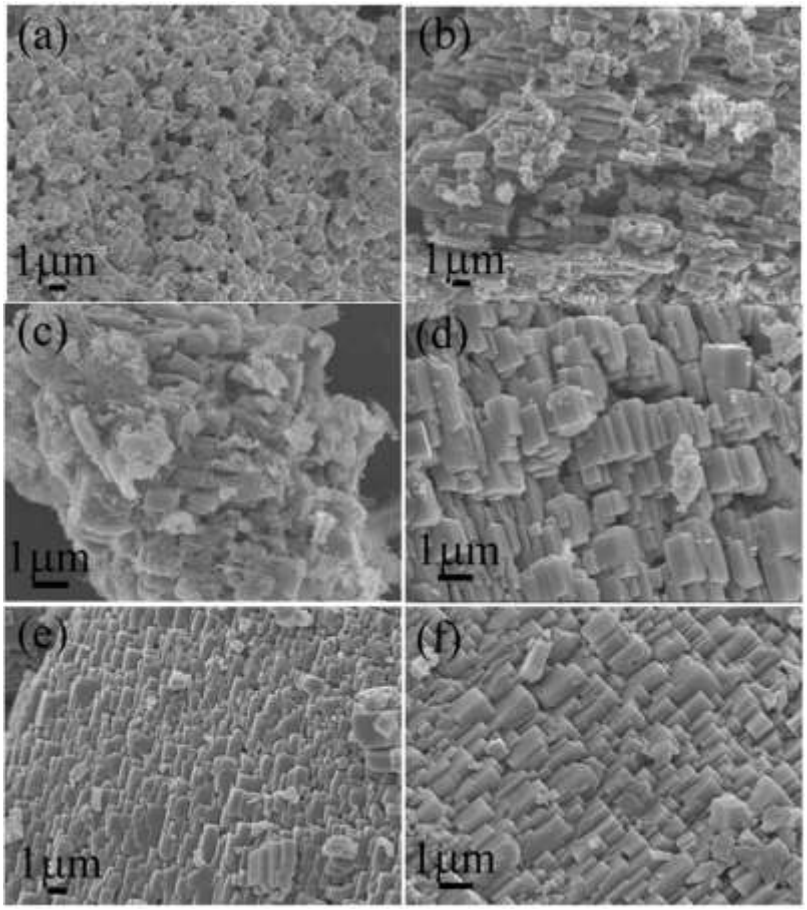

Fig. S12 SEM images of the samples prepared at 200 ^{o}C and [NaOH]=1 M for various dwelling time: (a) 0 h, (b) 1 h, (c) 3 h, (d) 6 h, (e) 12 h and (f) 24 h.