Supporting information

Magnetic field effect on photocatalytic degrading methyl orange by commercial TiO_2 powder

Yuecheng Bian [a,b]，Ganhong Zheng [c], Wei Ding [d], Lin Hu [a,e*]，Zhigao Sheng [a,e*]

[a] Anhui Key Laboratory of Condensed Matter Physics at Extreme Conditions, High Magnetic Field Laboratory, Chinese Academy of Sciences, Hefei 230031, China

[b] University of Science and Technology of China, Hefei 230026, China

[c] School of Physics and Materials Science, Anhui University, Hefei 230039,China

[d] Institutes of Physical Science and Information Technology, Anhui University, Hefei 230601, China

[e] Key Laboratory of Photovoltaic and Energy Conservation Materials, Chinese Academy of Sciences, Hefei, 230031, China

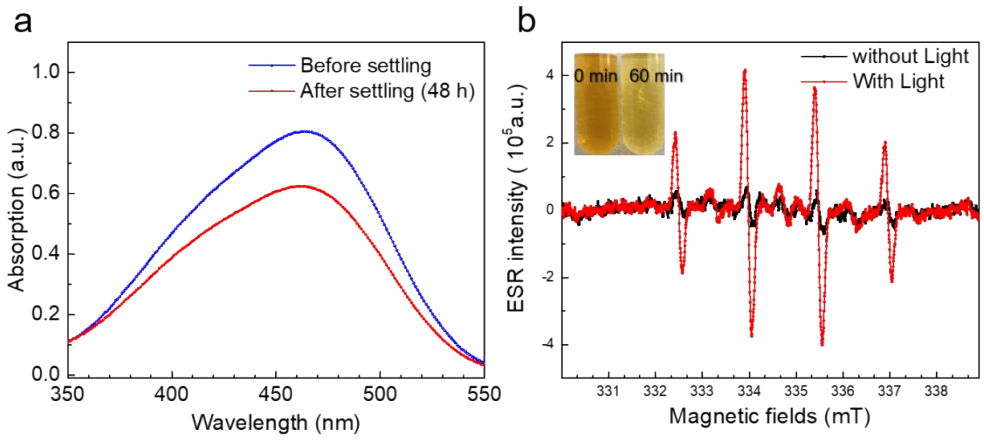

Figure S1. (a)The UV-visible absorption spectrum of mixing solution before settling and after settling for 48 h under dark. (b) The ESR (electron spin resonance) spectroscopy measurement of the samples at room temperature, insert image shows the color variation of the reaction solution before and after irradiated by xenon lamp for 60 min, respectively, the radical trapping agent is DMPO (5,5-dimethyl-1-pyrroline N-oxide) in experiment.

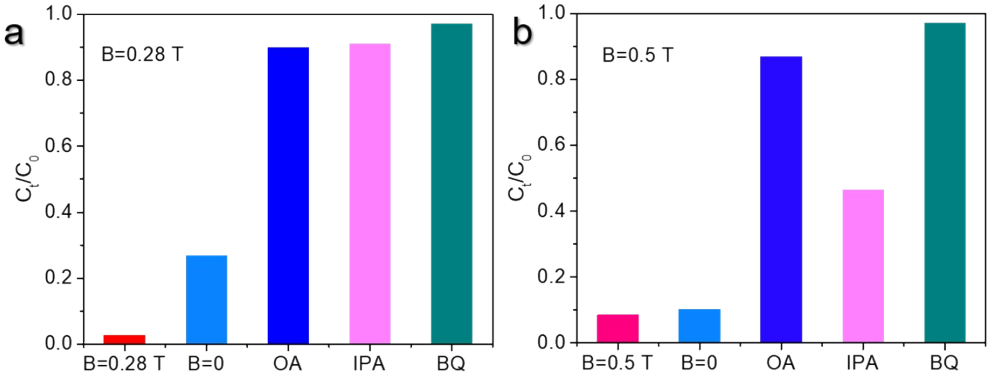

Figure S2. Trapping experiment of active species during the photocatalytic degradation of MO over TiO_2 sample with low (*B*=0.28 T) and high (*B*=0.5 T) magnetic fields under visible light irradiation.

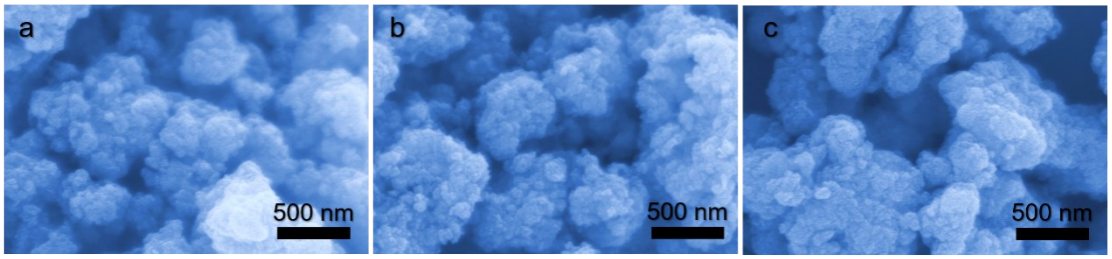

Figure S3. SEM images of the sample. (a) Original TiO_2 powder, (b) the photocatalyst powder morphology after photocatalytic reaction under low magnetic fields B=0.28 T, (c) the photocatalyst powder morphology after photocatalytic reaction under high magnetic fields B=0.5 T, respectively. The SEM analysis are the catalyst samples obtained in a photocatalysis cycle.

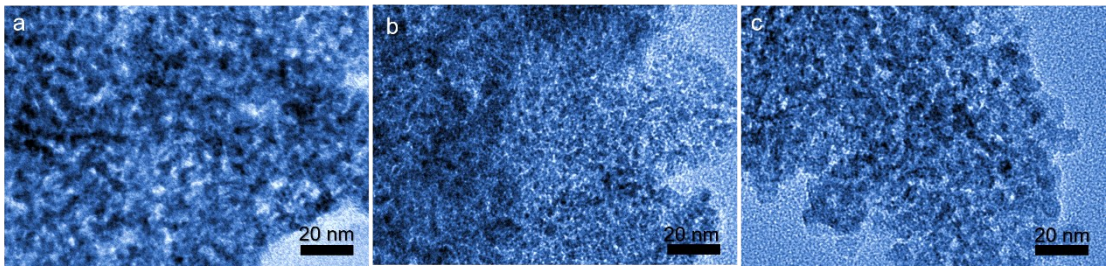

Figure S4. TEM images of the samples under different conditions. (a) the original TiO_2 powder, (b) the TiO_2 powder after taking as photocatalyst reaction with methyl orange dye under low magnetic fields B=0.28 T, (c) the TiO_2 powder after taking as photocatalyst reaction with methyl orange dye under low magnetic fields B=0.5 T, respectively. The TEM analysis are the catalyst samples obtained in a photocatalysis cycle.

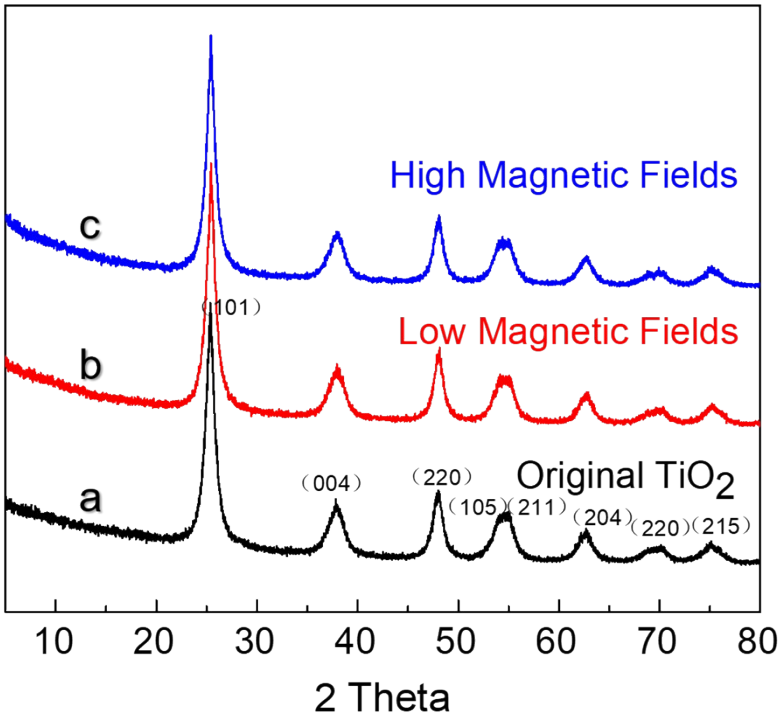

Figure S5. XRD pattern analysis of the samples obtained under different experiment conditions. In the diagram, the curve a is the XRD data of the original TiO_2 powder, the curve b represents the XRD data of the catalyst TiO_2 after reacting with methyl orange dye under a low magnetic field B=0.28 T, and the curve c represents the XRD data of the catalyst TiO_2 after reacting with methyl orange dye under a high magnetic field B=0.5 T, respectively. The XRD analysis are the catalyst samples obtained in a photocatalysis cycle.

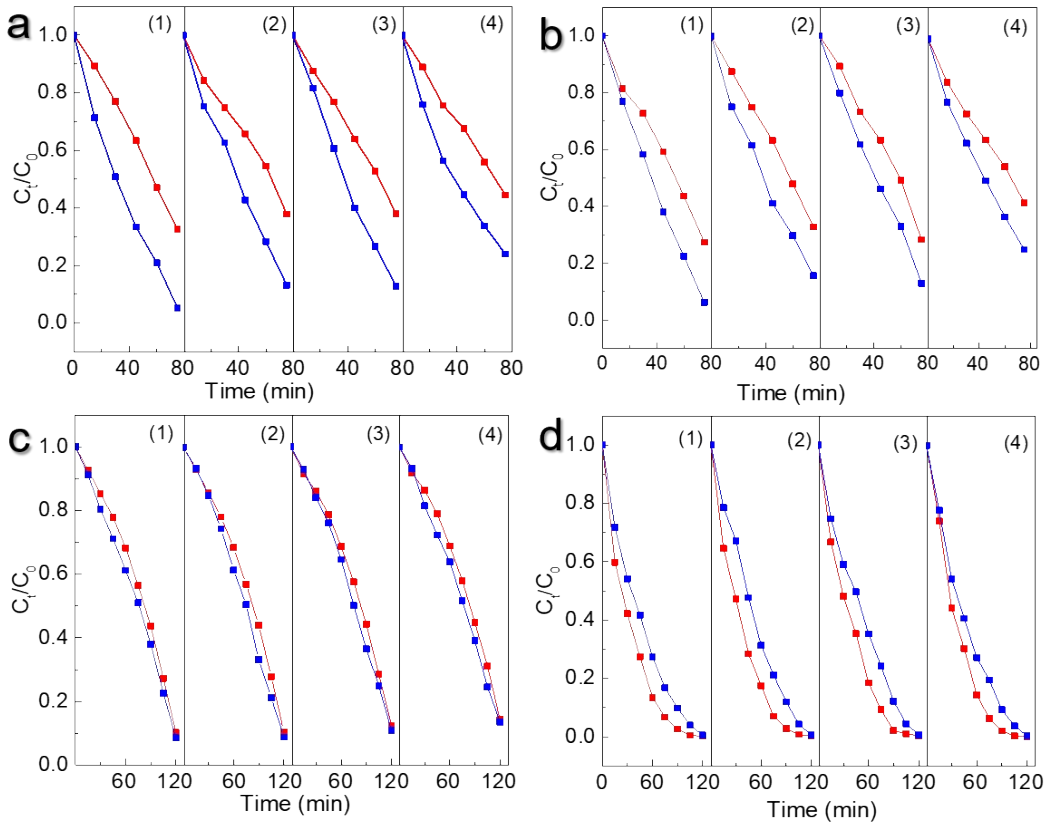

Figure S6. Photocatalytic cycle diagram of the photocatalyst sample for non-settling and settling 48 h under without and with a magnetic field. For the non-settling condition, (a) with a low magnetic field B=0.28 T, and (c) with a high magnetic field B=0.5 T, respectively. For the settling 48 h condition, (b) with a low magnetic field B=0.28 T, and (d) with a high magnetic field B=0.5 T, respectively. In the experiment, the catalyst is centrifuged, washed with deionized water and ethanol completely, and then is dried in oven at 60 ℃ overnight for every time experiment.

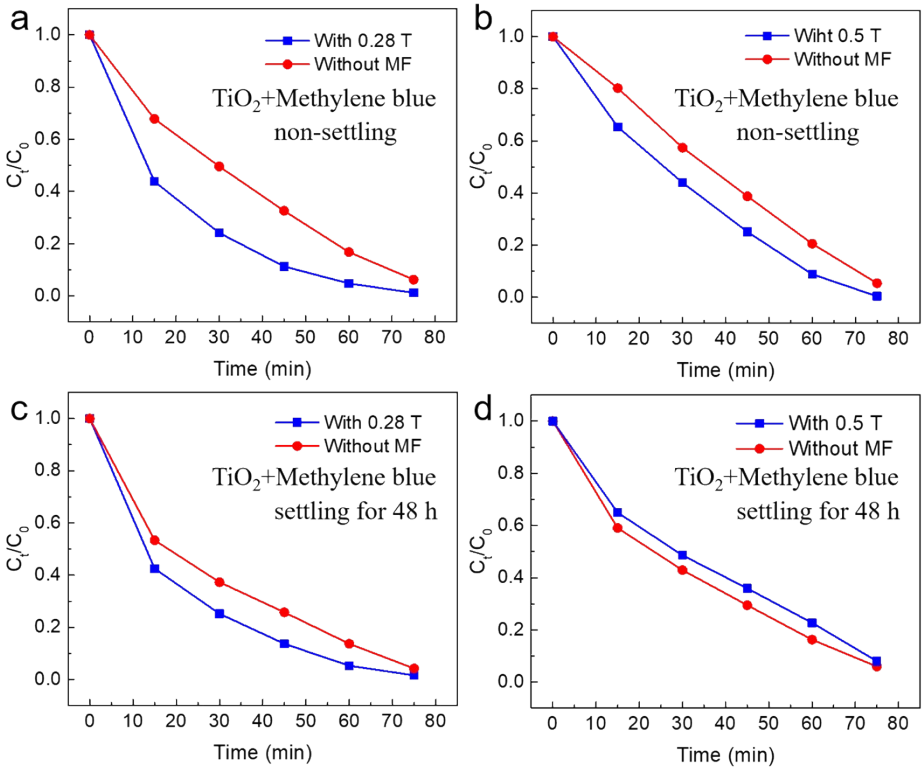

Figure S7. Variation of degradation rate of non-settling and settling for 48 h methylene blue solution with different degradation time, respectively. For non-settling condition, (a) with and without a low magnetic field *B*=0.28 T, respectively. (b) with and without a high magnetic field *B*=0.5 T, respectively. For settling for 48 h condition, (c) with and without a low magnetic field *B*=0.28 T, respectively. (d) with and without a high magnetic field *B*=0.5 T, respectively.

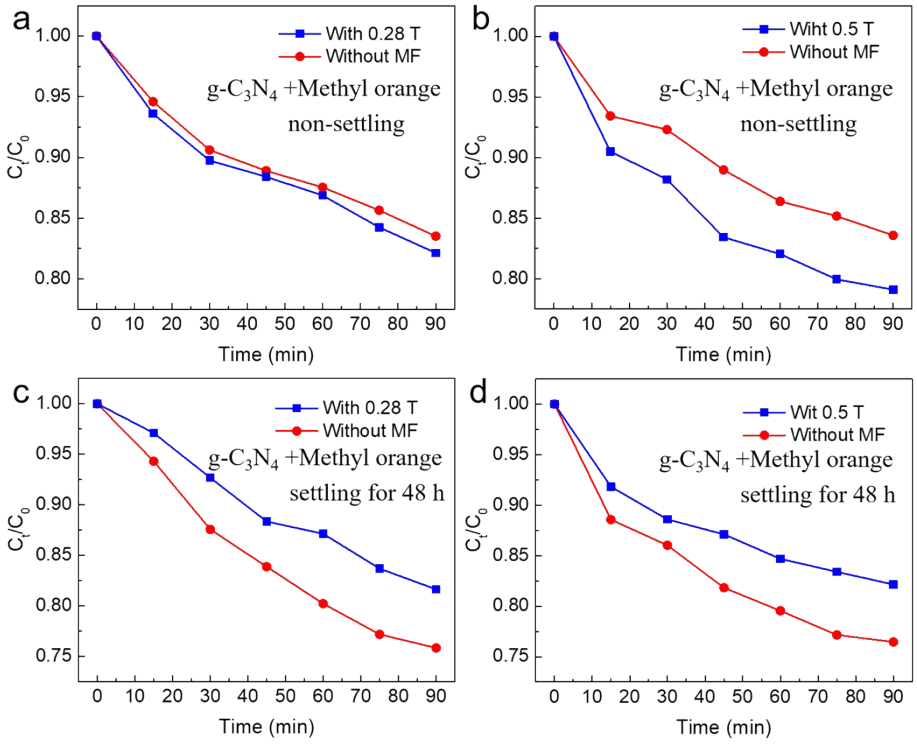

Figure S8. Variation of degradation rate of non-settling and settling for 48 h methyl orange solution with different degradation time, respectively. For non-settling condition, (a) with and without a low magnetic field B=0.28 T, respectively. (b) with and without a high magnetic field B=0.5 T, respectively. For settling for 48 h condition, (c) with and without a low magnetic field B=0.28 T, respectively. (d) with and without a high magnetic field B=0.5 T, respectively.