Supplementary Material

High-efficiently simultaneous oxidation of organoarsenic and immobilization of arsenic in Fenton enhanced plasma system

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Supplementary Table caption

Table S1. The mineral compositions of precipitate generated in GDP system mediated by various additive Fe(II) after 17 min treatment (input energy 58W, $[ROX]_0$= 100 μM, pH 4.0).

Supplementary Figure captions

Figure S1. Schematic diagram of the GDP reactor.

Figure S2. Effect of the input energy on active species generation: hydroxyl radical (a) and hydrogen peroxide (b) (Typical condition: input energy 58W, $[ROX]_0$ = 100 μM, pH 4.0).

Figure S3. The yields of H_2O_2 in ROX free solution, ROX and ROX/500 μM Fe(II) modified solution in GDP system within 17 min (input energy 58W, $[ROX]_0$ = 100 μM, $[Fe(II)]_0$ = 500 μM, pH 4.0)

Figure S4. The photographs of precipitations after 17 min GDP treatment with the present of various Fe(II) addition (input energy 58W, $[ROX]_0$ = 100 μM, pH 4.0).

Figure S5. The effect of solution pH on the formation of As(V) (a) and the oxidation of Fe(II) (b) after 17min GDP/Fenton treatment (input energy 58W, $[ROX]_0$ = 100 μM, $[Fe(II)]_0$ = 500 μM).

Figure S6. Eh–pH diagrams for the system As–Fe at 25 °C and 1 bar, ΣAs is set at **a** 10^{-3} M, **b** 10^{-5} M.

Figure S7. The fluorescence intensity of 7-hydroxycoumarin produced within 4.0 min

treatment at different EtOH addition in GDP/Fenton (input energy 58W, $[ROX]_0$ = 100 μM, $[Fe(II)]_0$ = 500 μM, pH 4.0).

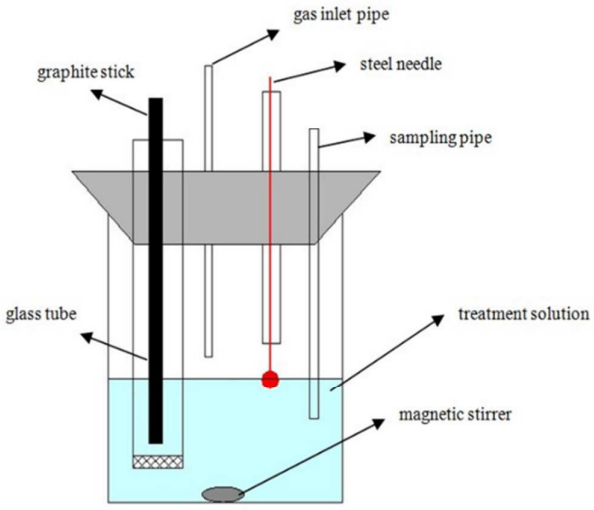
Figure S8. The fluorescence intensity of 7-hydroxycoumarin produced within 4.0 min treatment at different F^- addition in GDP/Fenton (input energy 58W, $[ROX]_0$ = 100 μM, $[Fe(II)]_0$ = 500 μM, pH 4.0)

Figure S9. The curve-fitted narrow scan XPS spectra of Fe 2p of the precipitate collected after17 min GDP/Fenton treatment (input energy 58W, $[ROX]_0$ = 100 μM, $[Fe(II)]_0$ = 500 μM, pH 4.0).

Table S1

Precipitation	Initial Fe(II) concentration (μM)				
	50	100	200	500	1000
$As(V)_{solid}/As_{ini.}$	10%	19%	41%	79%	82%
$As(t)_{solid}/As_{ini.}$	12%	21%	44%	85%	87%
$Fe(II)_{solid}/Fe_{ini.}$	2%	14%	16%	20%	12%
$Fe(t)_{solid}/Fe_{ini.}$	48%	55%	68%	81%	79%

Figure S1



The reaction vessel was a jacketed glass cylinder with inner diameter of 7.0 cm and height of 17.0 cm. The anode was a pointed stainless steel needle (diameter: 1.0 mm). The cathode was a graphite rod (diameter: 6 mm) placed in another glass tube and separated from the anodic compartment by a glass frit of medium porosity. During the treatment, the bulk solution in the jacketed reaction vessel was maintained at 298±2K by circulation cold water, argon-purged by argon shield through gas inlet pipe and magnetically stirred by magnetic stirrer constant speed stirring.

Figure S2

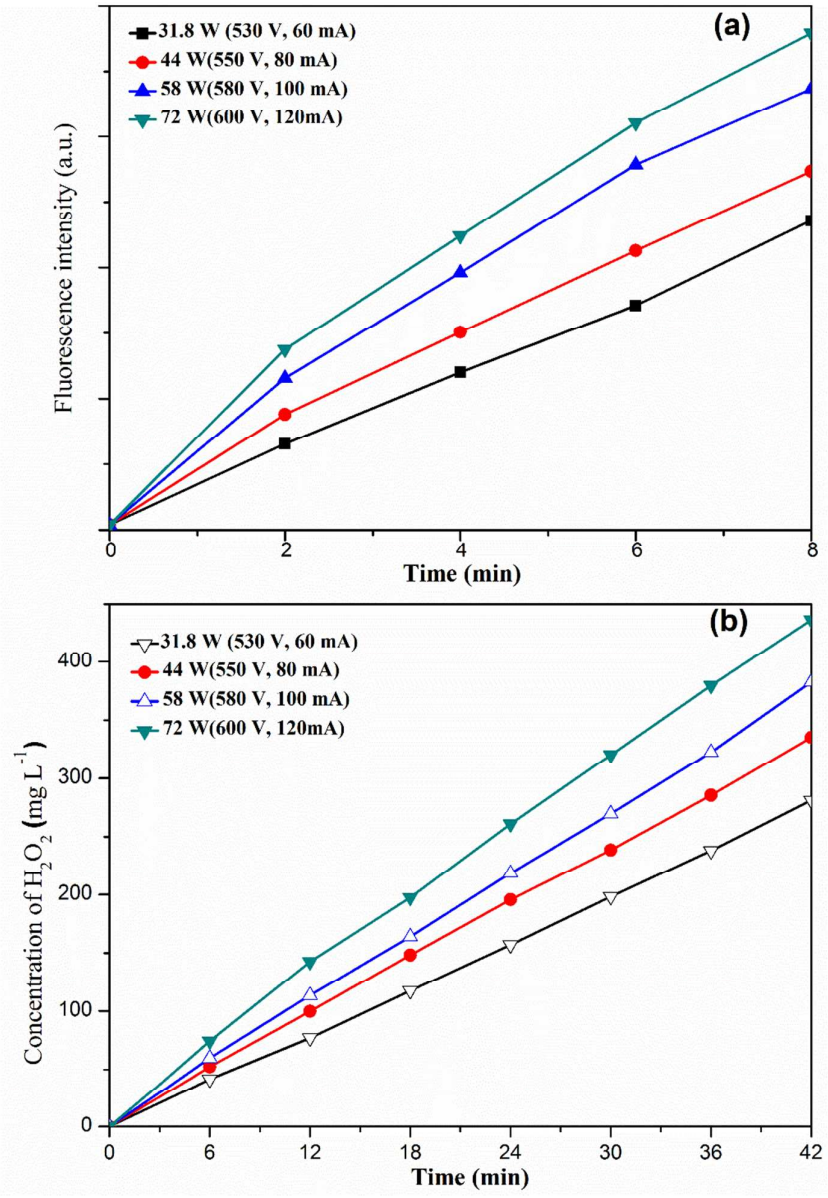

(a)
31.8 W (530 V, 60 mA)
44 W(550 V, 80 mA)
58 W(580 V, 100 mA)
72 W(600 V, 120mA)
Fluorescence intensity (a.u.)
Time (min)
0
2
4
6
8
(b)
31.8 W (530 V, 60 mA)
44 W(550 V, 80 mA)
58 W(580 V, 100 mA)
72 W(600 V, 120mA)
Concentration of H_2O_2 (mg L^{-1})
Time (min)
0
100
200
300
400
0
6
12
18
24
30
36
42

Figure S3

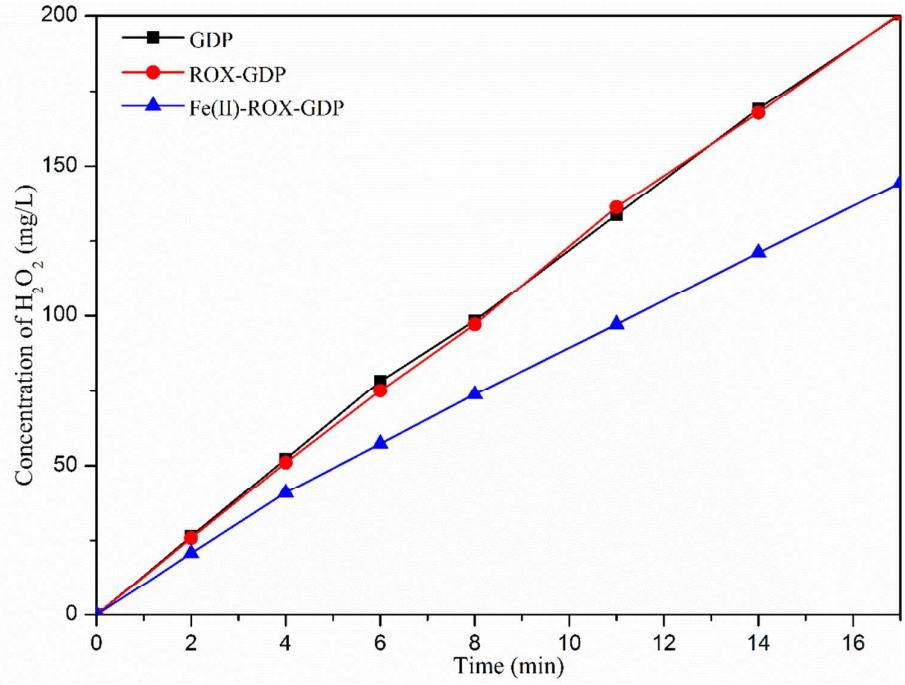

GDP
ROX-GDP
Fe(II)-ROX-GDP
Concentration of H_2O_2 (mg/L)
Time (min)
0
50
100
150
200
0
2
4
6
8
10
12
14
16

Figure S4

50μM 100 μM 200 μM 500 μM 1000 μM

Figure S5

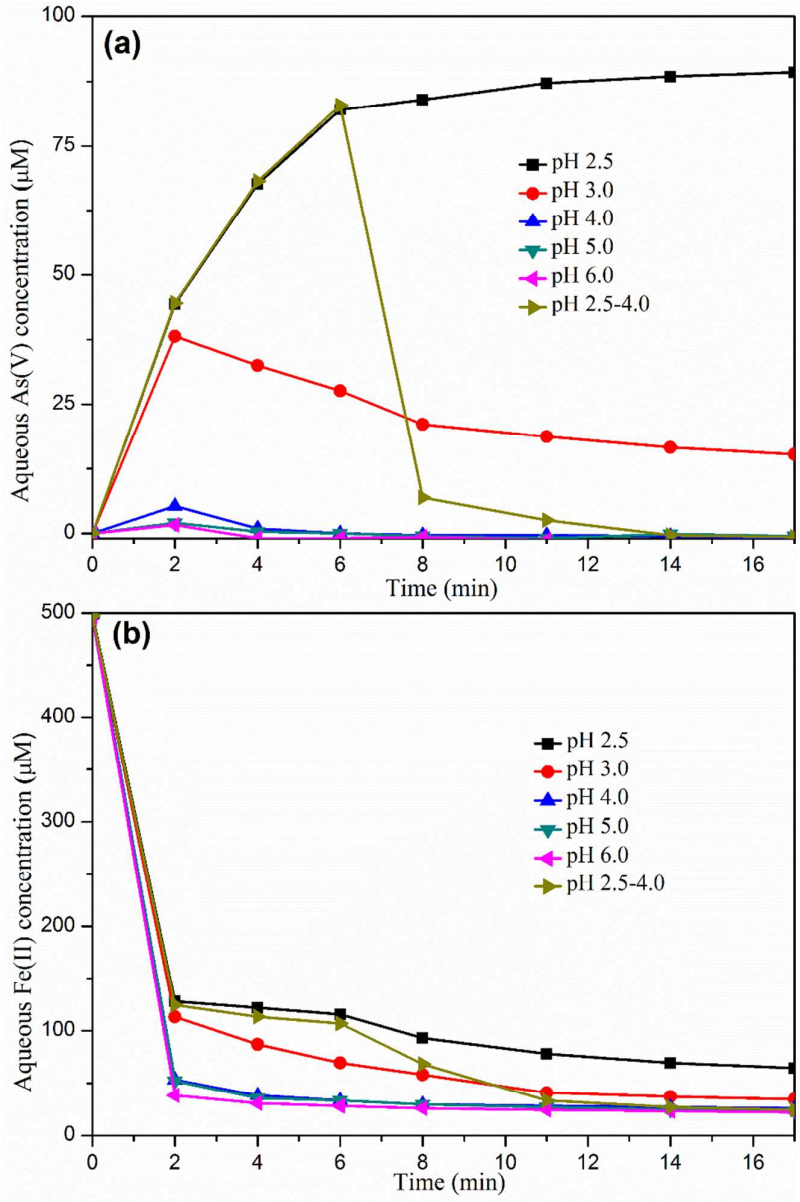

(a)
Aqueous As(V) concentration (μM)
Time (min)
pH 2.5
pH 3.0
pH 4.0
pH 5.0
pH 6.0
pH 2.5-4.0
(b)
Aqueous Fe(II) concentration (μM)
Time (min)
pH 2.5
pH 3.0
pH 4.0
pH 5.0
pH 6.0
pH 2.5-4.0

Figure S6

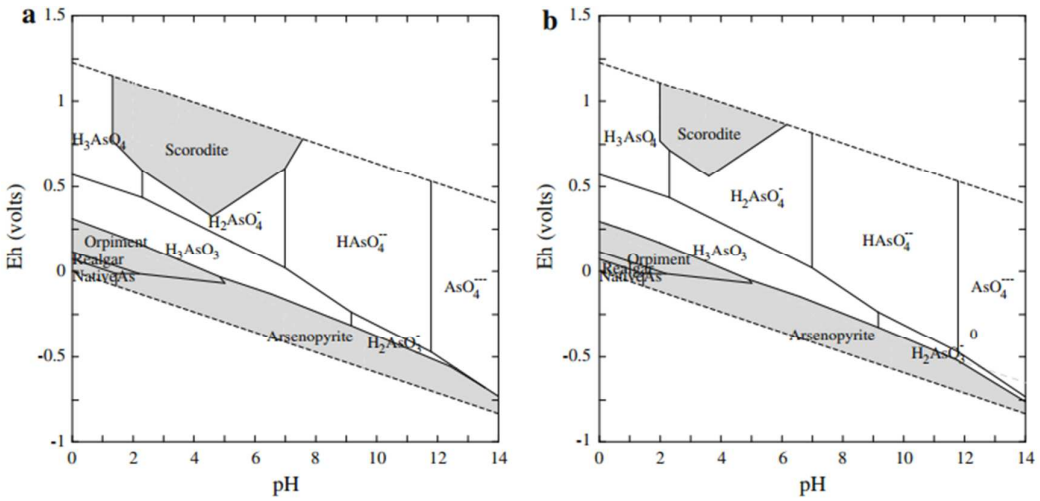

a
b
Eh (volts)
pH
Scorodite
H_3AsO_4
$H_2AsO_4^-$
$HAsO_4^{--}$
AsO_4^{---}
H_3AsO_3
Orpiment
Realgar
NativeAs
Arsenopyrite
$H_2AsO_3^-$
0

Figure S7

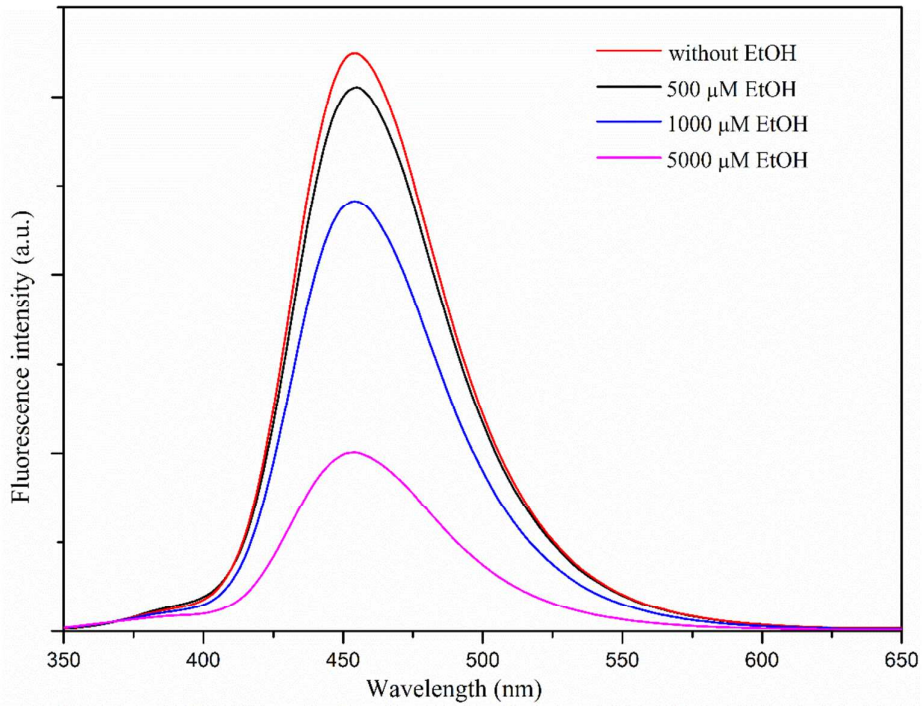

without EtOH
500 μM EtOH
1000 μM EtOH
5000 μM EtOH
Fluorescence intensity (a.u.)
350
400
450
500
550
600
650
Wavelength (nm)

Figure S8

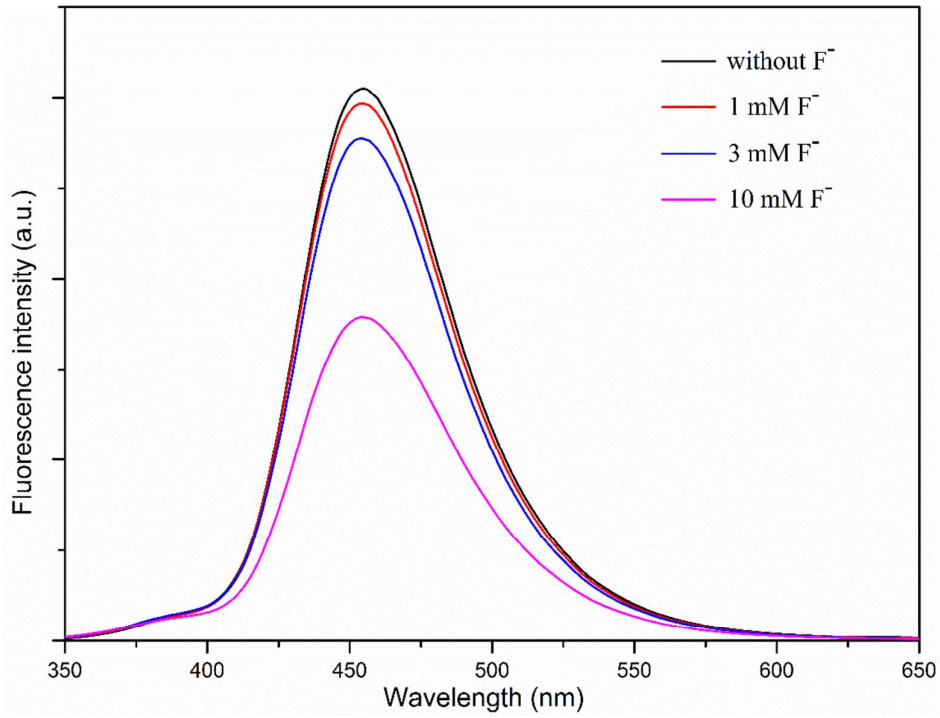
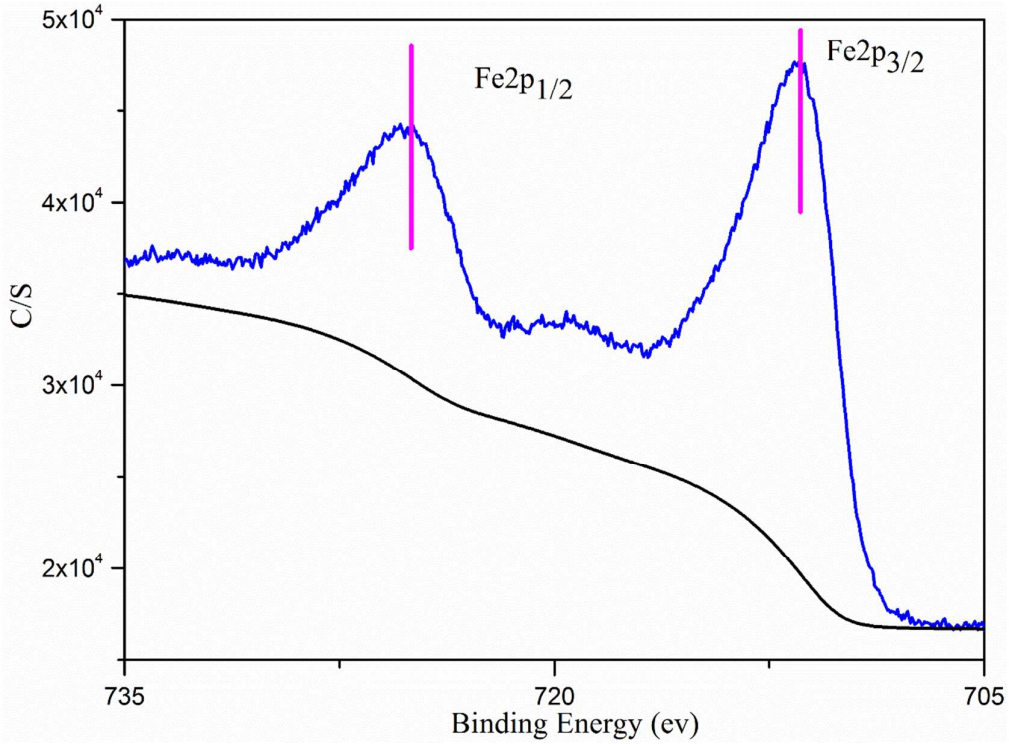

without F-
1 mM F-
3 mM F-
10 mM F-
Fluorescence intensity (a.u.)
350
400
450
500
550
600
650
Wavelength (nm)

Figure S9


5x10^4
4x10^4
3x10^4
2x10^4
C/S
Fe2p1/2
Fe2p3/2
735
720
705
Binding Energy (ev)