Electronic Supplementary Material (ESI) for Environmental Science: Nano.

Table S1 The kinetics equation and particle dispersion model parameters for Se(IV).

Pseudo-first order			Pseudo-second order		
Q_e	k_1	R^2	Q_e	k_2	R^2
105.535	0.059	0.655	106.383	0.015	0.999

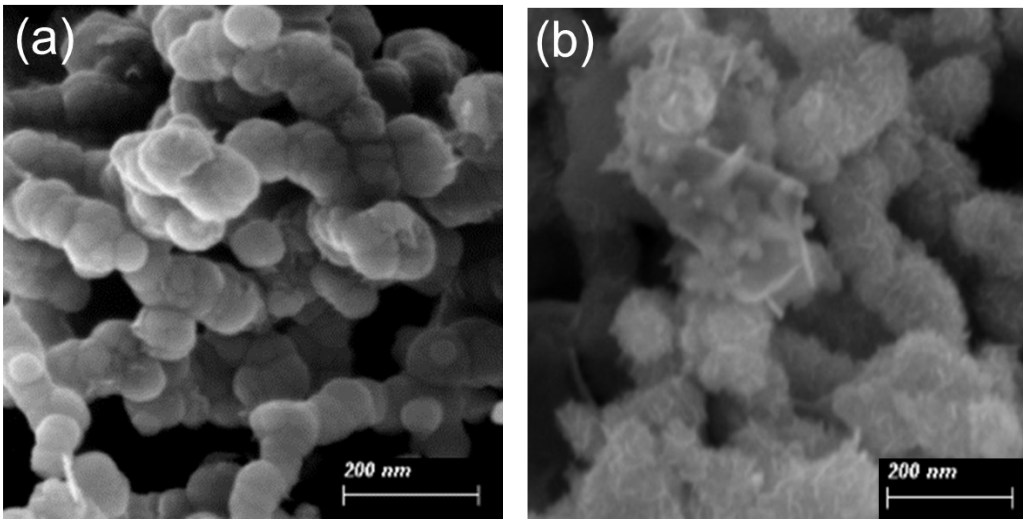

Fig. S1 Scanning electron microscope (SEM) of nZVI. (a) Fresh nZVI; (b) Spent nZVI after the reactions with partial sodium selenate solution (Se(IV)).

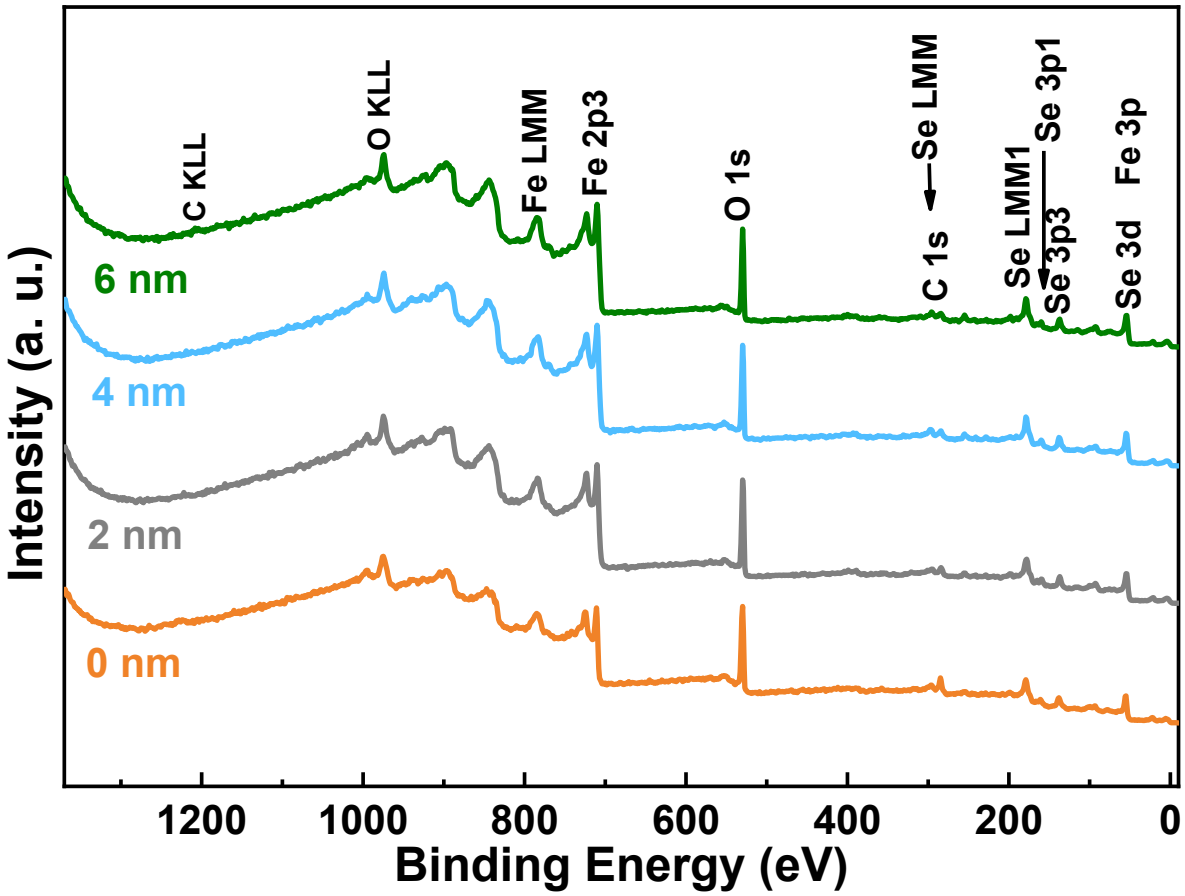

Fig. S2 Survey spectrum of HR-XPS spectra of Se-nZVI. $[Se(IV)]_{initial}$ = 1.3 mM; the nZVI dose is 1.0 g L^{-1}, the $pH_{initial}$ is 5.0, and the reaction time is 24 h.

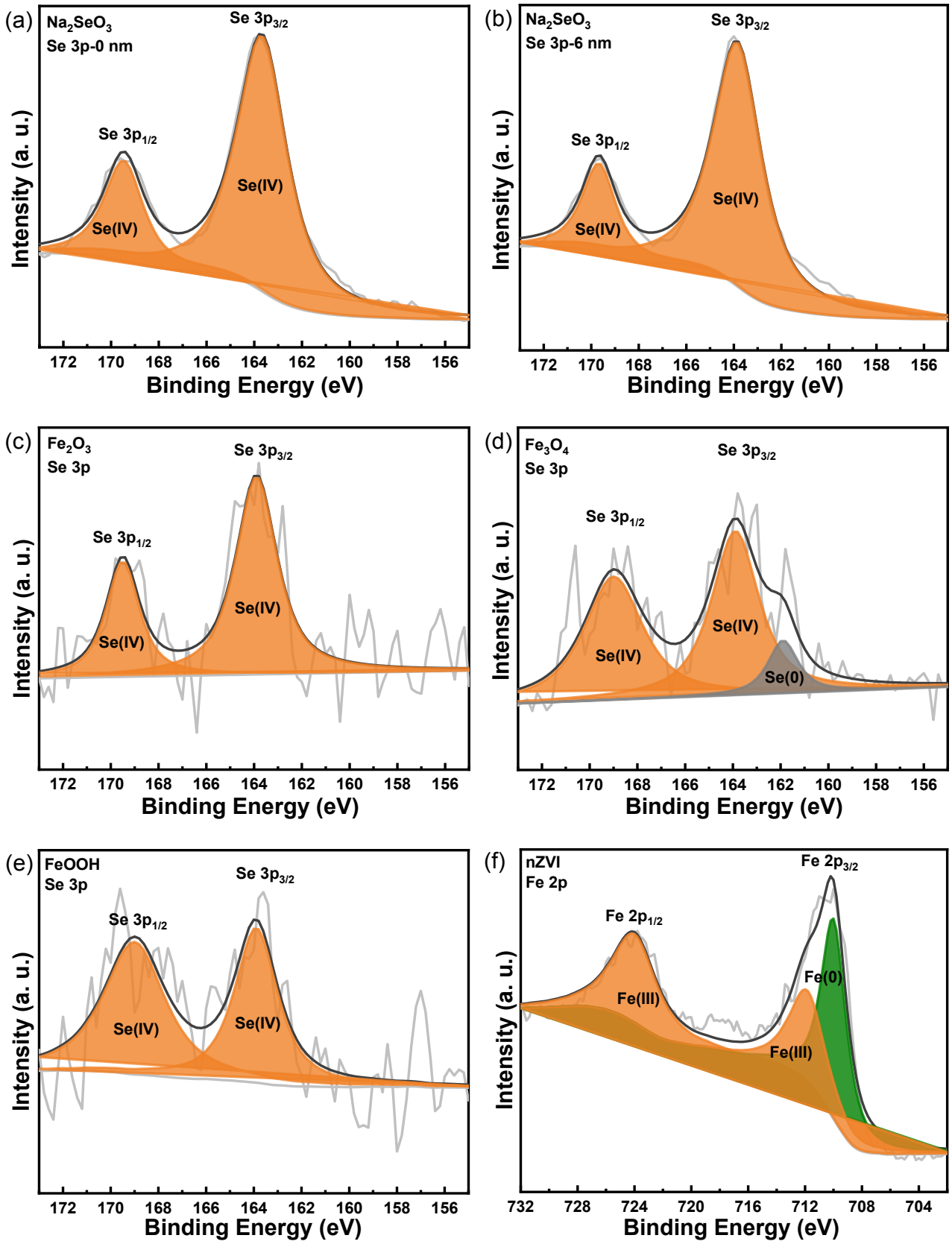
(a)
Na2SeO3
Se 3p-0 nm
Se 3p3/2
Se 3p1/2
Se(IV)
Se(IV)
Intensity (a. u.)
172 170 168 166 164 162 160 158 156
Binding Energy (eV)
(b)
Na2SeO3
Se 3p-6 nm
Se 3p3/2
Se 3p1/2
Se(IV)
Se(IV)
Intensity (a. u.)
172 170 168 166 164 162 160 158 156
Binding Energy (eV)
(c)
Fe2O3
Se 3p
Se 3p3/2
Se 3p1/2
Se(IV)
Se(IV)
Intensity (a. u.)
172 170 168 166 164 162 160 158 156
Binding Energy (eV)
(d)
Fe3O4
Se 3p
Se 3p3/2
Se 3p1/2
Se(IV)
Se(IV)
Se(0)
Intensity (a. u.)
172 170 168 166 164 162 160 158 156
Binding Energy (eV)
(e)
FeOOH
Se 3p
Se 3p3/2
Se 3p1/2
Se(IV)
Se(IV)
Intensity (a. u.)
172 170 168 166 164 162 160 158 156
Binding Energy (eV)
(f)
nZVI
Fe 2p
Fe 2p3/2
Fe 2p1/2
Fe(III)
Fe(0)
Fe(III)
Intensity (a. u.)
732 728 724 720 716 712 708 704
Binding Energy (eV)

Fig. S3 HR-XPS spectra of Se 3p and Fe 2p species at oxide layer. (a) XPS spectra of Se 3p element in 0 nm of Na_2SeO_3; (b) XPS spectra of Se 3p element in 6 nm of Na_2SeO_3; (c) XPS spectra of Se 3p element in Fe_2O_3-Se(IV); (d) XPS spectra of Se 3p element in Fe_3O_4-Se(IV); (e) XPS spectra of Se 3p element in FeOOH-Se(IV); (f) XPS spectra of Fe 2p species in fresh nZVI. $[Se(IV)]_{initial}$ = 1.3 mM, the nZVI dose is 1.0 g L^{-1}, the $pH_{initial}$ is 5.0, and the reaction time is 24 h.

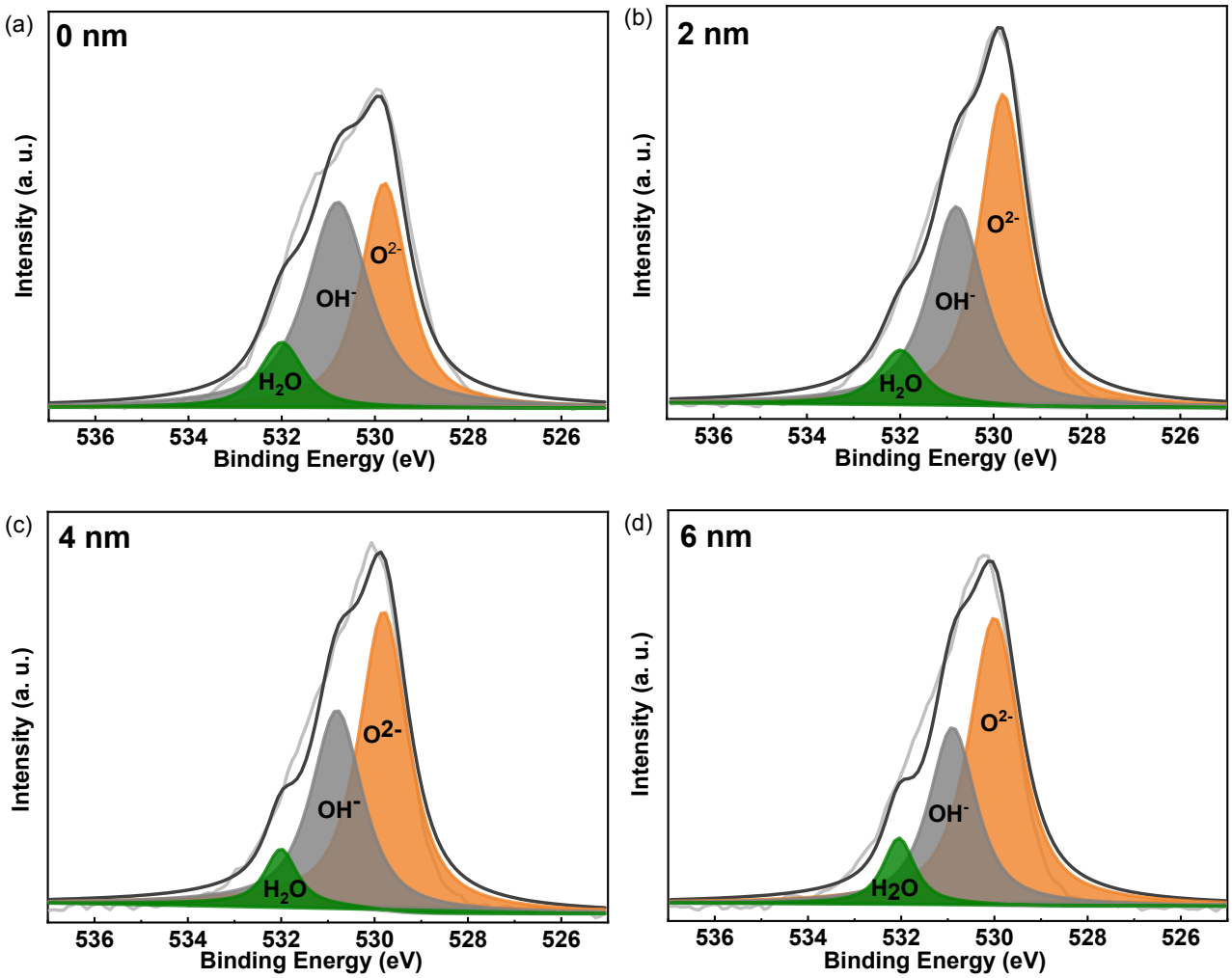

Fig. S4 HR-XPS spectra of O 1s species at selected depth. (a) 0 nm; (b) 2 nm; (c) 4 nm; (d) 6 nm. $[Se(IV)]_{initial}$ = 1.3 mM; the nZVI dose is 1.0 g L^{-1}, the $pH_{initial}$ is 5.0, and the reaction time is 24 h.