Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Cauliflower-like Ni/NiO and NiO architectures transformed from nickel alkoxide and their excellent removal of Congo red and Cr (VI) ions from water

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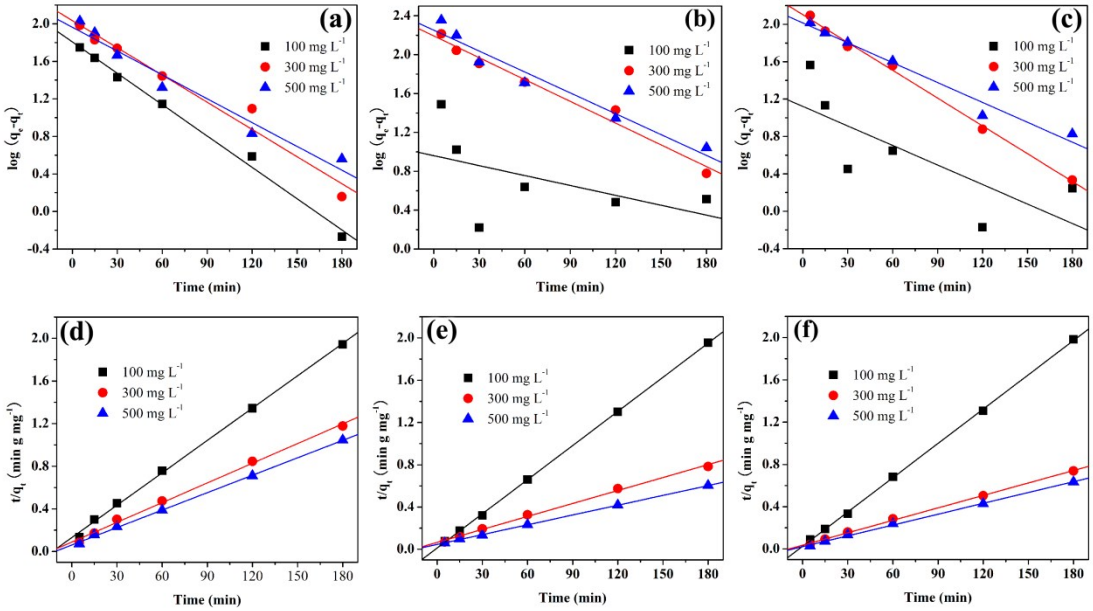

Fig. S1 Pseudo-first-order kinetics plots of CR adsorption on the (a) nickel alkoxide, (b) Ni/NiO, and (c) NiO architectures. Pseudo-second-order kinetics plots of CR adsorption adsorption on the (d) nickel alkoxide, (e) Ni/NiO, and (f) NiO architectures.

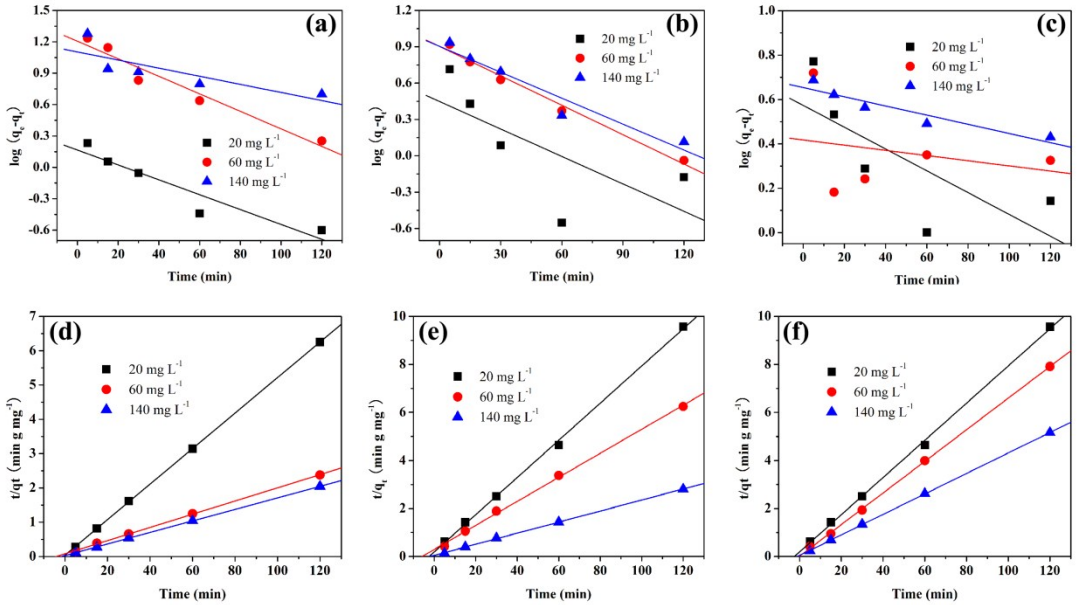

Fig. S2 Pseudo-first-order kinetics plots of Cr (VI) adsorption on the (a) nickel alkoxide, (b) Ni/NiO, and (c) NiO architectures. Pseudo-second-order kinetics plots of Cr (VI) adsorption adsorption on the (d) nickel alkoxide, (e) Ni/NiO, and (f) NiO architectures.

Table S1 Kinetic parameters of CR adsorption on the nickel alkoxide, Ni/NiO, and NiO architectures

Sample	C_0 (mg L^{-1})	$q_{e,exp}$ (mg g^{-1})	Pseudo-first-order			Pseudo-second-order		
			k_1 (g mg^{-1} min^{-1})	$q_{e,cal}$ (mg g^{-1})	R^2	k_2 (g mg^{-1} min^{-1})	$q_{e,cal}$ (mg g^{-1})	R^2
nickel alkoxide	100	92..59	0.0256	64.15	0.99653	0.0008	98.72	0.99929
	300	162.84	0.0138	108.33	0.98428	0.0004	162.34	0.99835
	500	172.15	0.0195	92.01	0.97165	0.0005	183.15	0.99961
Ni/NiO	100	92.01	0.0078	9.13	0.51243	0.0048	92.85	0.99993
	300	229.74	0.0172	155.97	0.98817	0.0004	244.50	0.99838
	500	298.41	0.0248	178.42	0.97774	0.0005	323.62	0.99982
NiO	100	90.72	0.0160	13.24	0.76480	0.0004	92.34	0.99985
	300	243.58	0.0228	103.59	0.98784	0.0005	254.45	0.99934
	500	284.11	0.0163	126.84	0.98828	0.0048	293.26	0.99927

Table S2 Kinetic parameters of Cr (VI) adsorption on the nickel alkoxide, Ni/NiO, and NiO architectures

Sample	C_0 (mg L^{-1})	$q_{e,exp}$ (mg g^{-1})	Pseudo-first-order			Pseudo-second-order		
			k_1 (g mg^{-1} min^{-1})	$q_{e,cal}$ (mg g^{-1})	R^2	k_2 (g mg^{-1} min^{-1})	$q_{e,cal}$ (mg g^{-1})	R^2
nickel alkoxide	20	19.21	0.0164	1.46	0.94614	0.0666	19.32	0.99998
	60	50.49	0.0193	16.05	0.97515	0.0047	51.98	0.99967
	140	58.71	0.0089	12.68	0.81781	0.0099	59.42	0.99997
Ni/NiO	20	12.54	0.0174	2.81	0.70330	0.0312	12.91	0.99948
	60	19.21	0.0186	7.99	0.97360	0.0085	19.97	0.99924
	140	42.73	0.0164	8.02	0.96760	0.0102	43.40	0.99985
NiO	20	12.53	0.0113	3.75	0.73943	0.0311	12.91	0.99948
	60	15.16	0.0027	2.62	0.25830	0.3354	15.19	0.99984
	140	23.28	0.0048	4.51	0.94066	0.0386	23.44	0.99996

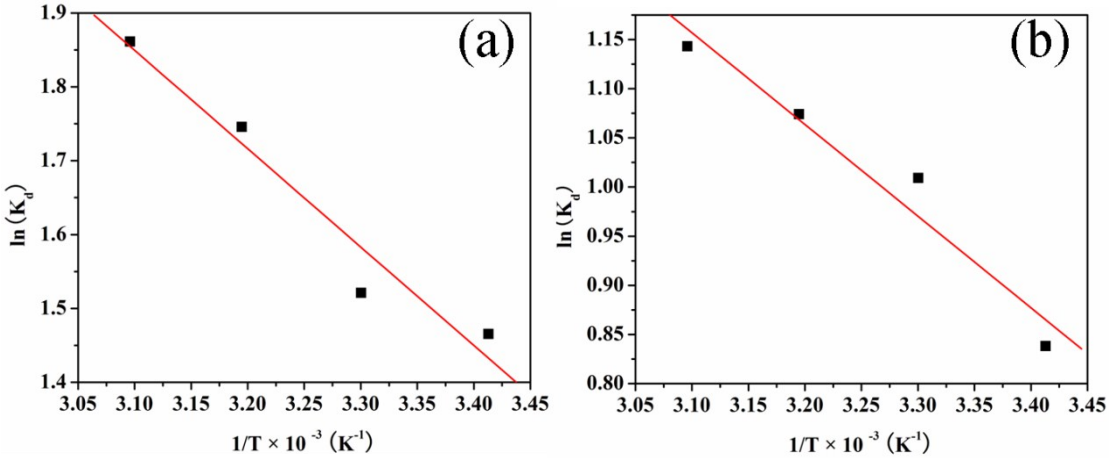

Fig. S3 Thermodynamic plot for the adsorption of (a) CR and (b) Cr(VI) onto Ni/NiO architectures

Table S3 Thermodynamic parameters for the adsorption of CR and Cr(VI) onto Ni/NiO architectures

Pollutants	Temperature (°C)	ΔG^o (kJ mol^{-1})	ΔH^o (kJ mol^{-1})	ΔS^o (J mol^{-1}K^{-1})	R
CR	293	-3.5696	11.0723	49.6589	0.9737
	303	-3.7851			
	313	-4.2528			
	323	-4.5336			
Cr(VI)	293	-2.0416	7.7542	33.6565	0.9744
	303	-2.5419			
	313	-2.7948			
	323	-3.0693			

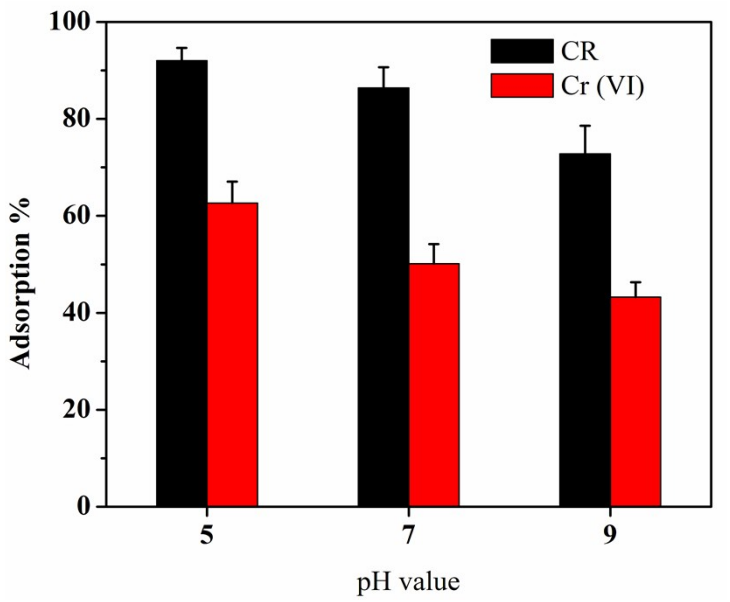

Fig. S4 Effect of initial pH on the adsorption of CR (100 mg L-1) and Cr(VI) (20 mg L-1) onto the Ni/NiO architectures (0.1g) at room temperature