Electronic Supplementary Information(ESI)

Magnetic Mesoporous Silica Hybrid Nanoparticles For Highly Selective Boron Adsorption

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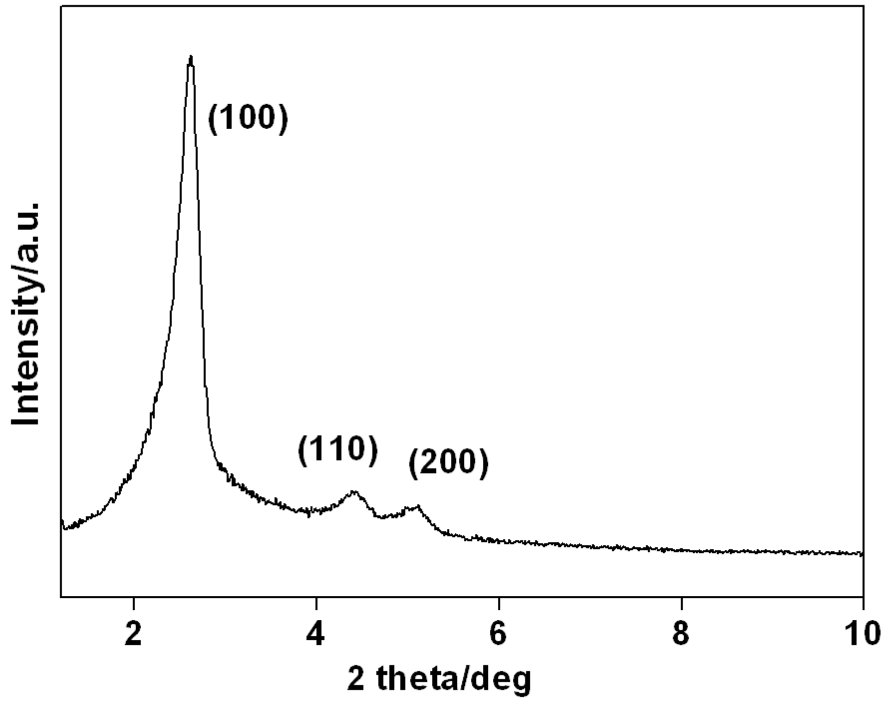

Fig. S1 Low-angle XRD pattern of MSH@NH-$(OH)_2$ adsorbent.

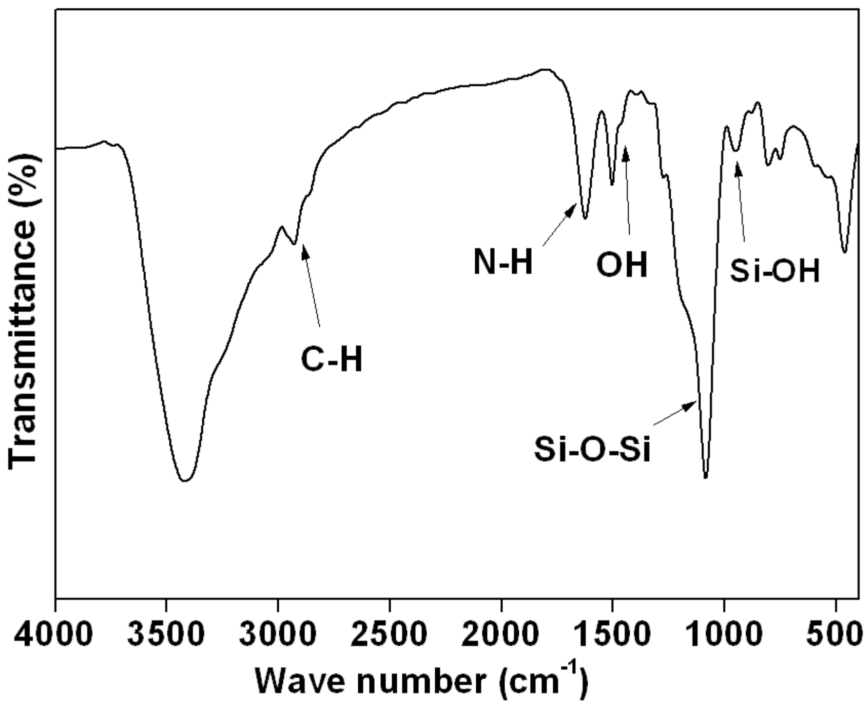

Fig. S2 FTIR spectrum of MSH@NH-$(OH)_2$ adsorbent.

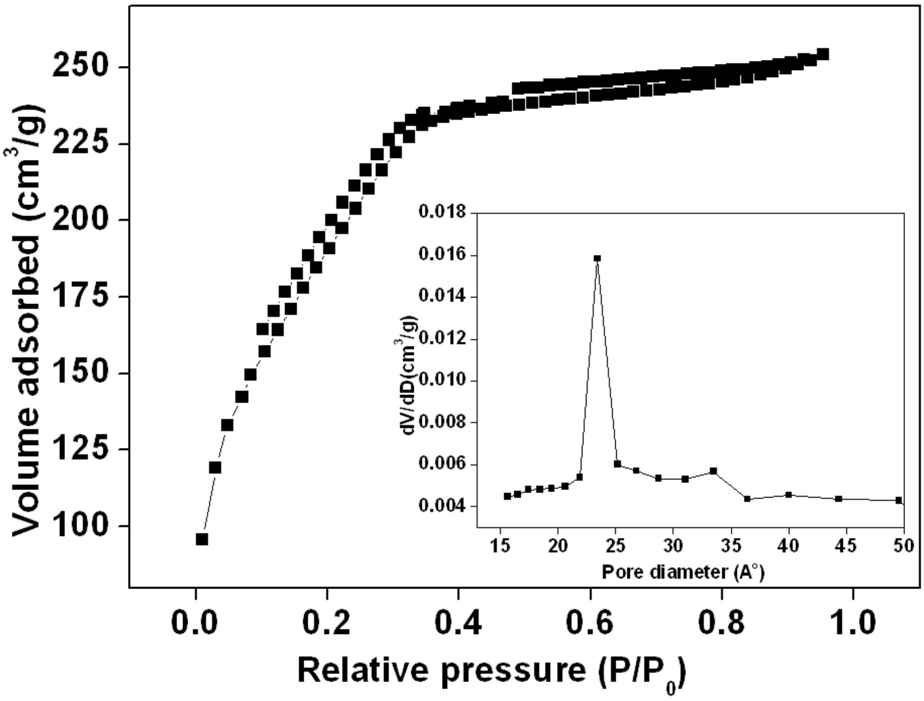

Fig. S3 N_2 adsorption-desorption and mesopore size distribution (inset) of MSH@NH-$(OH)_2$.

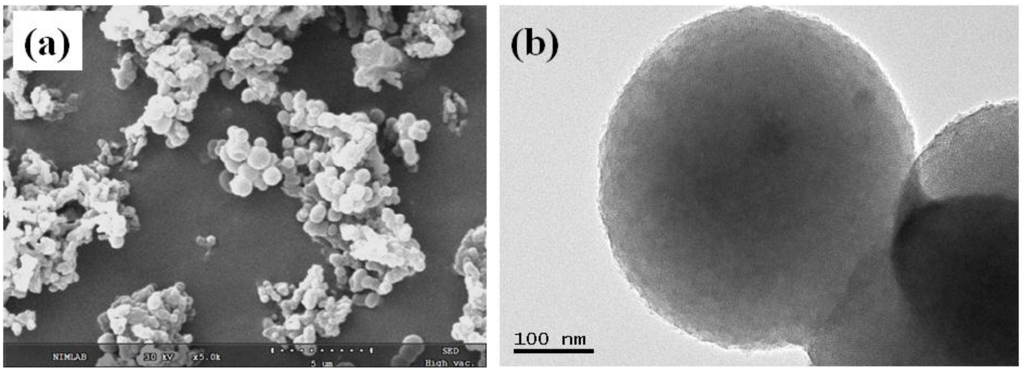

Fig. S4 (a) SEM and (B) TEM images of the MSH@NH-$(OH)_2$.

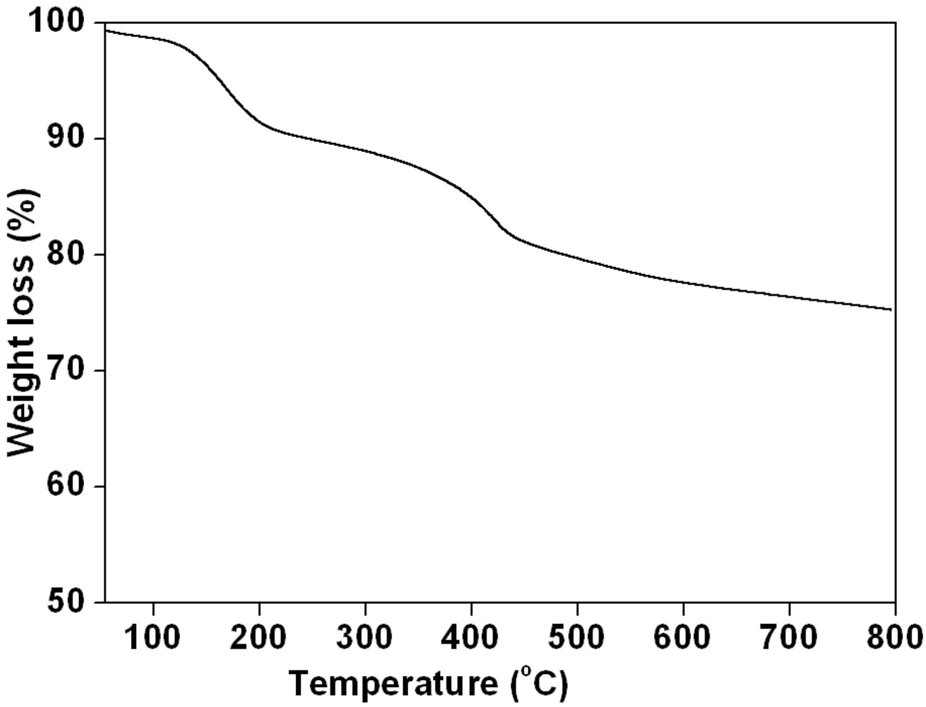

Fig. S5 TGA curve of MSH@NH-$(OH)_2$.

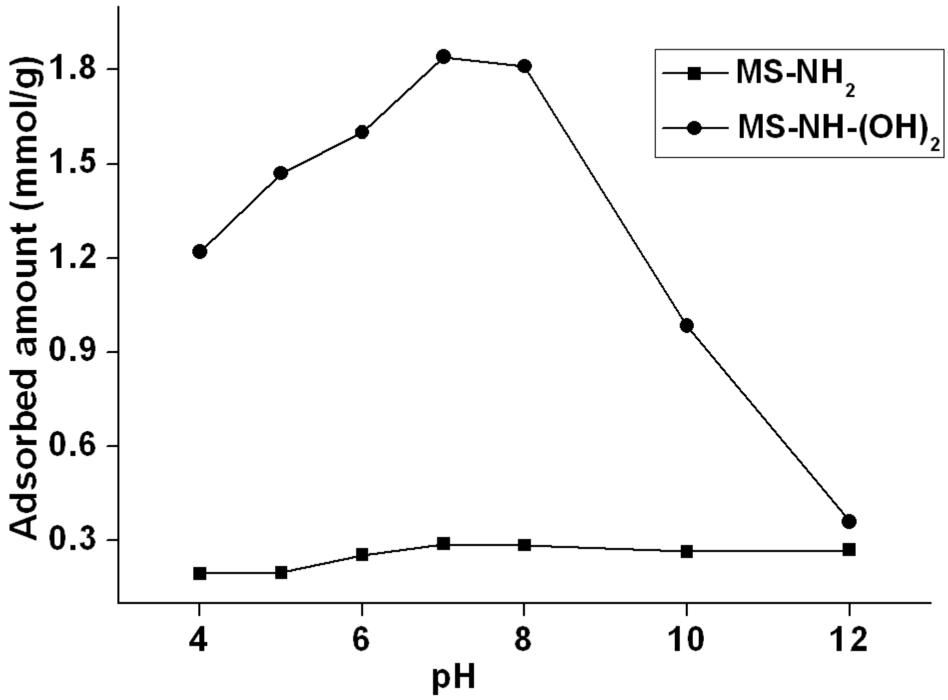

Fig. S6 Boron adsorption efficiency of MSH@NH_2 (■) and MSH@NH-$(OH)_2$ (●) as a function of the pH.

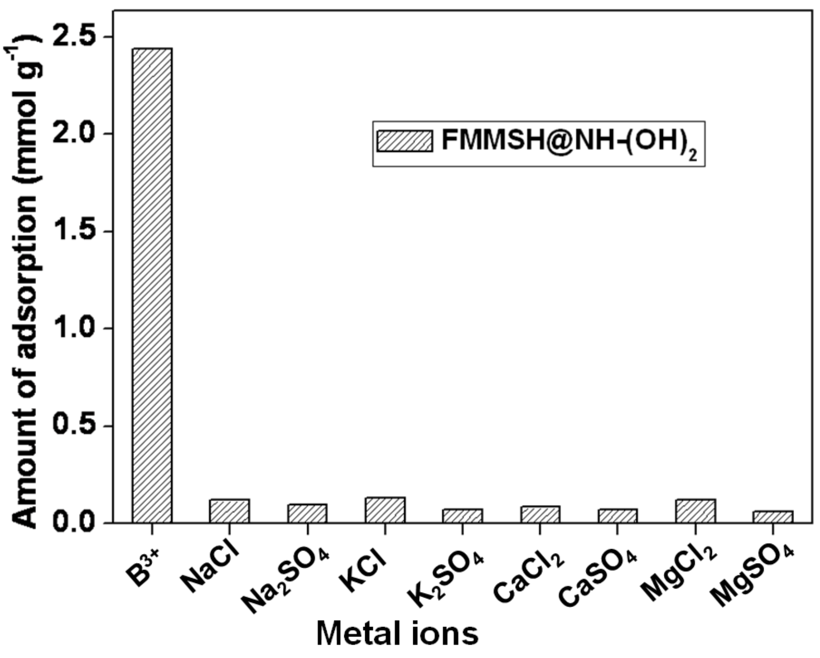

Fig. S7 Boron adsorption efficiency on FMMSH@NH-$(OH)_2$ adsorbent in the presence of sulphates and chlorides of Na, K, Ca and Mg ions.

Table S1 Textural properties of the MSH@NH-$(OH)_2$.

Sample	d_{100} (nm)[a]	a_0 (nm)[b]	Wall thickness (nm)[c]	SBET (m^2/g)	Pore volume (cm^3/g)[d]	Pore diameter (nm)[e]
MSH@NH-$(OH)_2$	3.4	3.92	1.62	567	1.6	2.3

[a] Calculated from XRD analysis
[b] $a_0 = 2d100/\sqrt{3}$
[c] Wall thickness = a_0 – pore diameter
[d] Calculated from adsorption branch of nitrogen isotherm using BJH model
[e] Calculated from volume adsorbed of P/P0 at 0.5

Table S2 Boron adsorption capacity of various adsorbents as reported in the literature[a]

Adsorbent	Q_m/mmol g^{-1}	Reference
FMMSH@NH-$(OH)_2$	2.37	This study
glycidol modified terpolymer	0.83	[22a]
glucose modified mesoporous silicas	0.38	[23b]
D-glucamine modified silicas	1.55	[23c]
Polymer gel	2.1	[43a]
Terpolymer beads	1.77	[43b]
Sacride modified mesoporous silicas	1.85	[43c]
Cotton cellulose	0.69	[43d]
Hydroxyl functionalized polymers	3.21	[S1]
D-glucamine modified polymer microspheres	0.03	[S2]
Calcium alginate gel beads	1.40	[S3]
Resin XSC-700	0.12	[S4]
Curcumin containing activated carbon	0.08	[S5]
Amine modified tannin gel	0.12	[S6]
Salicylic HCHO polymer resin	1.36	[S7]
Modifiedvermiculite	0.15	[S8]
Modified clays	0.03	[S9]

[a] In this table, we list only several representative adsorbents employed for boron adsorbent.

Reference

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