Supporting Information

Well-Dispersed Nanoscale Zero-valent Iron Supported in Macroporous Silica Foams :Synthesis, Characterization and Performance in Cr(VI) Removal

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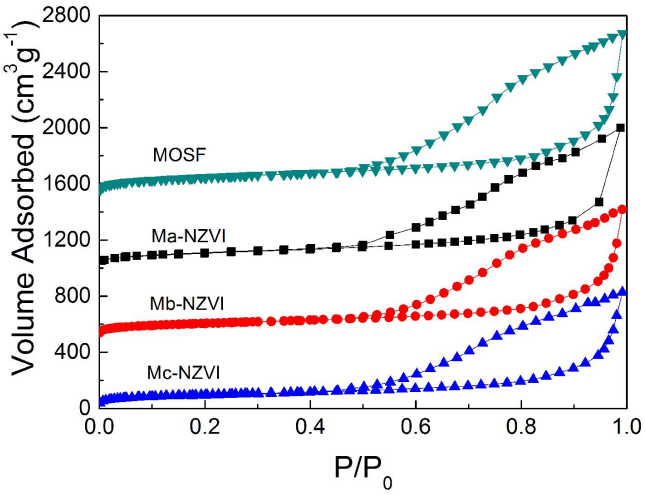

Figure s1. The nitrogen adsorption-desorption isotherms of MOSF and Mx-NZVI composites. The adsorption isotherms of Mb-NZVI, Ma-NZVI and MOSF are shifted by 500, 1000 and 1500 $cm^3 \cdot g^{-1}$ (STP), respectively.

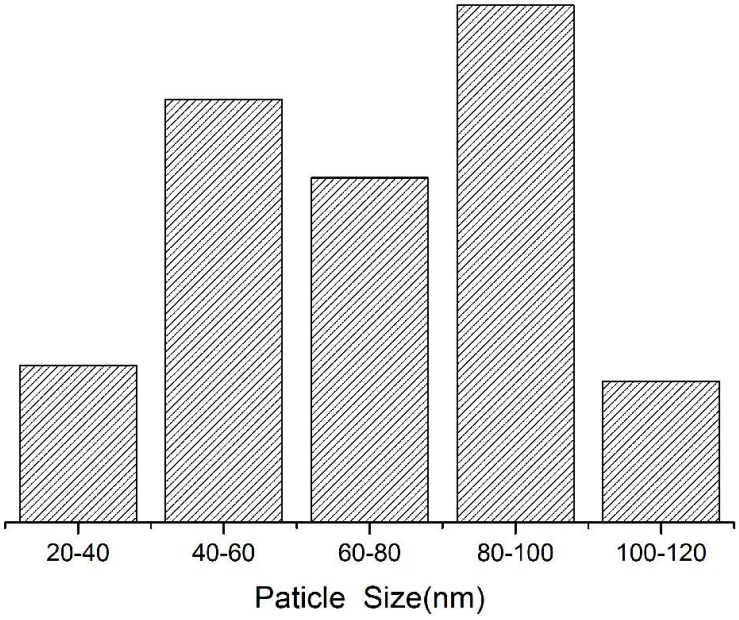

Figure S2. The size-distribution histogram of NZVI nanoparticles in Mc-NZVI

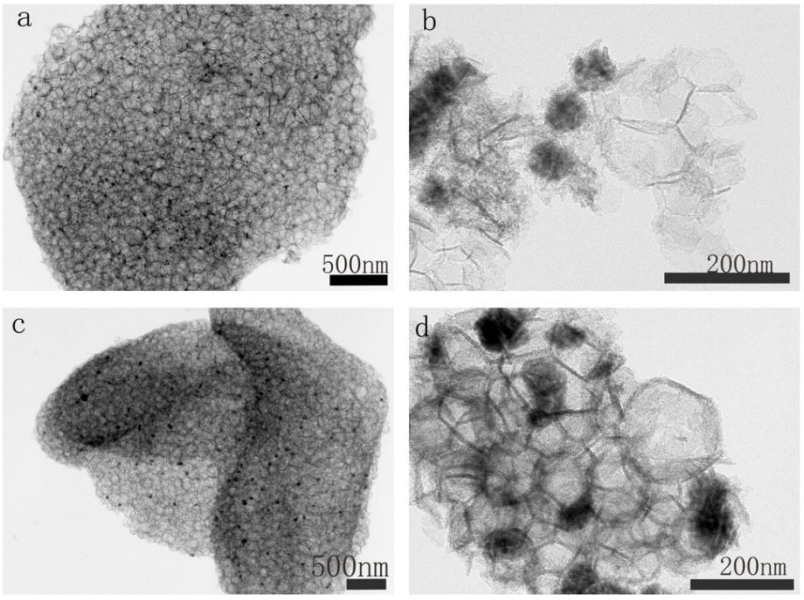

Figure S3. TEM images of (a-b) Ma-NZVI and (c-d) Mb-NZVI.

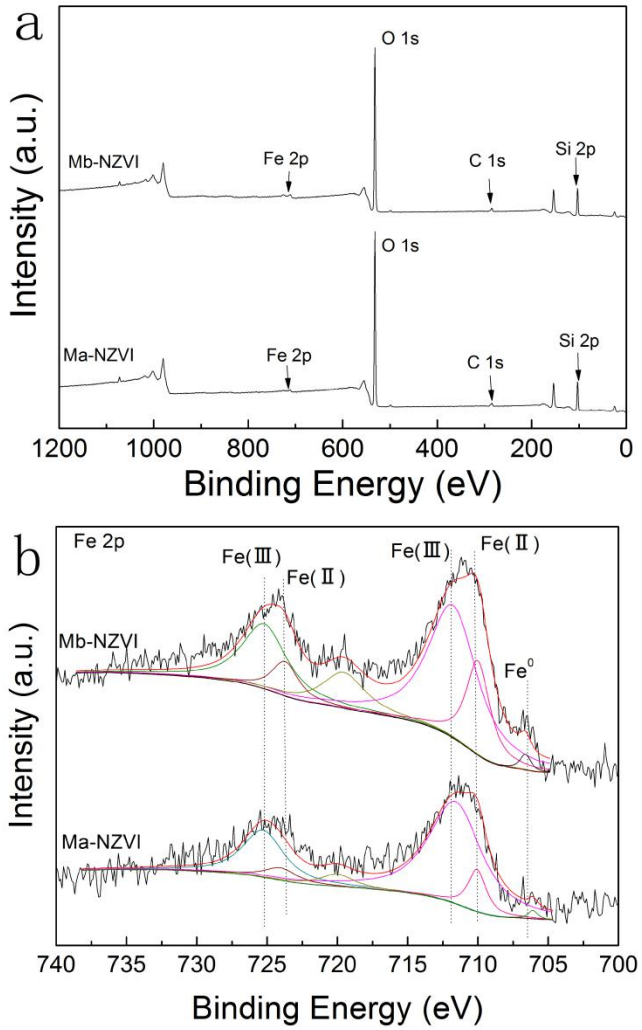

Figure S4. (a) XPS survey scan and (b) the corresponding high resolution spectra of Fe 2p for Ma-NZVI and Mb-NZVI.

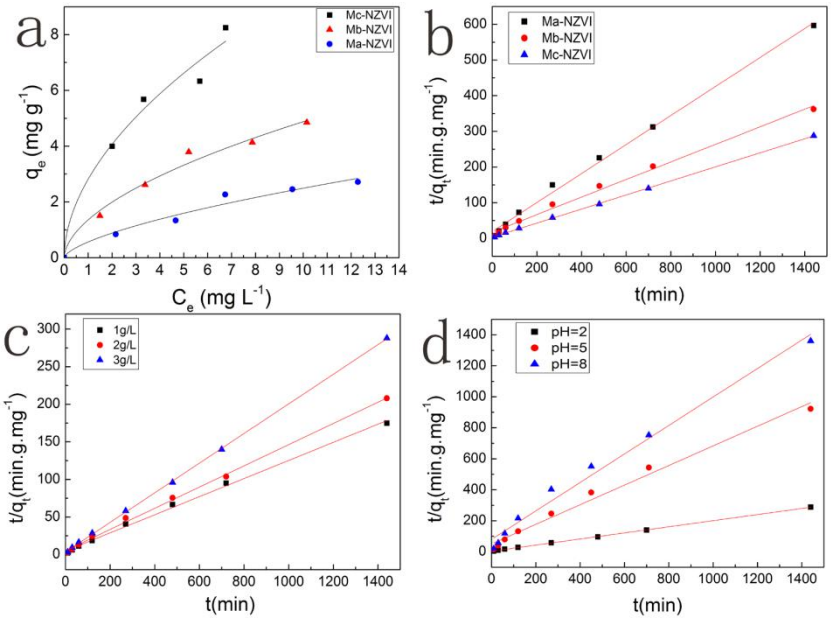

Figure S5. (a) adsorption isotherms of Mx-NZVI composites fitted to Freundlich isotherm model; (b) pseudo-second-order adsorption kinetics of Mx-NZVI composites; (c) pseudo-second-order adsorption kinetics of Mc-NZVI with different dosage; (d) pseudo-second-order adsorption kinetics of Mc-NZVI at different initial pH.

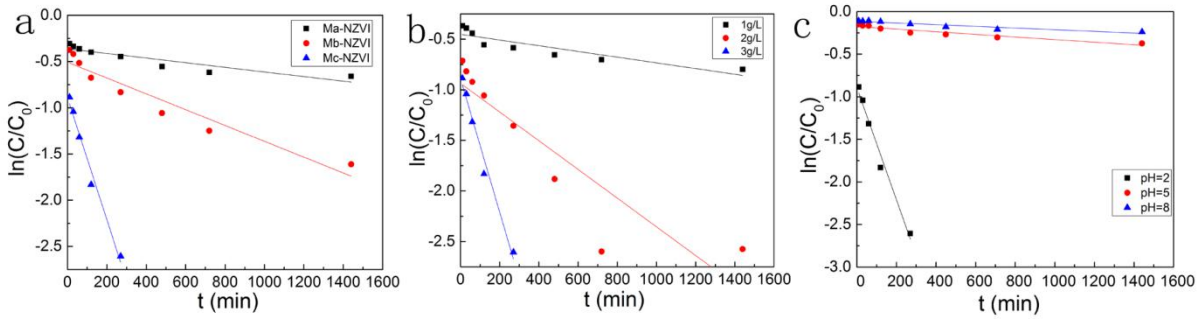

Figure S6. (a) pseudo-first order adsorption kinetics of Mx-NZVI composites; (b) pseudo-first-order adsorption kinetics of Mc-NZVI with different dosage; (c) pseudo-first-order adsorption kinetics of Mc-NZVI at different initial pH.

Table S1. Summary of properties of Mx-NZVI composites.

sample	Feed Iron (wt %)[a)]	The atomic ratio of Fe: Si[b)]	Actual iron (wt %)[c)]	Surface area (m^2g^{-1})	Pore size (nm)	Total pore volume (cm^3g^{-1})
MOSF	0	---	---	503	124	1.81
Ma-NZVI	4.92	5.56:100	4.30	376	122	1.56
Mb-NZVI	9.84	11.12:100	8.31	366	122	1.46
Mc-NZVI	14.76	16.68:100	12.81	311	117	1.28

[a)] and [b)]: calculated according to the feed ratio

[c)]: analyzed by AAS

Table S2**.** Adsorption Isotherm of Mx-NZVI composites.

sample	Freundlich model			Langmuir model		
	K ($mg^{(1-n)}$ L^n g^{-1})	n	R^2	Q_{max} ($mg\ g^{-1}$)	b (Lmg^{-1})	R^2
Ma-NZVI	0.564	1.549	0.962	5.415	0.087	0.972
Mb-NZVI	1.354	1.797	0.984	7.658	0.165	0.991
Mc-NZVI	2.813	1.882	0.968	12.665	0.227	0.965

Table S3**.** Kinetic studies of Mx-NZVI composites.

sample	C_s ($g\ L^{-1}$)	pH[a)]	Q_{eq} ($mg\ g^{-1}$)[b)]	Pseudo-second-order			Pseudo-first-order	
				k ($g\ mg\ min^{-1}$)	R^2	Q_e ($mg\ g^{-1}$)[b)]	$k_{obs(min^{-1})}$	R^2
Ma-NZVI	3.0	2	2.460	0.00863	0.996	2.414	0.00025	0.816
Mb-NZVI	3.0	2	4.063	0.00349	0.992	3.974	0.00086	0.913
Mc-NZVI	3.0	2	5.074	0.01150	0.999	5.000	0.00660	0.976
Mc-NZVI	2.0	2	7.092	0.00381	0.996	6.929	0.00142	0.791
Mc-NZVI	1.0	2	8.301	0.00304	0.997	8.244	0.00028	0.775
Mc-NZVI	3.0	8	1.088	0.00797	0.984	1.058	0.00010	0.893
Mc-NZVI	3.0	5	1.580	0.01061	0.984	1.562	0.00015	0.897

[a)]: the initial pH of the Cr(VI) suspension.

[b)]: calculated according to the 1,5-diphenylcarbazide method after batch experiment for 24h.

[c)]: calculated according to pseudo-second order kinetic model.