Supporting information

1.1 The specific surface area and mean surface area diameter of catalysts

The mean diameter and specific surface area of PANI nanoparticles and MCC-stabilized PANI were measured by Mastersizer 2000 (Malvein Instruments, Ltd, Britain) as shown in Table S1. The mean surface area diameter and the specific surface area of MCC-stabilized PANI are slightly larger than those of PANI nanoparticles. Although the decoration on MCC increased the mean surface area diameter of PANI, MCC prevented the agglomeration of PANI nanoparticles as a supporting material and increased its dispersion in the aqueous phase due to the excellent hydrophilic property of cellulose.

Sample	Mean surface area diameter (μm)	Specific surface area (m^2/g)
MCC-stabilized PANI	12.996	0.462
PANI nanoparticles	7.121	0.843

Table S1The mean diameter and specific surface area of catalysts

1.2 SEM study of MCC-stabilized PANI

The morphology of MCC-stabilized PANI was observed by SEM as shown in Fig. S1. PANI nanoparticles are densely decorated on the surface of fibers which are micron-sized. Comparing to PANI-decorated cellulose aerogel which contains nanofibrillated cellulose, the size of PANI/MCC composite is significantly larger, which resulted poorer accessibility of PANI to dye molecules in aqueous phase.

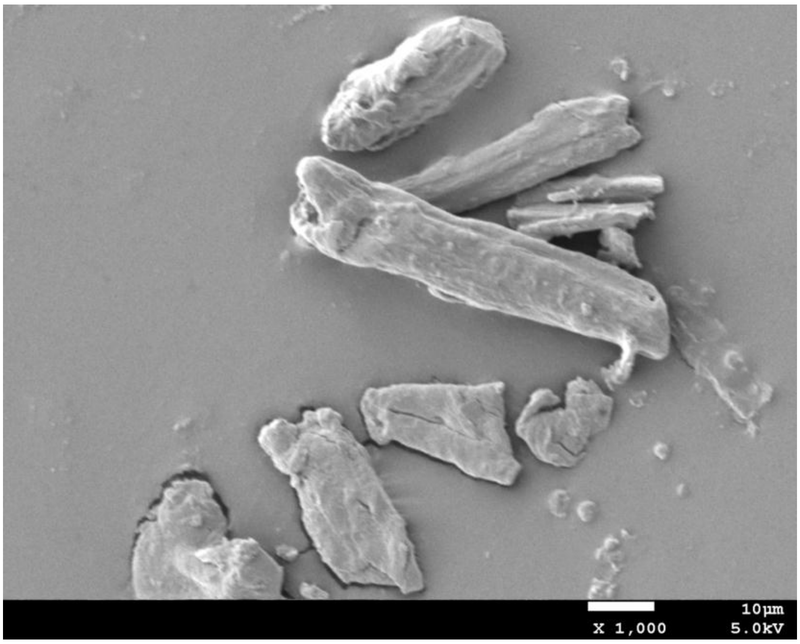

Figure S1. SEM image of MCC-stabilized PANI.

1.3 The effect of MB adsorption by the catalysts

The adsorption effect of the used organic photocatalysts was studied by keeping the catalysts (1.5 mg/mL) in MB solution (20 mg/mL) under dark condition. UV-vis absorption spectra of MB solution absorbed by PANI nanoparticles, MCC-stabilized PANI and PANI-decorated cellulose aerogel are shown in Fig. S2. It is noticeable that the effect of MB adsorption by the catalysts is poor. Furthermore, the adsorption effect reached a balance within 30 min. As the MB/catalyst suspensions were homogenized with stirring under dark condition and stayed to still for about 30 min, the effect of MB adsorption by the catalysts in this experiment was very limited.

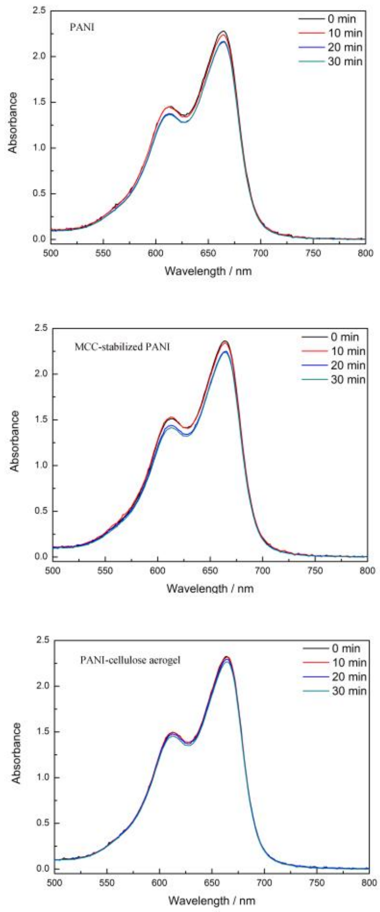

Figure S2. UV-vis absorption spectra of MB solution absorbed with PANI, MCC-stabilized PANI nanoparticles and PANI-decorated cellulose aerogel (catalyst concentration= 1.5 mg/mL, initial concentration of dyes= 20 mg/mL).

1.4 Catalytic property of regenerated PANI-decorated cellulose aerogel

After the measurement of photocatalytic property, PANI-decorated cellulose aerogel was collected by filtering and regenerated by drying in oven under 40 ^{o}C. The photocatalytic property of regenerated PANI-decorated cellulose aerogel was studied under same condition. The UV-vis absorption spectrum of MB catalyzed by regenerated PANI-decorated cellulose aerogel under natural sunlight is shown in Fig. S3a. The degradation rate of MB solution in the presence of regenerated PANI-decorated cellulose aerogel is compared with that of other catalysts as shown in Fig. S3b. It reaches 60% after reaction for 2 h. Although the photocatalytic activity of regenerated PANI-decorated cellulose aerogel is decreased comparing to original PANI-decorated cellulose aerogel, it is still remarkably higher than that of other organic catalysts. Instead of being a result of light irradiation, the decrease of photocatalytic activity might be attributed to the change of cellulose aerogel during regeneration process.

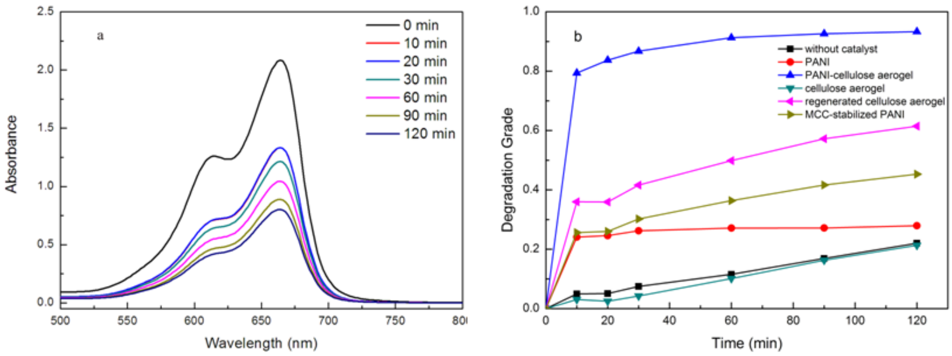

Figure S3. The UV-vis absorption spectrum of MB catalyzed by regenerated PANI-decorated cellulose aerogel (a) and the degradation rate of MB solution in the absence/presence of catalysts under the irradiation of natural sunlight (b) (catalyst concentration= 1.5 mg/mL, initial concentration of dyes= 20 mg/mL).