Supplementary material

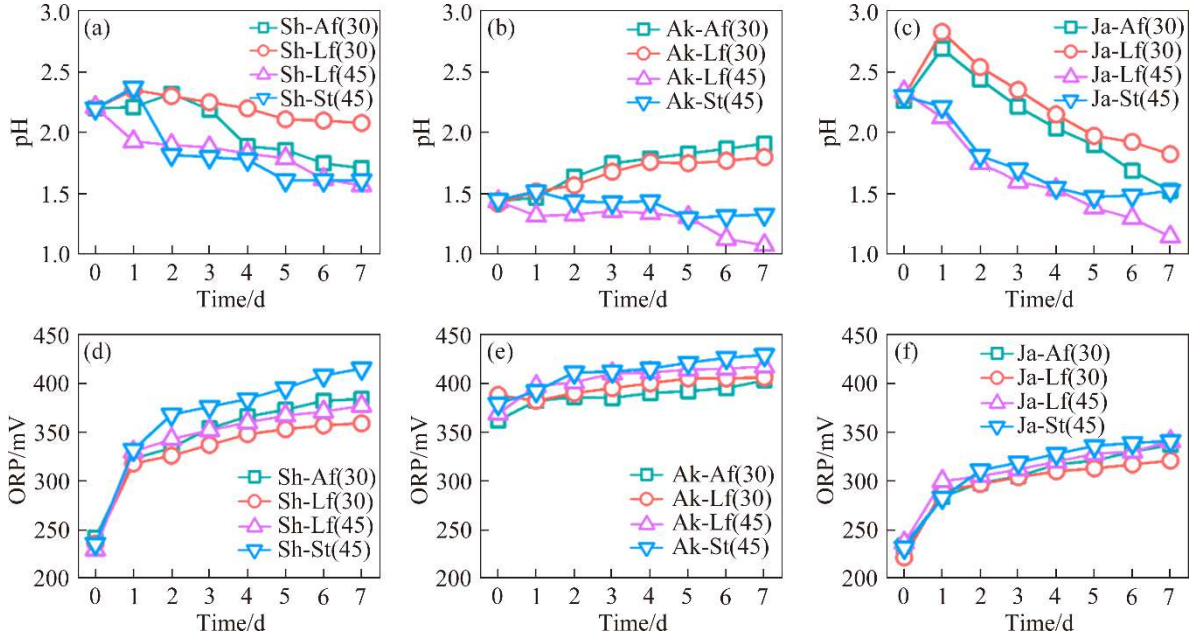

Figure S1 pH (a, b, c) and ORP (d, e, f) variation during iron minerals formation process

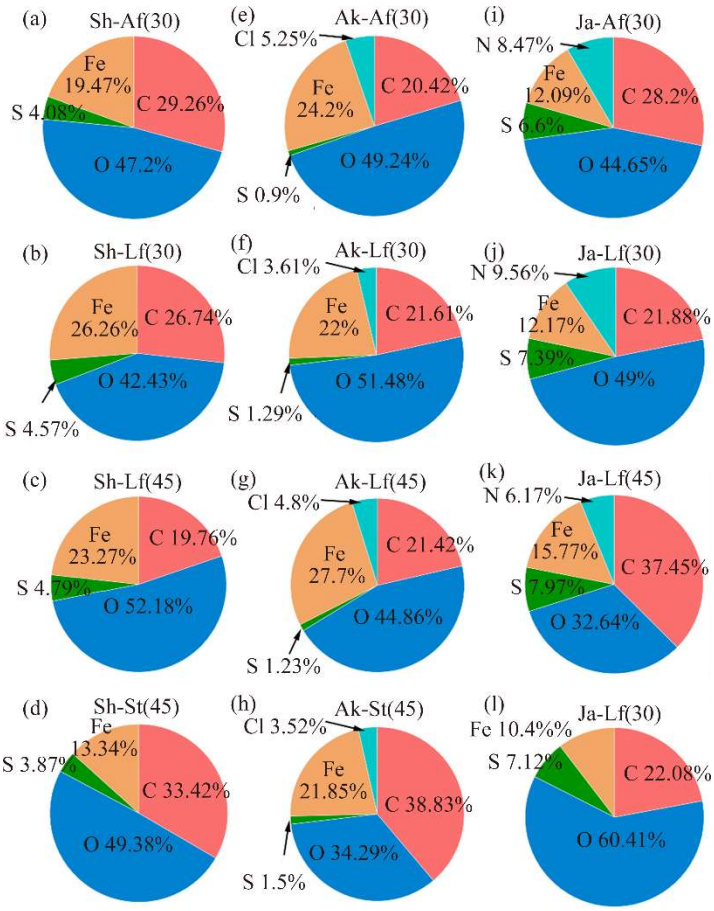

Figure S2 The EDS datas of the precipitate. Schwertmannite (a−d), Akaganéite (e−h) and Ammoniojarosite (i−l) biosynthesized by *A. ferrooxidans* (30 ℃), *L. ferrooxidans* (30 ℃), *L. ferriphilum YSK* (45 ℃), and *S. thermosulfidooxidans* (45 ℃) respectively

Table S1 Parameters of Schwertmannnite, Akaganéite and Ammoniojarosite

	Bacteria	*T*/°C	*Q*/g	*w*(Fe)/%	*w*(S)/%	*w*(Cl)/%	*w*(O)/%	*w*(N)/%	(Fe/S, Cl, N) mole ratio	Formula	XRD peak	XS/nm
Sh-Af(30)	*A. ferrooxidans*	30	3.28	46.77	5.62	—	32.48	—	4.755	$Fe_8O_8(OH)_{4.64}(SO_4)_{1.68}$	0	non-crystal body
Sh-Lf(30)	*L. ferrooxidans*	30	1.08	56.12	5.61	—	25.98	—	5.716	$Fe_8O_8(OH)_{5.20}(SO_4)_{1.40}$	0	non-crystal body
Sh-Lf(45)	*L.. ferriphilum YSK*	45	2.12	51.46	6.08	—	33.06	—	4.836	$Fe_8O_8(OH)_{4.69}(SO_4)_{1.65}$	0	non-crystal body
Sh-St(45)	*S.thermosulfidooxidans*	45	3.56	36.15	6.02	—	38.35	—	3.431	$Fe_8O_8(OH)_{3.33}(SO_4)_{2.33}$	5	non-crystal body
Ak-Af(30)	*A. ferrooxidans*	30	0.47	51.99	—	7.16	30.31	—	4.603	$Fe_8O_8(OH)_{6.26}Cl_{1.74}$	6	381
Ak-Lf(30)	*L. ferrooxidans*	30	0.44	49.52	—	5.16	33.19	—	6.084	$Fe_8O_8(OH)_{6.68}Cl_{1.31}$	2	179
Ak-Lf(45)	*L.. ferriphilum YSK*	45	0.78	56.63	—	6.23	26.28	—	5.762	$Fe_8O_8(OH)_{6.61}Cl_{1.39}$	4	358
Ak-St(45)	*S.thermosulfidooxidans*	45	1.1	50.67	—	5.19	22.78	—	6.189	$Fe_8O_8(OH)_{6.70}Cl_{1.29}$	2	167
Ja-Af(30)	*A. ferrooxidans*	30	3.24	32.8	10.27	—	34.71	5.76	1.826, 1.423	$Fe_8O_8(OH)_{4.85}(NH_4)_{5.62}(SO_4)_{4.38}$	13	390
Ja-Lf(30)	*L. ferrooxidans*	30	1.85	32.4	11.3	—	37.38	6.39	1.639, 1.268	$Fe_8O_8(OH)_{4.55}(NH_4)_{6.31}(SO_4)_{4.88}$	16	411
Ja-Lf(45)	*L. ferriphilum YSK*	45	4.13	40.12	11.64	—	23.8	3.94	1.970, 2.548	$Fe_8O_8(OH)_{3.01}(NH_4)_{3.14}(SO_4)_{4.06}$	19	694
Ja-St(45)	*S.thermosulfidooxidans*	45	4.32	28.46	11.18	—	47.36	3.34	1.455, 2.128	$Fe_8O_8(OH)_{0.76}(NH_4)_{3.76}(SO_4)_{5.50}$	18	499

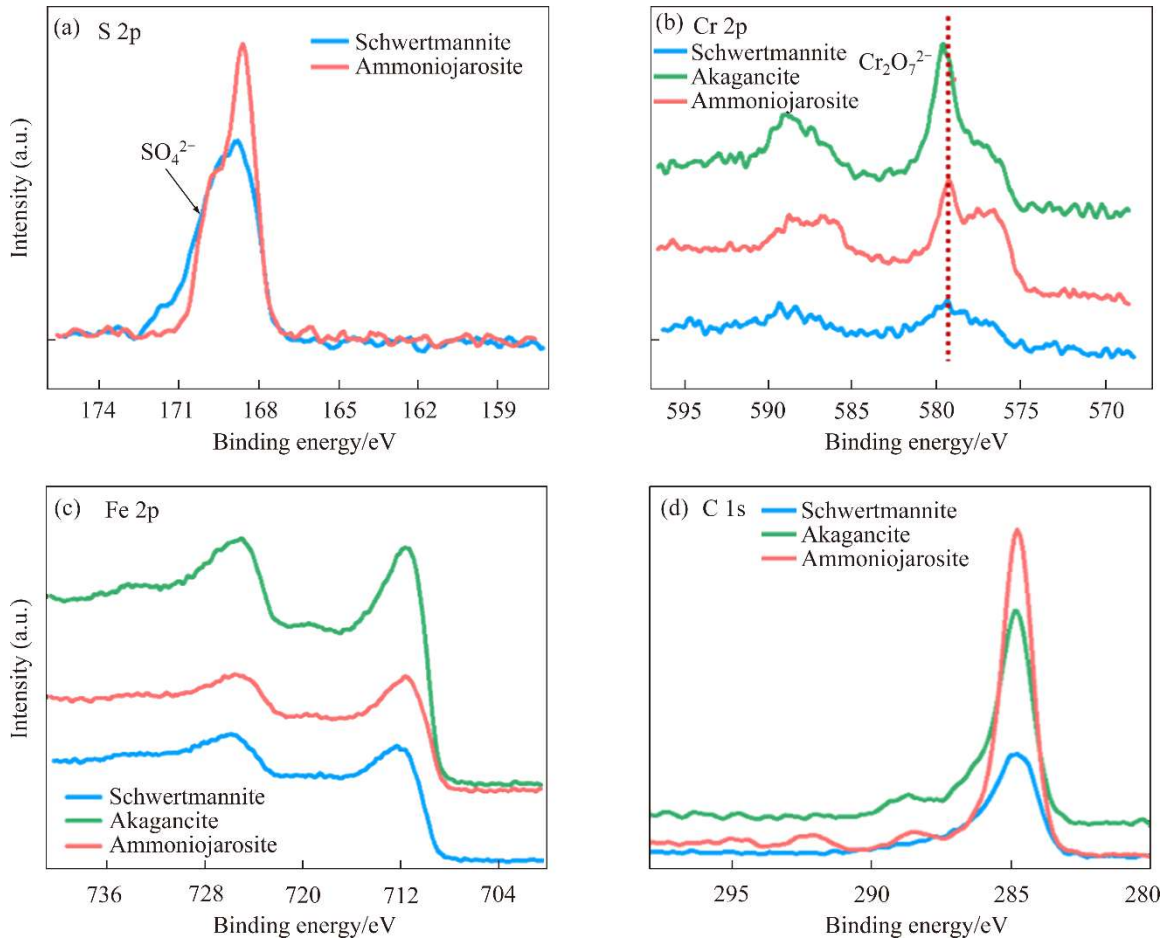

Figure S3 XPS spectra of the precipitates

Table S2 Surface element composition of the materials after Cr(VI) adsorption at.%

Mineral	C	O	Cr	Fe	S	Cl
Schwertmannite	24.54	56.55	0.88	12.58	5.45	—
Akaganéite	24.79	54.19	1.3	16.83	—	2.88
Ammoniojarosite	39.13	43.6	1.35	9.73	4.27	—

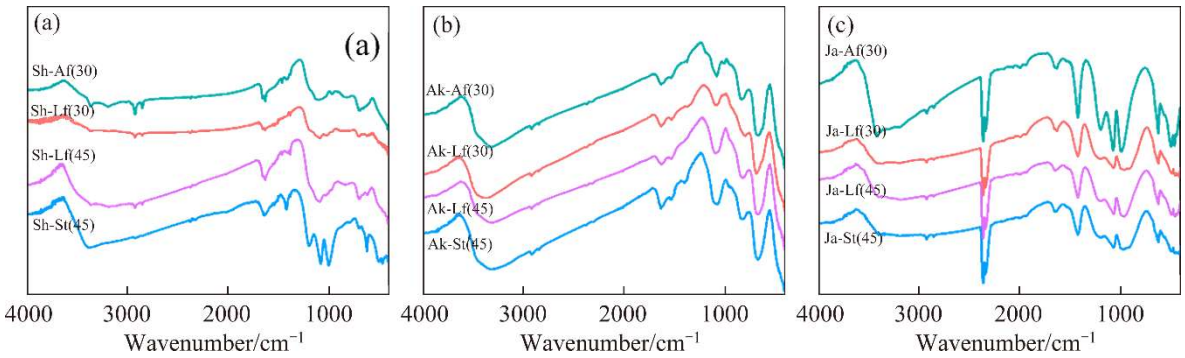

Figure S4 FTIR spectra of the precipitates after Cr(VI) adsorption