Supplementary information

for

Arsenite photo-oxidation and removal by ferrihydrite in the presence of oxalate: pH dependence and surface-mediated process

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Table S1 Adsorption of As(III) by ferrihydrite in absence and presence of oxalate in ferrihydrite suspension at different pH values in darkness. Experimental conditions: $[As]_0$ = 100.0 μg L^{-1}, [ferrihydrite] = 0.0125 g L^{-1}

Removal efficiency (%)	in absence of oxalate				in presence of 0.1 mmol L^{-1} oxalate			
	pH 3.0	pH 5.0	pH 7.0	pH 9.0	pH 3.0	pH 5.0	pH 7.0	pH 9.0
	28.34±1.17	46.23±2.01	61.87±2.88	63.32±1.92	19.05±0.77	22.20±1.87	52.26±2.29	52.25±3.15

Table S2 Effect of ferrihydrite dosage on the As(III) concentration changes in darkness. Experimental conditions: $[As]_0$ = 100.0 μg L^{-1}, $[oxalate]_0$ = 0.1 mmol L^{-1},pH 3.0

Ferrihydrite dosage ($g \cdot L^{-1}$)	As(III) concentration after 90min reaction in darkness($\mu g \cdot L^{-1}$)
0.00	99.45 ± 0.34
0.0125	93.17 ± 1.33
0.025	81.95 ± 1.55
0.25	23.25 ± 2.04

Table S3 Effect of oxalate on the As(III) concentration changes in darkness. Experimental conditions: $[As]_0$ = 100.0 μg L^{-1}, [ferrihydrite] = 0.0125 g L^{-1}

Oxalate concentration ($g \cdot L^{-1}$)	As(III) concentration after 90 min reaction in darkness($\mu g \cdot L^{-1}$)
0.0	71.66 ± 0.34
0.05	75.17 ± 1.33
0.1	81.95 ± 1.55
0.2	83.25 ± 2.04
0.5	87.66 ± 1.09

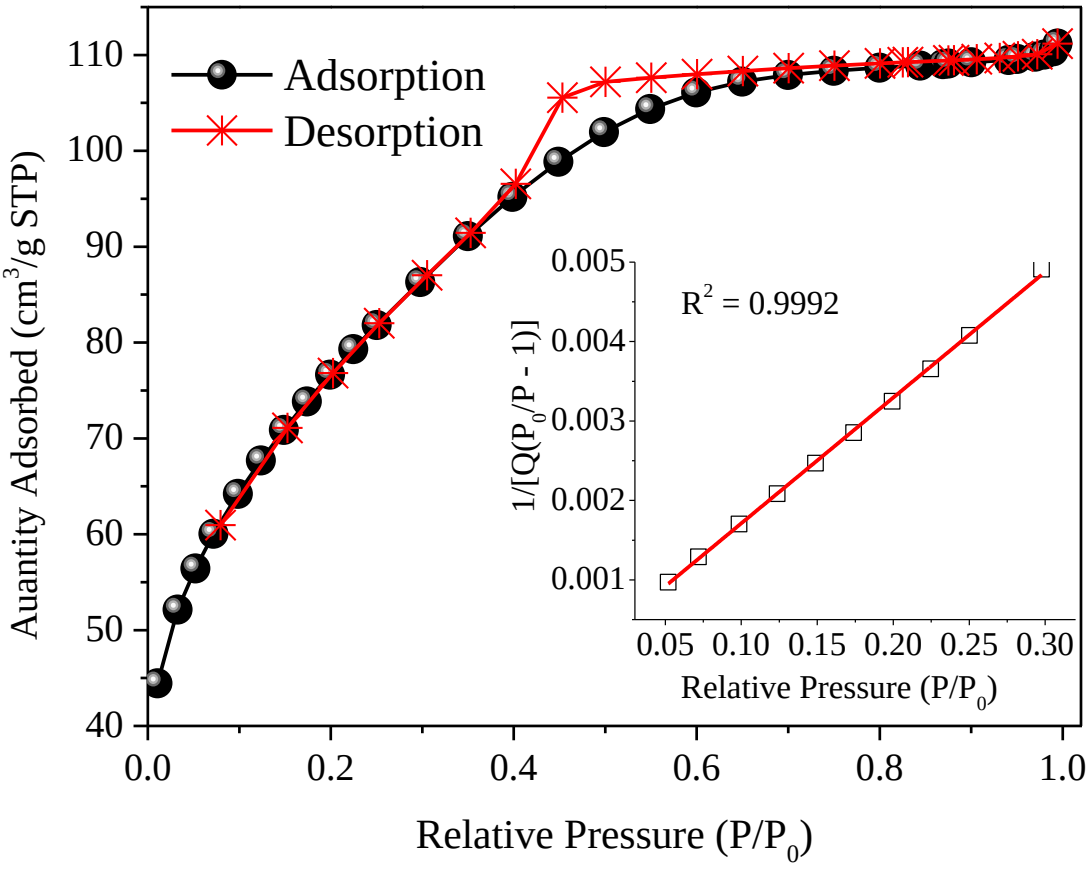


Fig.S1 N_2 adsorption desorption isotherm and fitting curve of the BET surface area of ferrihydrite (inset)

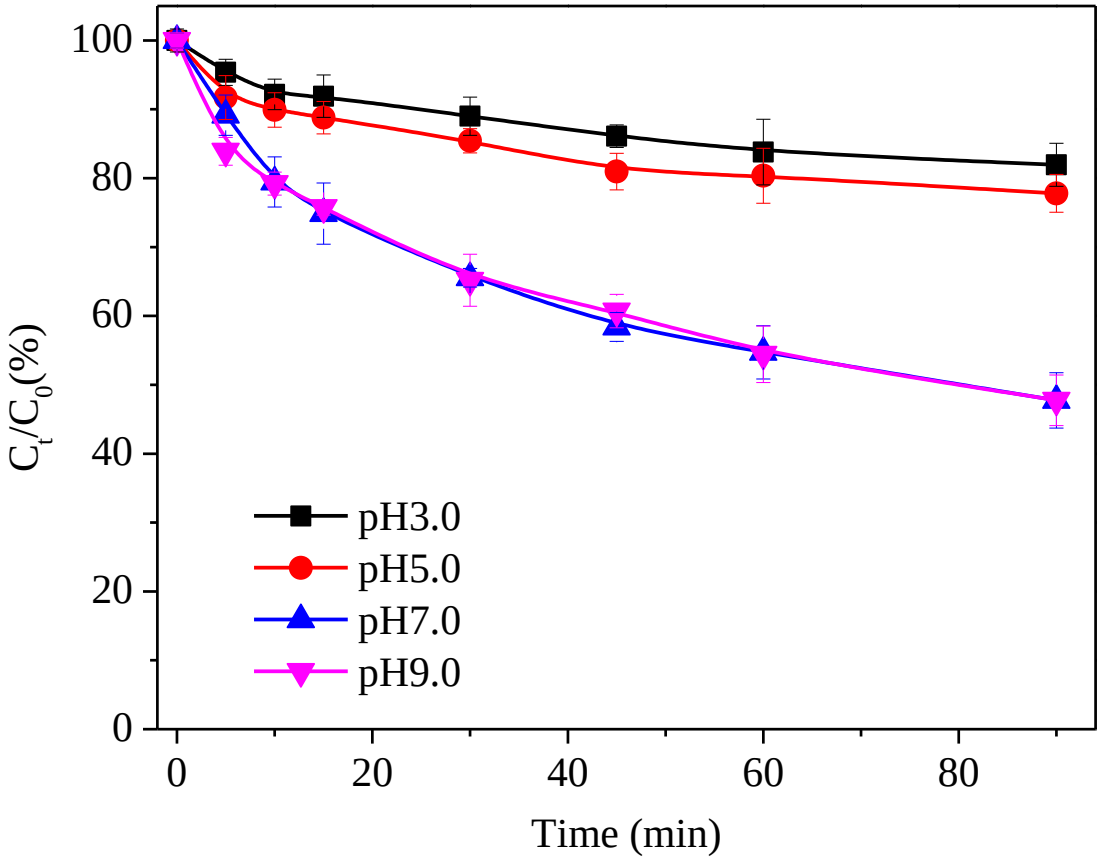


Fig.S2 As(III) removal in ferrihydrite/oxalate in the darkness at different pH conditions. Experimental conditions: $[As]_0$ = 100.0 μg·L^{-1}, [ferrihydrite] = 0.0125 g·L^{-1}, $[oxalate]_0$ = 0.1 mmol·L^{-1}

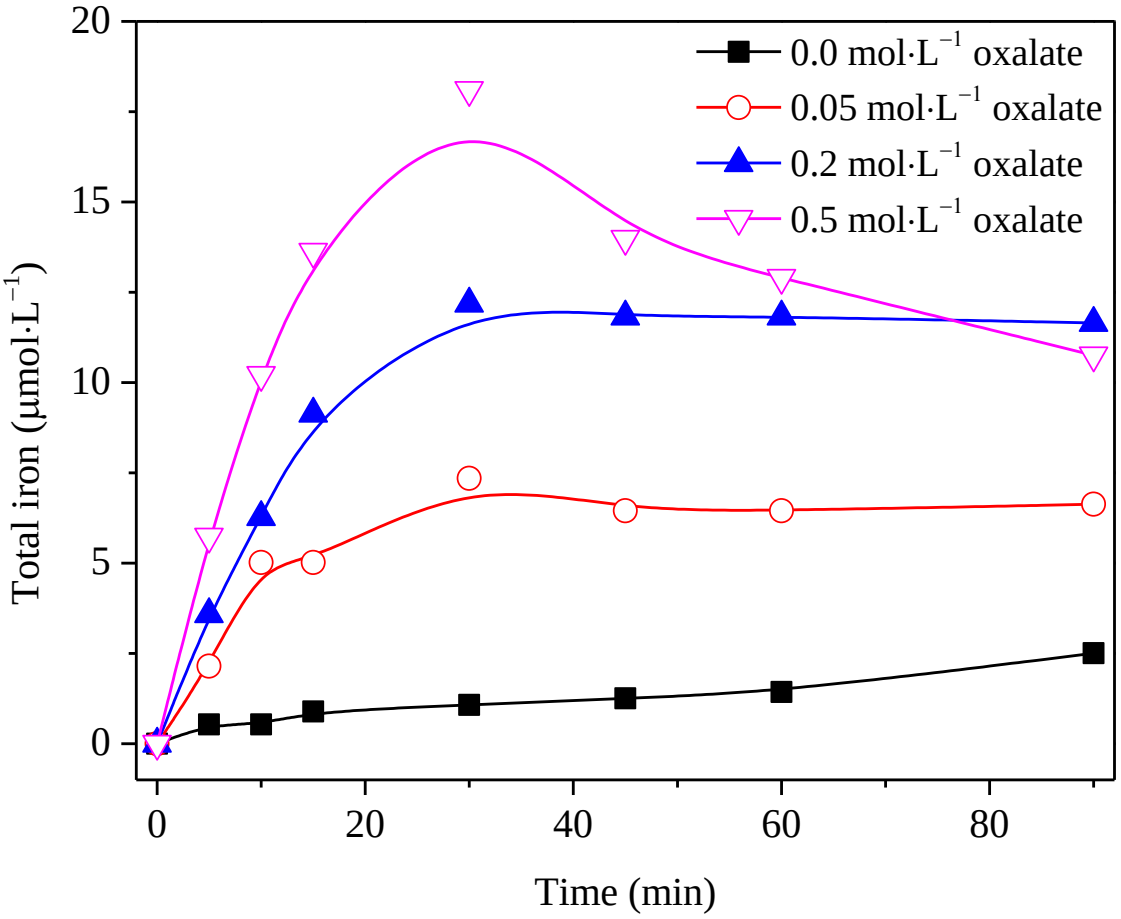


Fig.S3 Dissolution of iron ions in ferrihydrite system under different oxalate concentration at pH 3.0. Experimental conditions: $[As]_0$ = 100.0 μg·L^{-1}, [ferrihydrite] = 0.0125 g·L^{-1}

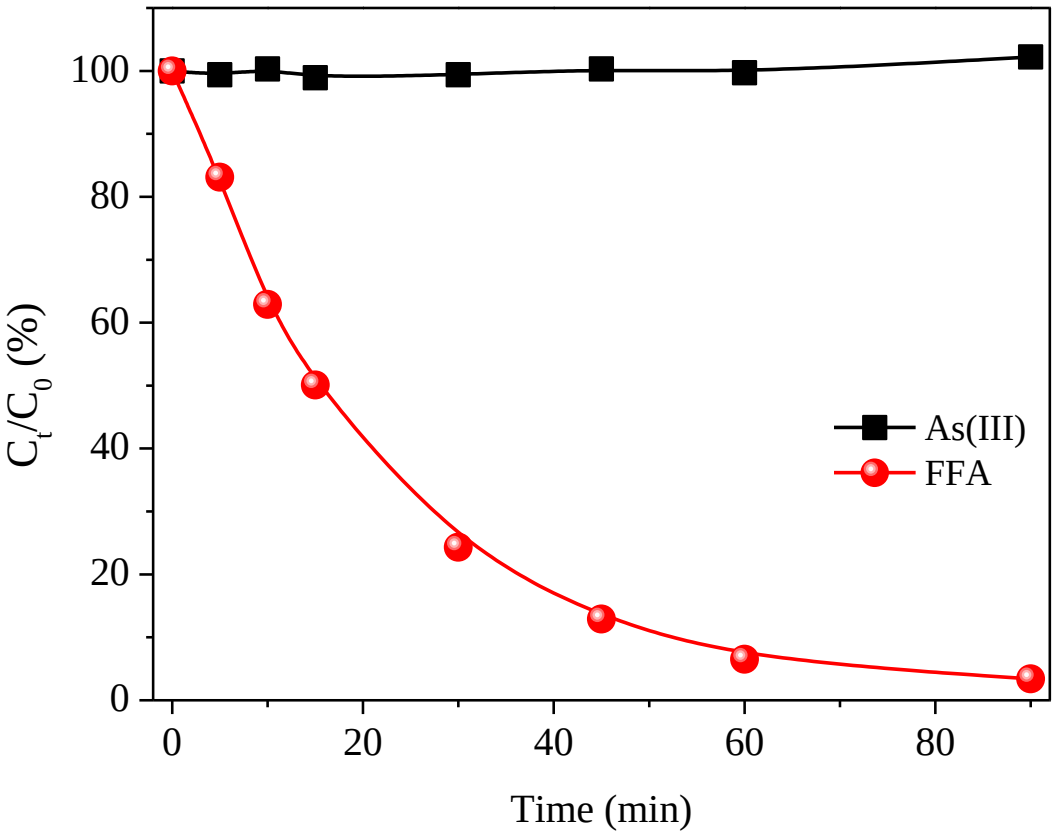
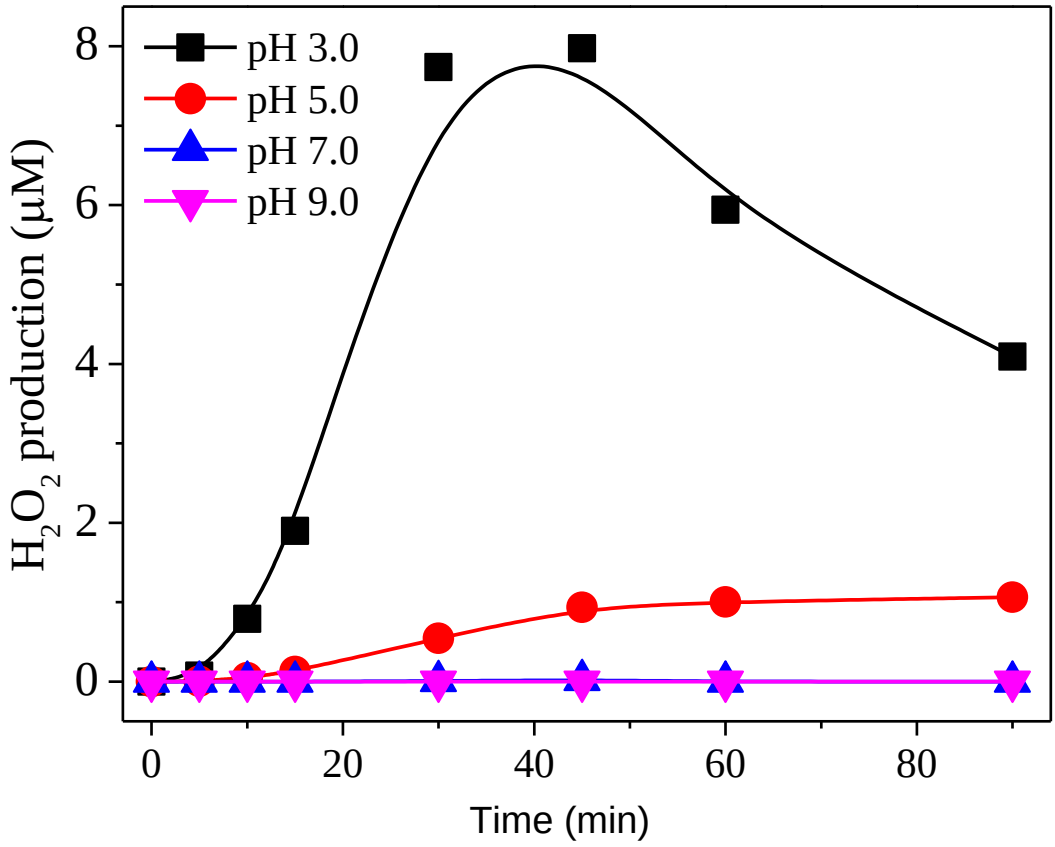


Fig.S4 Changes of As(III) and FFA concentration over time in the visible-light-MB^+ system. Experimental conditions: $[As]_0$ = 100.0 μg·L^{-1}, $[MB^+]_0$ = 5 mg·L–1,$[FFA]_0$ = 10 μmol·L^{-1},pH 7.0



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107 Fig.S5 Production of H_2O_2 in ferrihydrite/oxalate system at different pH conditions. Experimental

108 conditions: [ferrihydrite] = 0.0125 g·L^{-1}, $[oxalate]_0$ = 0.1 mmol· L^{-1}

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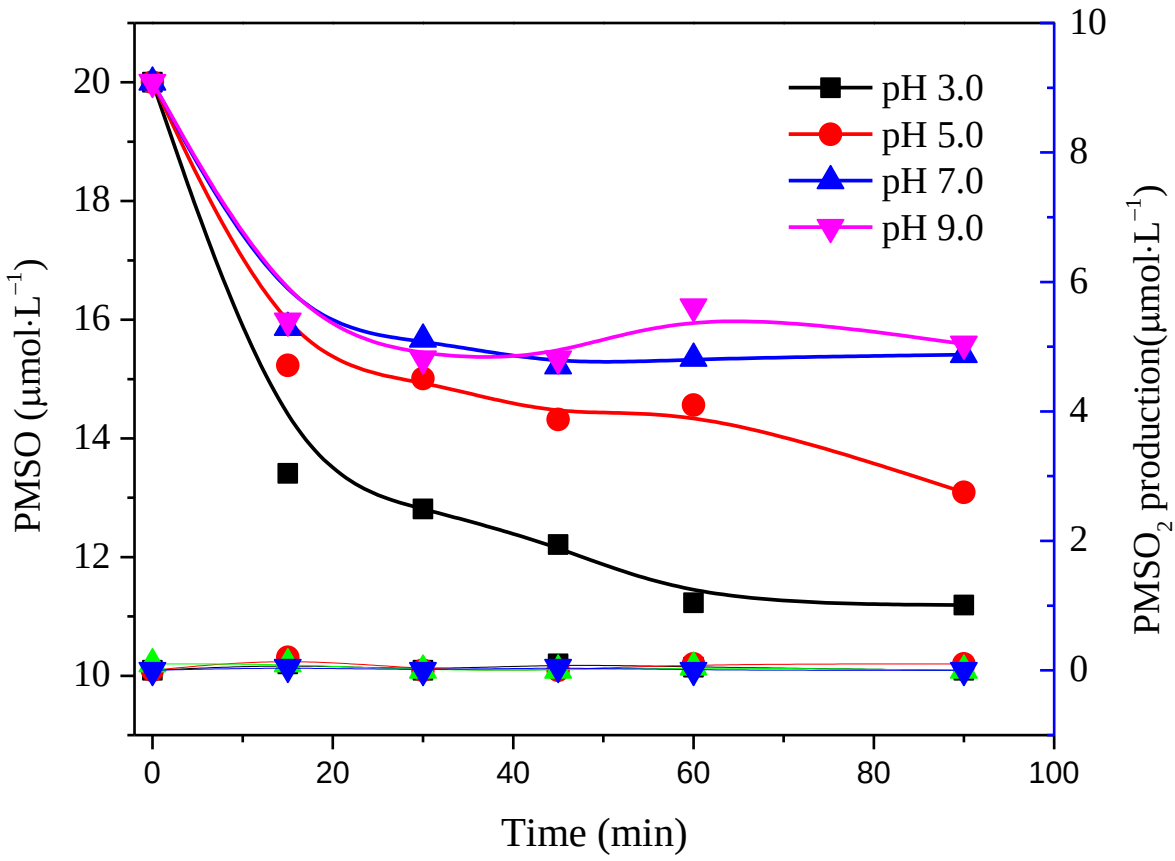
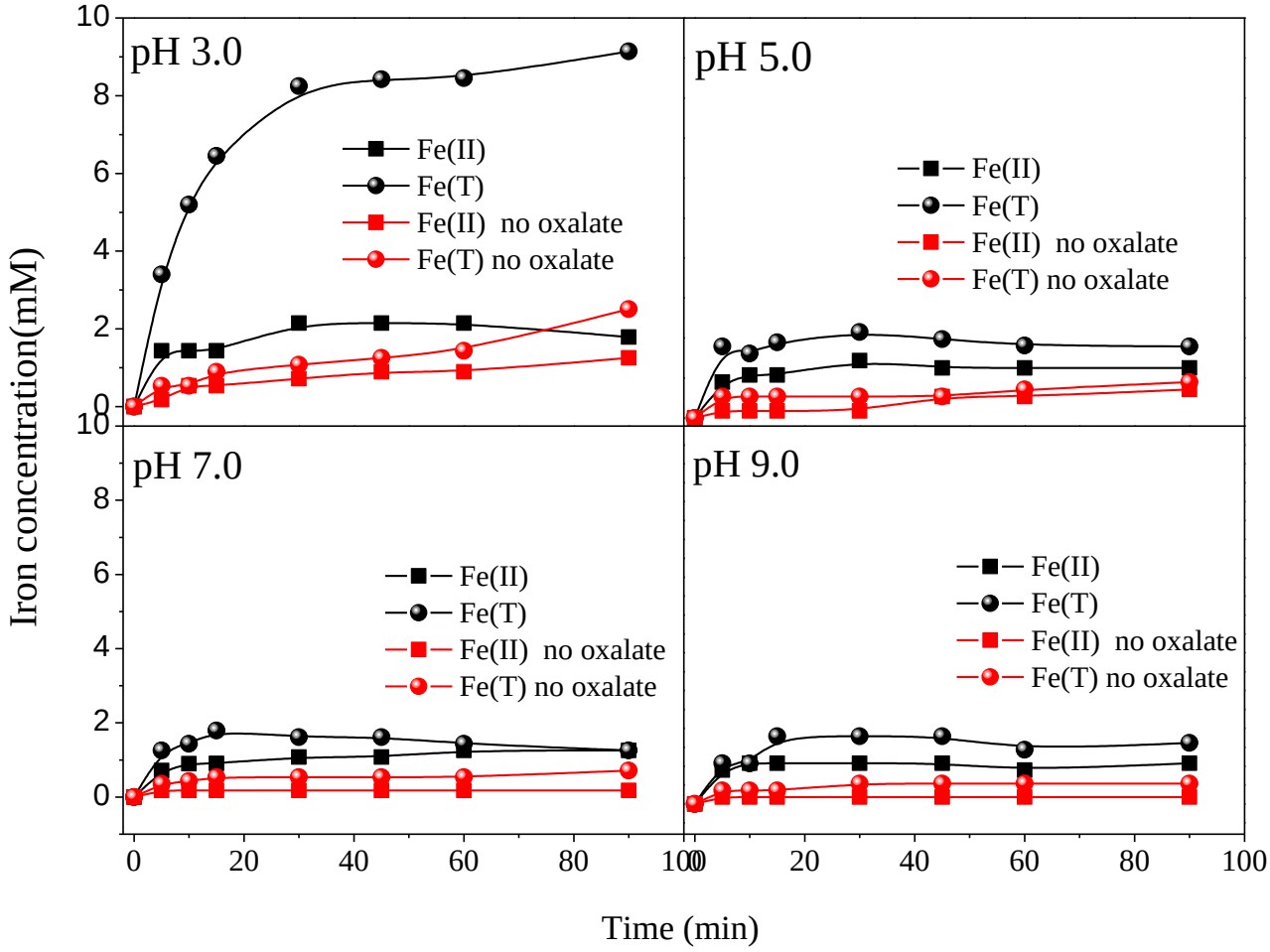


Fig.S6 Disappearance of PMSO and production of $PMSO_2$ in ferrihydrite/oxalate system under UVA irradiation at different pH conditions. Experimental conditions: $[PMSO]_0$ = 20.0 μmol·L^{-1}, [ferrihydrite] = 0.0125 g·L^{-1}, $[oxalate]_0$ = 0.1 mmol· L^{-1}



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124 Fig.S7 Dissolved iron ions from ferrihydrite in presence and absence of 0.1 mmol·L^{-1}oxalate at

125 different pH conditions. Experimental conditions: [ferrihydrite] = 0.0125 g·L^{-1}

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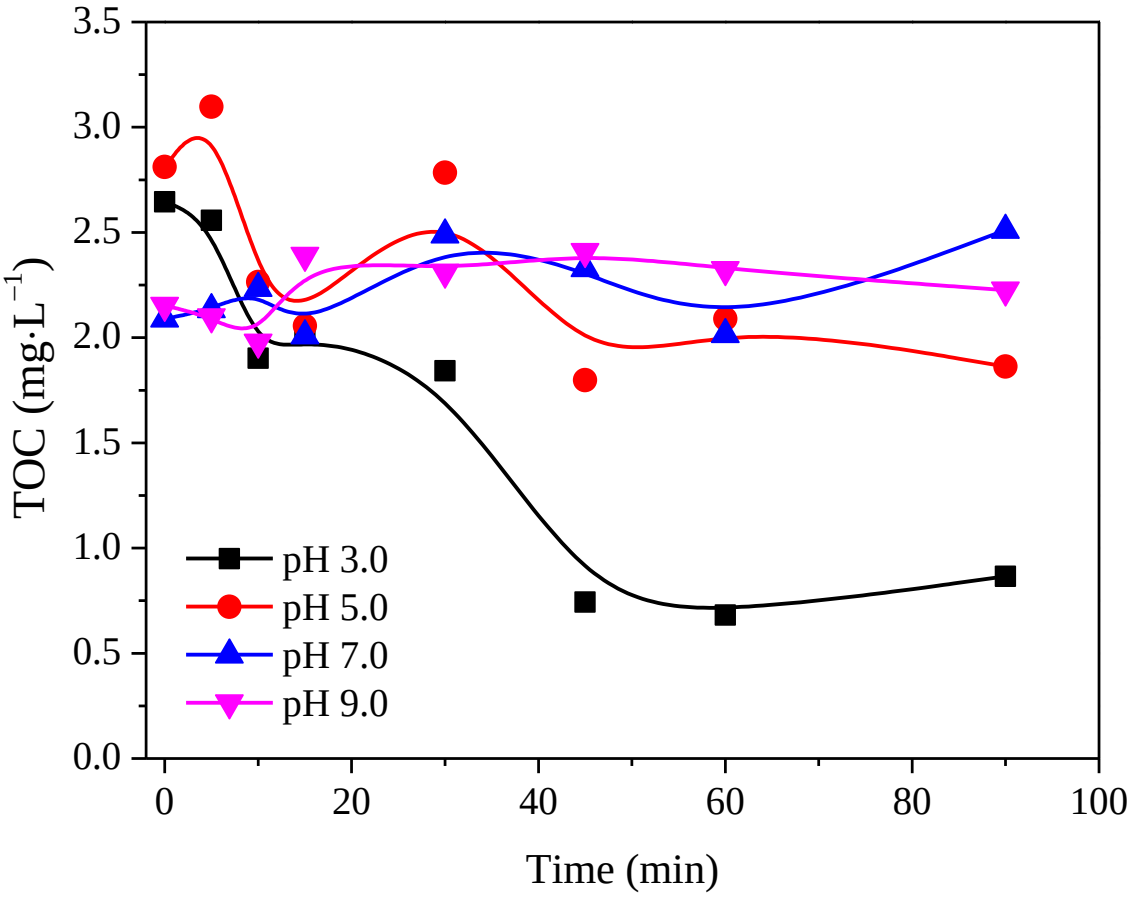


Fig.S8 Variation of TOC in ferrihydrite/oxalate under UVA-irradiation at different pH conditions. Experimental conditions: $[As]_0$ = 100.0 μg·L^{-1}, [ferrihydrite] = 0.0125 g·L^{-1}, $[oxalate]_0$ = 0.1 mmol·L^{-1}

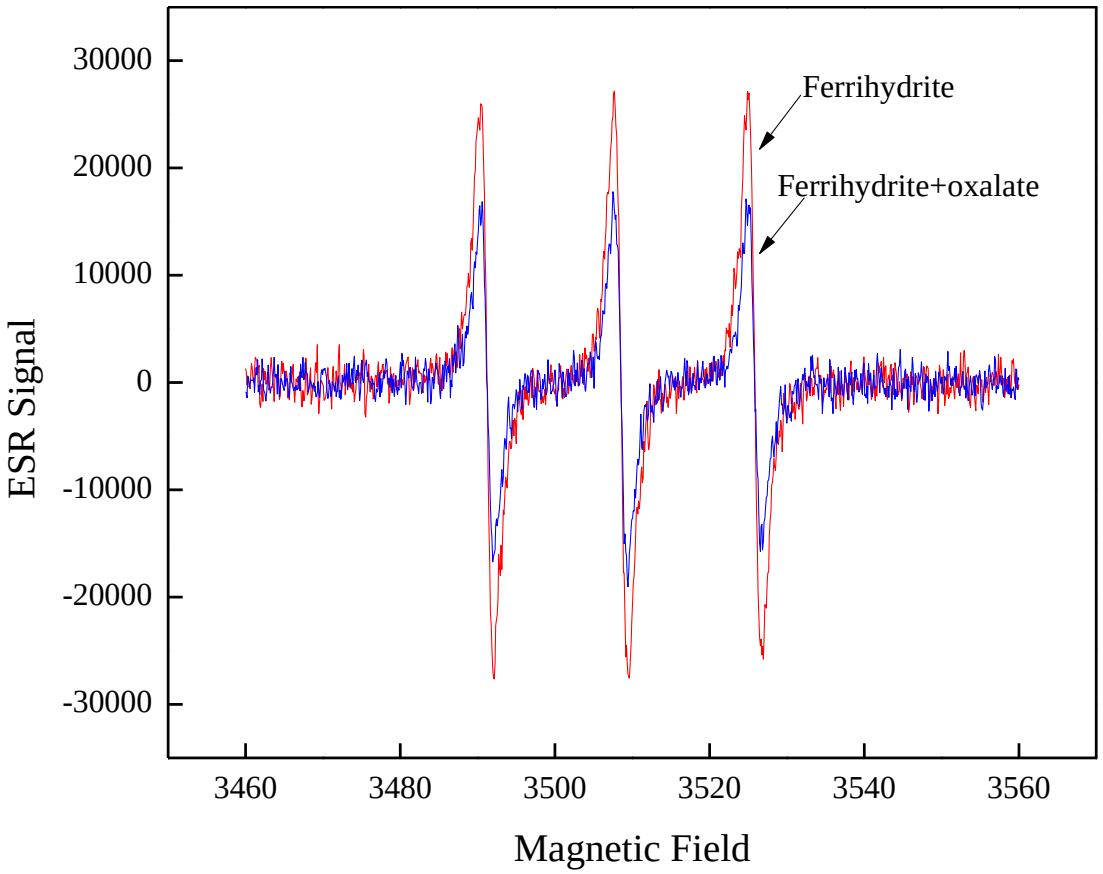


Fig.S9 ESR spectra of generated-hole in the presence and absence of 0.1 mol·L^{-1} oxalate at pH 3.0

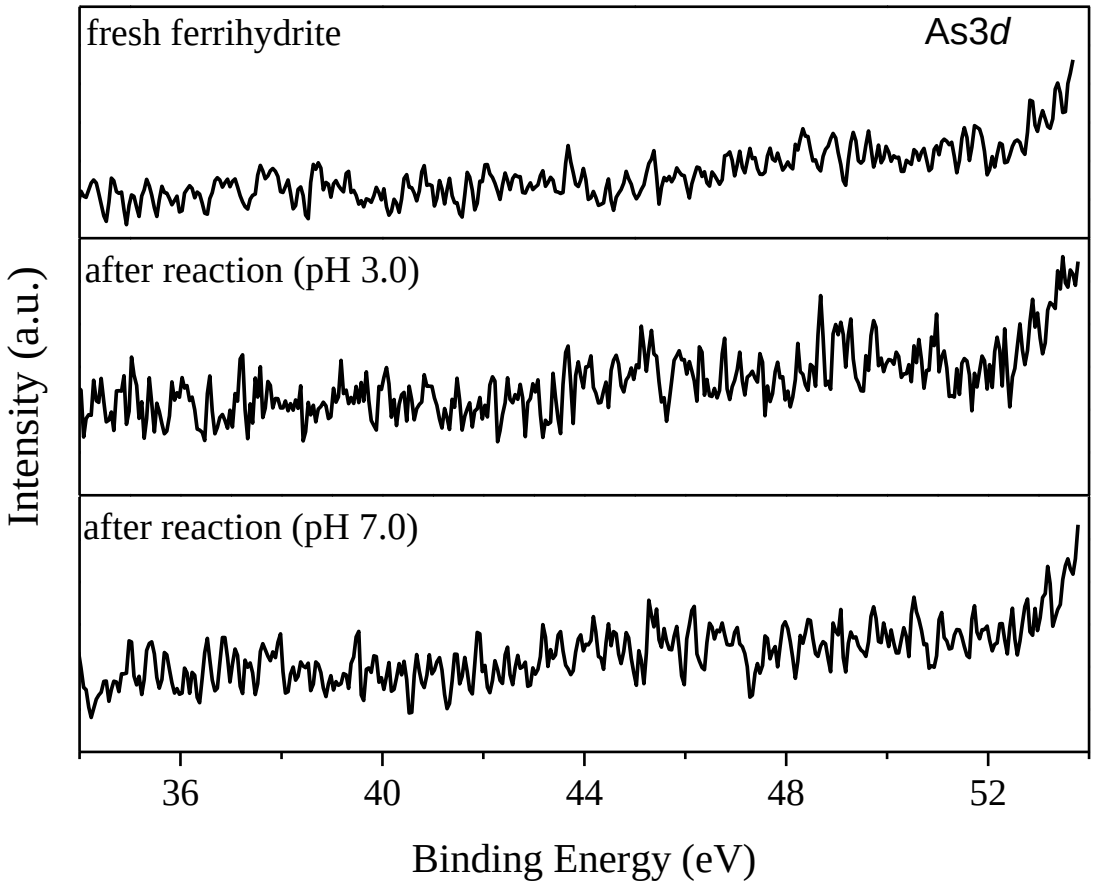
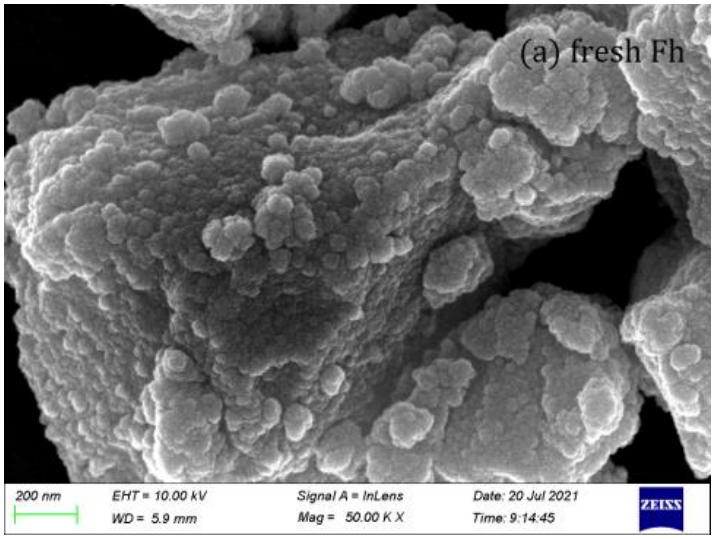
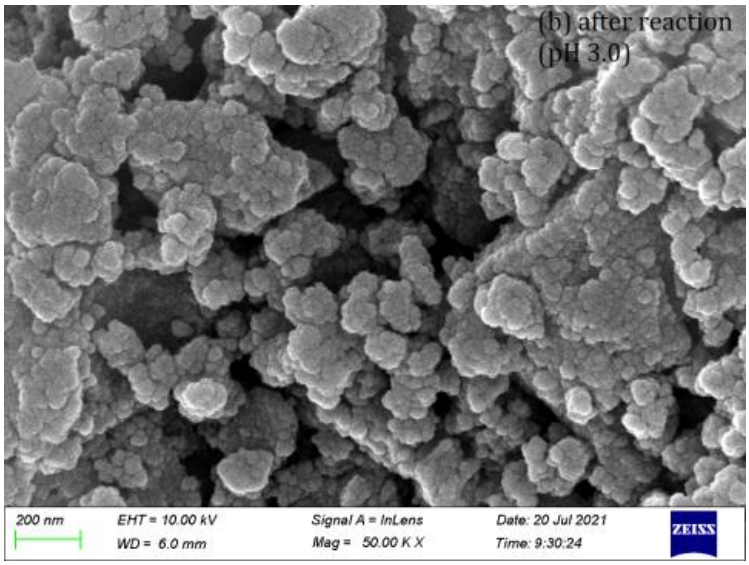


Fig.S10 XPS spectra of As 3d region of ferrihydrite before and after reaction





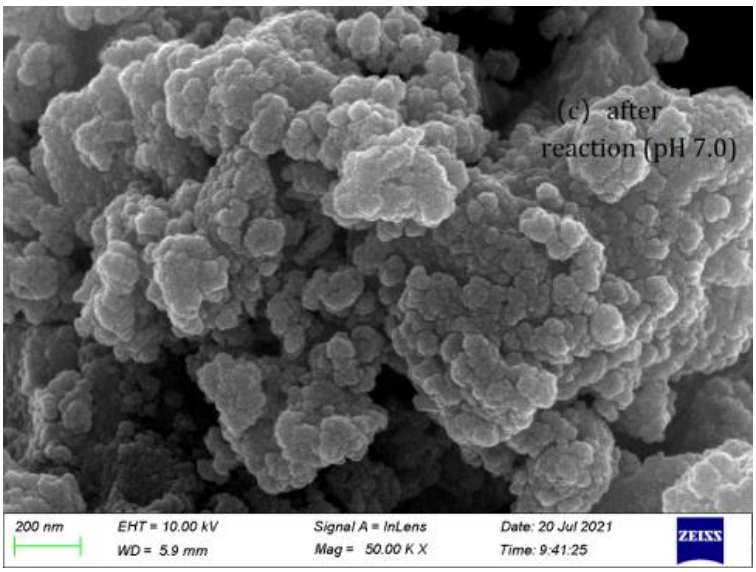


Fig.S11 SEM images of ferrihydrite before and after reaction