Supplementary Information

High Adsorption Capacity and the Key Role of Carbonate Groups for Heavy Metal Ions Removal by Basic Aluminum Carbonate Porous Nanospheres

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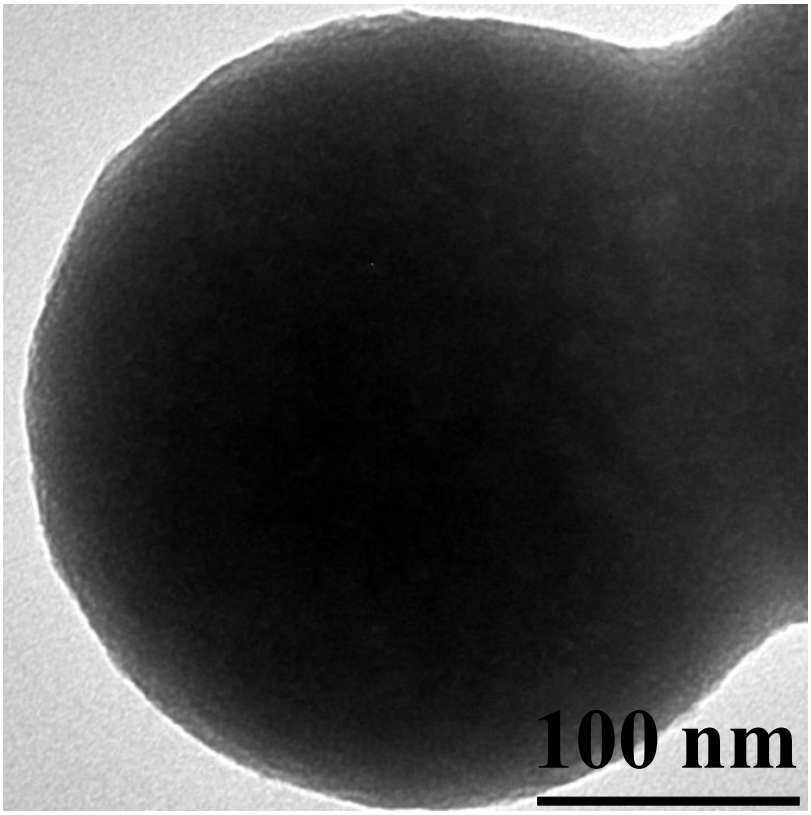

Fig. S1 TEM image of the obtained $Al(OH)CO_3$ nanospheres.

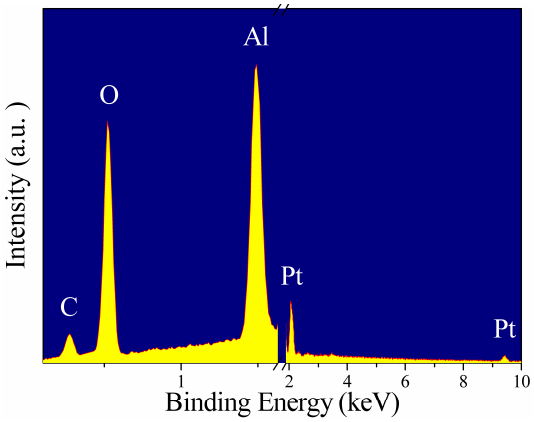

Fig. S2 EDS spectrum of $Al(OH)CO_3$ nanospheres.

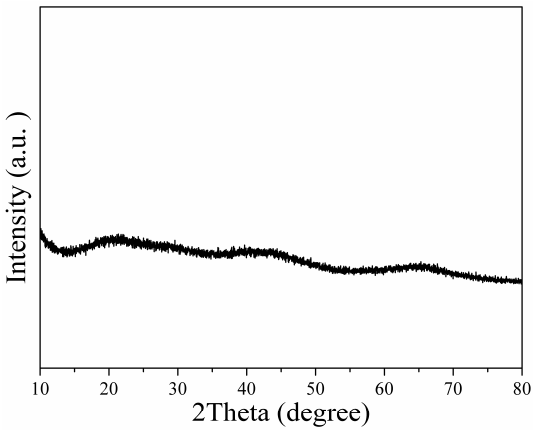

Fig. S3 XRD pattern of the obtained $Al(OH)CO_3$ nanospheres.

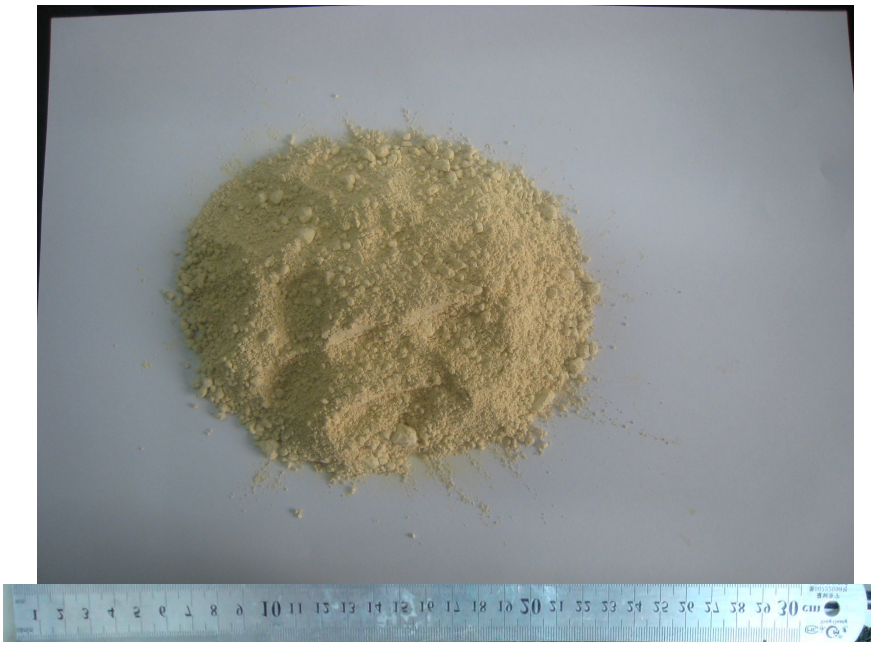

Fig. S4 Photograph image of the obtained $Al(OH)CO_3$ nanospheres.

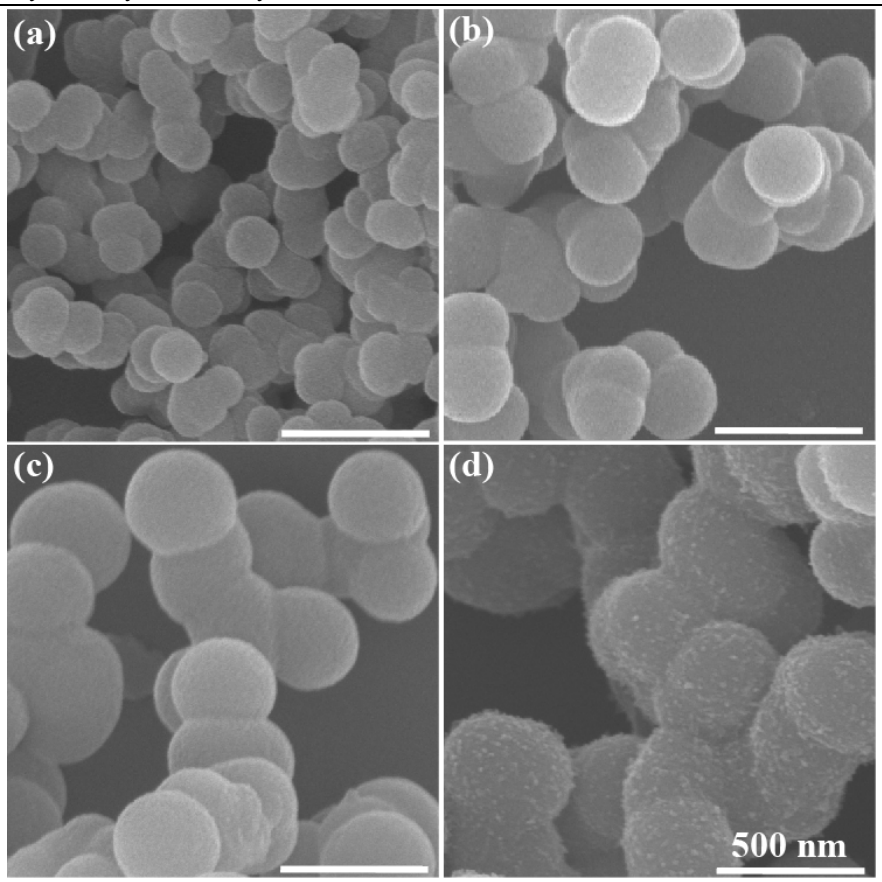

Fig. S5 SEM images of the obtained $Al(OH)CO_3$ nanospheres at different reaction concentrations: (a) 20 mM, (b) 50 mM, (c) 100 mM and (d) 200 mM.

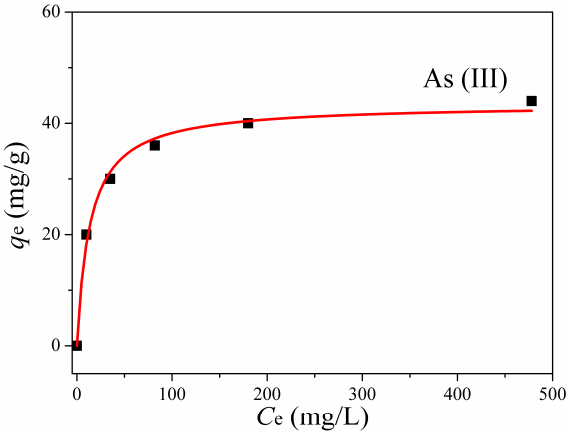

Fig. S6 Adsorption isotherm of $Al(OH)CO_3$ nanospheres for As (III) at pH 7.

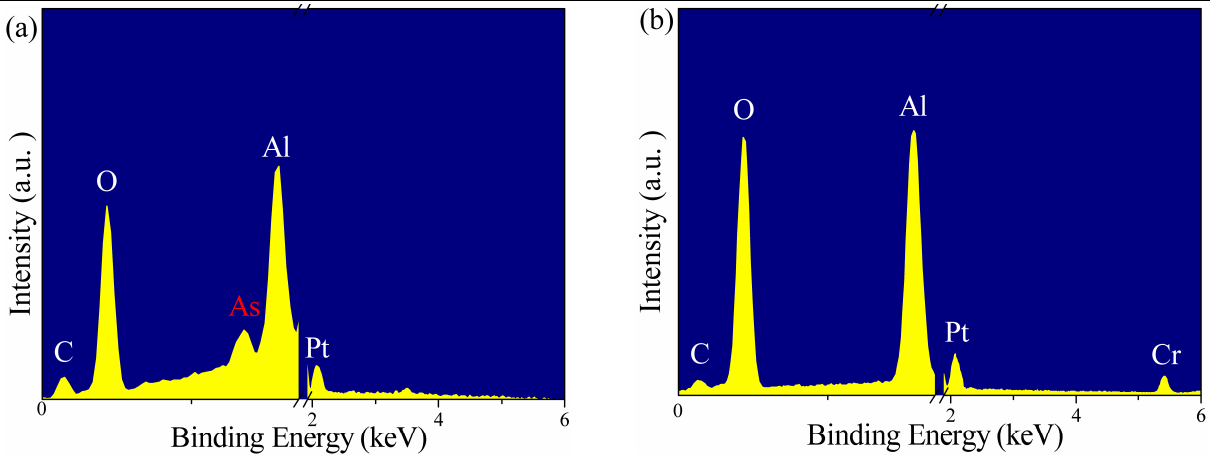

Fig. S7 EDS spectra of $Al(OH)CO_3$ nanospheres after adsorption of (a) As (V) and (b) Cr (VI).

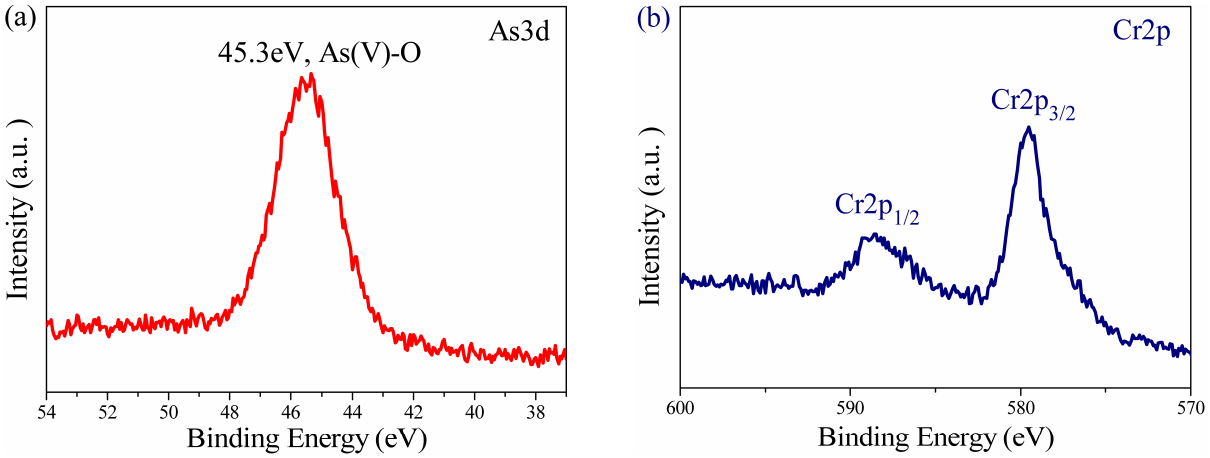

Fig. S8 (a) As 3d XPS spectrum and (b) Cr 2p XPS spectrum of $Al(OH)CO_3$ nanospheres after adsorption of As (V) or Cr (VI).

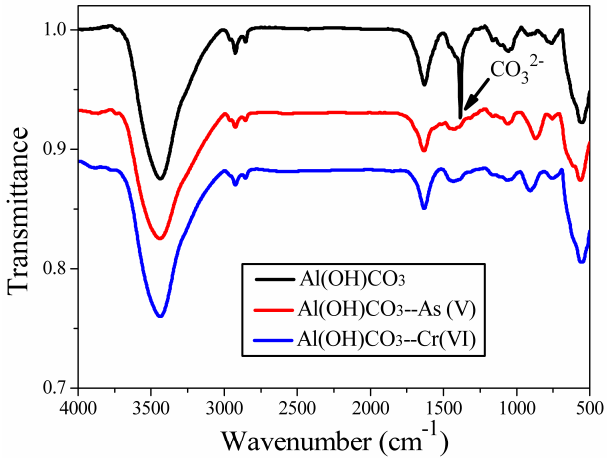

Fig. S9 FTIR spectra of $Al(OH)CO_3$ nanospheres before and after adsorption of As (V) or Cr (VI).

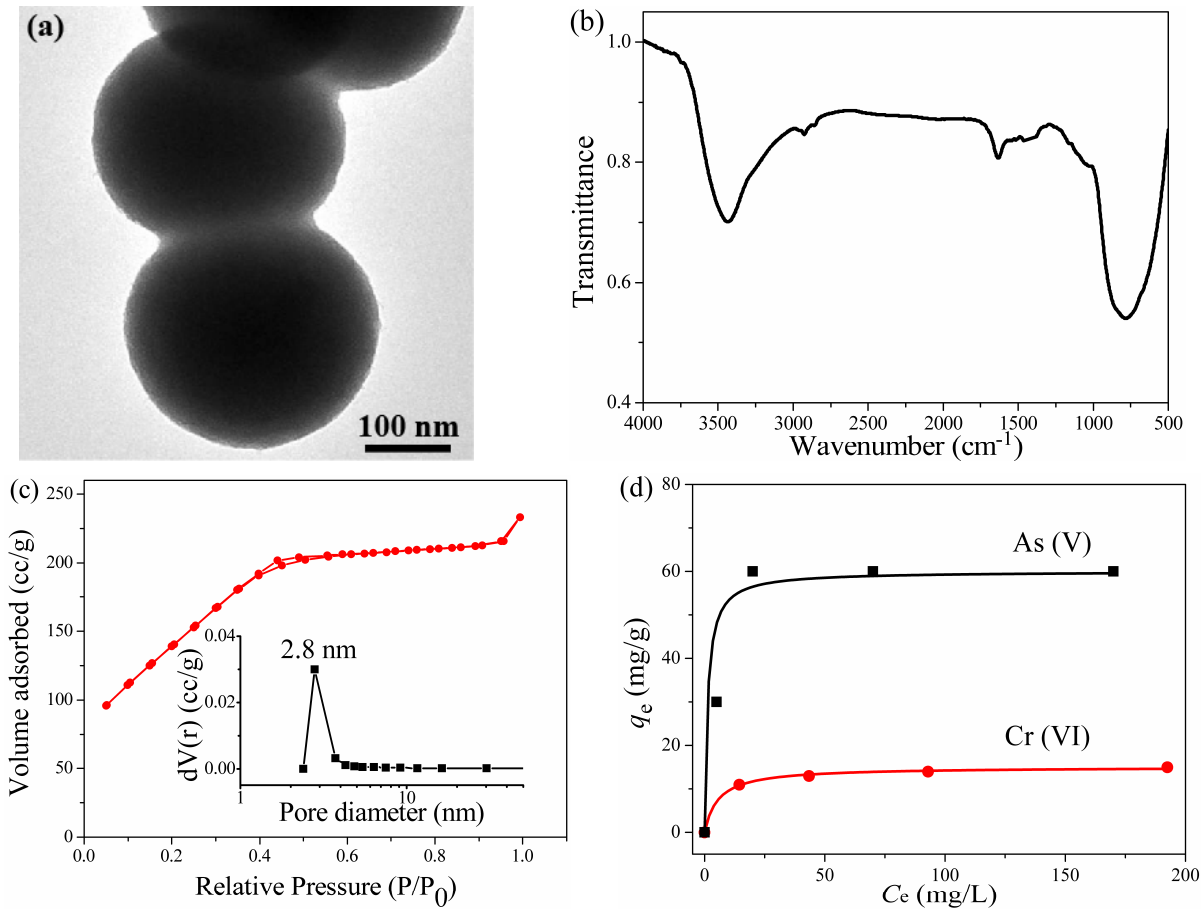

Fig. S10 (a) TEM image, (b) FTIR spectrum, (c) N_2 adsorption-desorption isotherms (Inset: pore size distribution) and (d) adsorption isotherms of As (V) and Cr (VI) of γ-Al_2O_3 nanospheres obtained by calcinations of $Al(OH)CO_3$ nanospheres at 400 °C for 2h in air.

Table S1 Equilibrium concentrations of As (V) and Cr (VI) at 100 ppb with different volume of treated water

Volume of water (L)	Initial concentration of As (V) (ppb)	Equilibrium concentration of As (V) (ppb)	Initial concentration of Cr (VI) (ppb)	Equilibrium concentration of Cr (VI) (ppb)
0.5	100	Not detected	100	10
1	100	Not detected	100	20
2	100	Not detected	100	48
4	100	2	100	60
6	100	8	-	-
8	100	20	-	-