Electronic Supplementary Material (ESI) for RSC Advances.

Supporting Information for:

Complexation of arsenate with ferric ion in aqueous solutions

Table S1 The pH values and composition of solution used in figure 1

Solutions in figure 1(a)			Solutions in figure 1(b)		
Concentration (mM)		pH	Concentration (mM)		pH
$Fe(NO_3)_3$	Na_3AsO_4		$Fe(NO_3)_3$	Na_2SO_4	
0.5	0	1.13	0.5	0	1.13
	0.5	1.03		0.5	1.05
	1	1.03		1	1.05
	2	1.06		2	1.05
	4	1.10		4	1.07
	6	1.12		6	1.07
	8	1.17		8	1.08
	10	1.20		10	1.09
	15	1.31		15	1.10
	20	1.43		20	1.12
	25	1.62		25	1.14
0	25	6.09	0	25	1.13

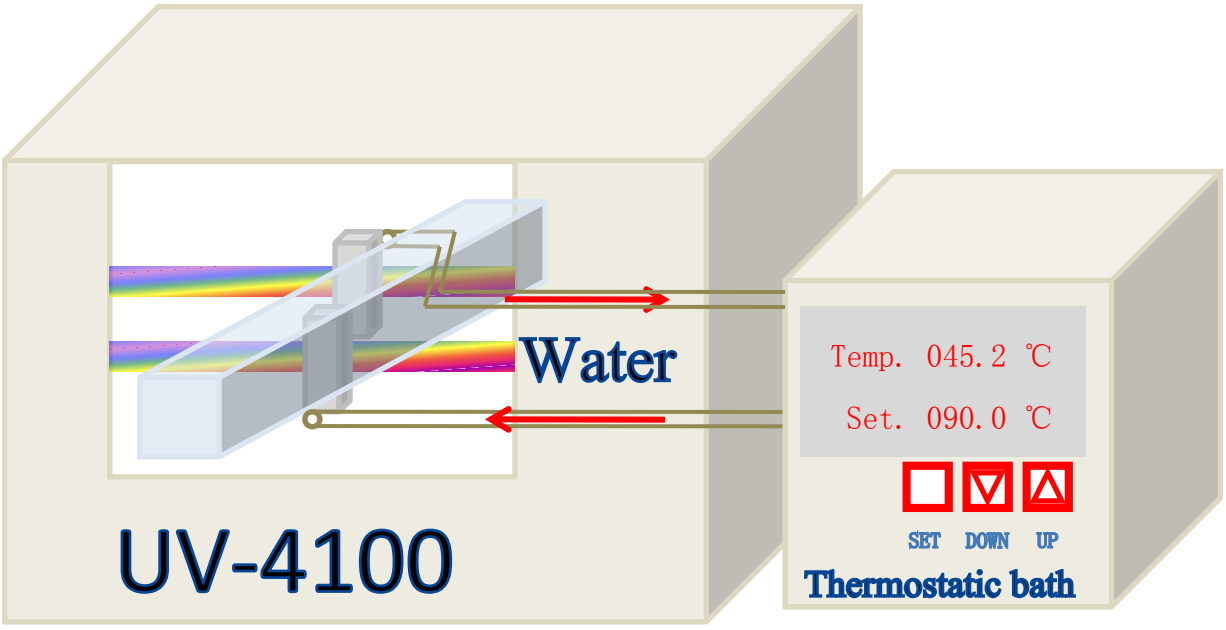

Figure S1 Experimental apparatus of continues heating process (Thermostatic bath THS-10 was purchased from Ningbo Tianheng instrument factory)

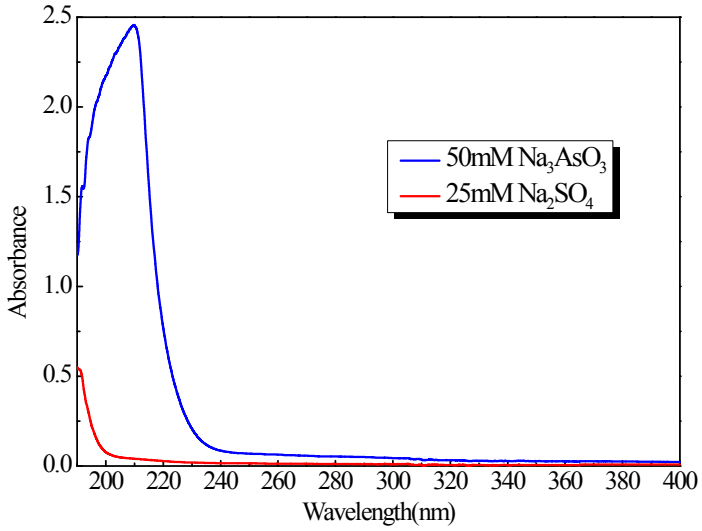

Figure S2 UV-Vis spectra of Na_2SO_4, Na_3AsO_4 in 0.1 M $HClO_4$

Table S2 The enthalpy change of hydrolysis reaction of ferric

Reaction	Delta H (kJ/mol)
$Fe^{3+} + H_2O = FeOH^{2+} + H^+$	25.1
$Fe^{3+} + 2H_2O = Fe(OH)_2^+ + 2H^+$	37.7
$Fe^{3+} + 3H_2O = Fe(OH)_3 + 3H^+$	75.3
$Fe^{3+} + 4H_2O = Fe(OH)_4^- + 4H^+$	154.8

Table S3 Thermodynamic data of relative species (kJ/mol)

Species	Standard molar enthalpy of formation	Standard molar Gibbs free energy of formation
H_2O	-285.83[a]	-237.14[b]
H_3AsO_4	-903.45[a]	-768.06[b]
$HAsO_4^{2-}$	-908.41[a]	-714.43[b]
$H_2AsO_4^-$	-911.42[a]	-753.07[b]
AsO_4^{3-}	-890.21[a]	-642.62[b]
Fe^{3+}	-49.0[c]	-17.18[b]
$FeOH^{2+}$	-309.73[d]	-241.96[b]
$Fe(OH)_2^+$	-582.96[d]	-452.198[b]
$Fe(OH)_3$	-831.19[d]	-476.31[b]
$Fe(OH)_4^-$	-1037.52[d]	-849.29[b]
$FeAsO_4(s)$	-899.0[e]	-786.7[e]
$FeH_2AsO_4^{2+}$	-985.95[f]	-798.75[f]
$FeHAsO_4^+$	-972.04[f]	-787.38[f]
$FeAsO_4$	-914.83[f]	-744.17[f]
SO_4^{2-}	-909.60[b]	-744.36[b]
$FeSO_4^+$	-931.90[b]	-772.60[b]

Source: values with superscript letters a to f are respectively from Ref. 23, HSC 7.0,

Ref. 22, Visual MINTEQ 3.0, Ref. 25 and Ref. 24.

Table S4 XRF of the gel-like material in solid phase

Analyte	Result	Proc-Calc	Line	Net Int.	BG Int.
As	37.2494 %	Quant.-FP	As Kb	439.024	3.048
Fe	30.7726 %	Quant.-FP	Fe Ka	1858.207	3.677
O	30.0135 %	Quant.-FP	O Ka	4.447	0.622
Cl	1.1336 %	Quant.-FP	Cl Ka	17.513	1.705
Na	0.3797 %	Quant.-FP	Na Ka	1.266	0.385
K	0.2660 %	Quant.-FP	K Ka	11.978	2.313
Si	0.1142 %	Quant.-FP	Si Ka	1.590	0.429
S	0.0401 %	Quant.-FP	S Ka	1.406	1.007
Ca	0.0171 %	Quant.-FP	Ca Ka	0.716	3.230
Cr	0.0139 %	Quant.-FP	Cr Ka	0.585	1.166