Support Information

4'-aminobenzo-18-crown-6 functionalized magnetic nanoparticles as a solid-phase extraction adsorbent for determination of Pb^{2+}

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Synthesis of 4'-aminobenzo-18-crown-6

4'-aminobenzo-18-crown-6 was synthesized by a catalytic hydrogenation reaction. 4'-nitrodibenzo-18-crown-6 (500 mg, 1.23 mmol) was dissolved in 30 mL methyl alcohol with stirring for 30 min. Then Pd/C catalyst (50 mg) disposed by methyl alcohol was added into the solution under stirring, the mixture solution was transferred into a glass tube of high pressure reactor and hydrogen filled into the reactor (0.5 MPa). The solution was filtered for removing the Pd/C catalyst off after stirring for 24 h, the filter liquor was gathered and methyl alcohol evaporated, the claybank, thick solution (4'-aminobenzo-18-crown-6) was obtained. ^{1}H NMR (400MHz, $CDCl_3$) δ: 6.74 (d, J=8.0Hz, 1H), 6.31 (m, 1H), 6.32-6.25 (dd, J_1=2.8Hz, J_2=8.4Hz,1H), 4.07-4.11 (m, 4H), 3.86-3.93 (m, 4H), 3.69-3.76 (m, 12H); ^{13}C NMR (CDCl3) δ 105.2, 141.9, 117.2, 107.6, 103.0, 70.8, 70.7, 70.6, 70.4, 70.0, 69.7, 68.8. HRMS calcd for $C_{24}H_{18}N_2O_6Na$: 35.1571 $[M+Na]^+$; found, 350.1574 $[M+Na]^+$.

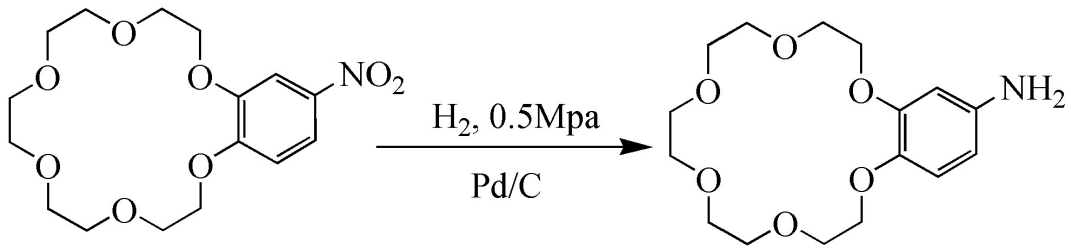
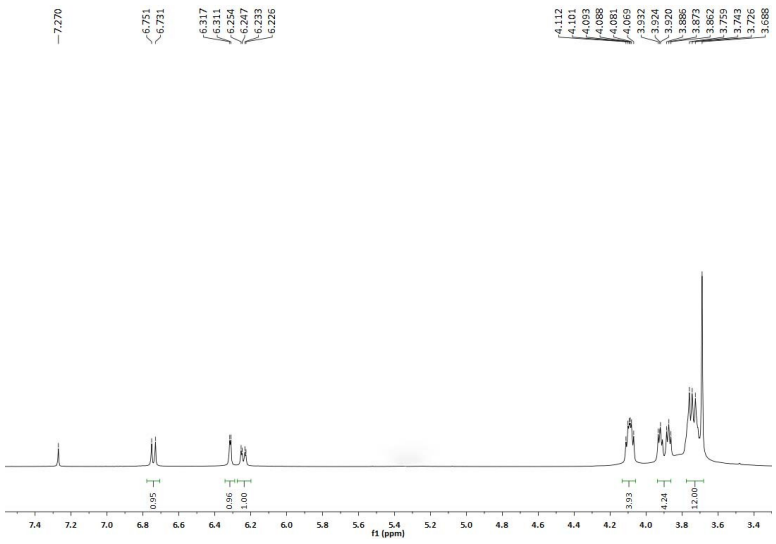
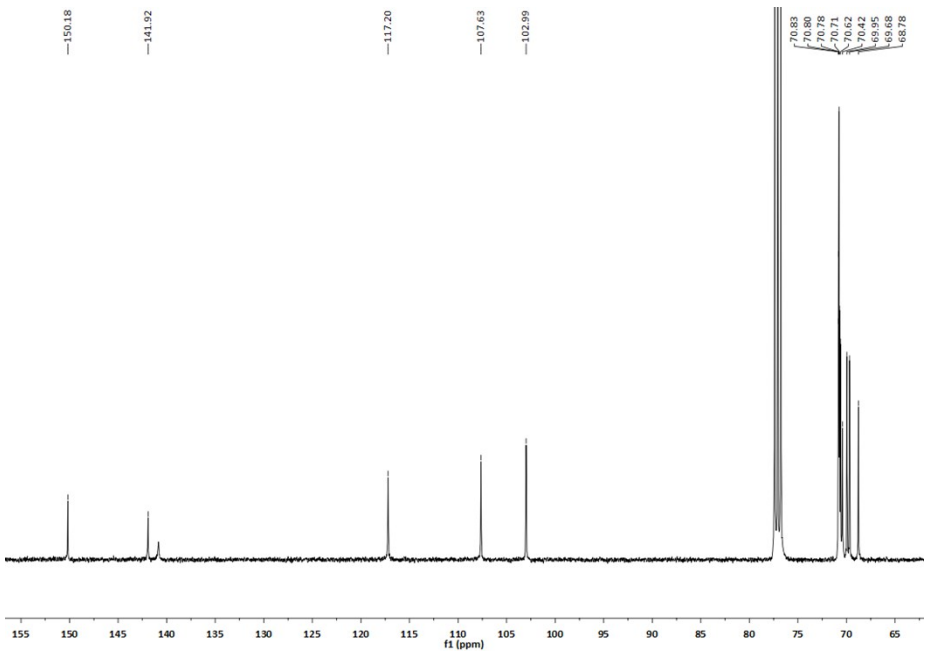


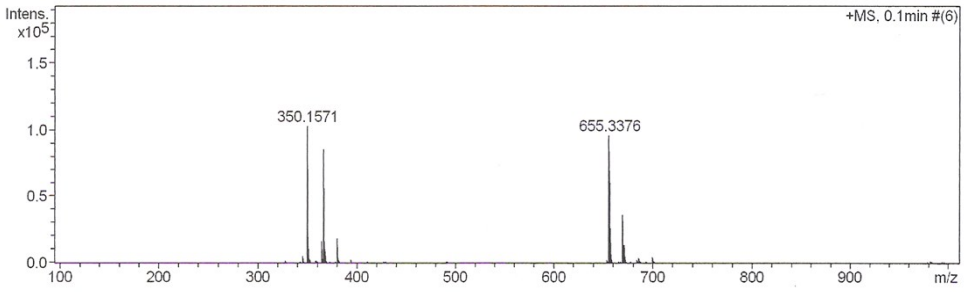
Fig. S1. Synthesis method of 4'-aminobenzo-18-crown-6



^{1}H NMR (400MHz, $CDCl_3$) spectra of AB18C6



^{13}C NMR ($CDCl_3$) spectra of AB18C6



High resolution mass spectrum on positive ion mode of AB18C6

Characterization of materials

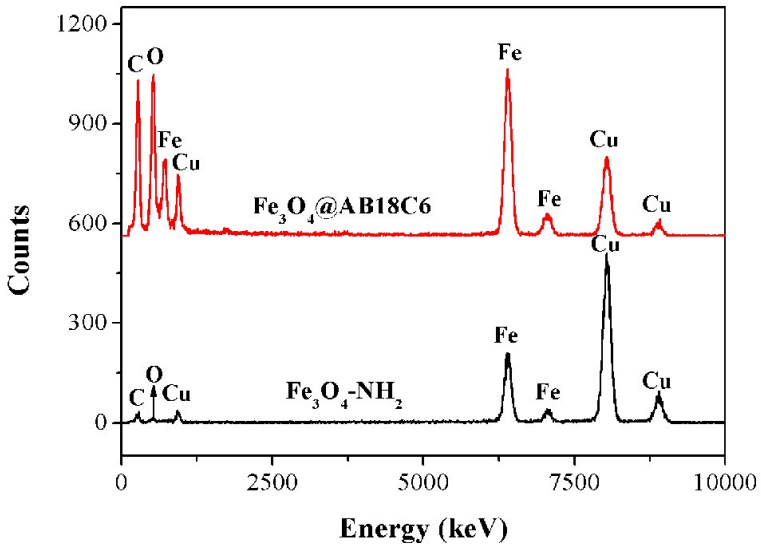


Fig.S2. EDS of Fe_3O_4-NH_2 and Fe_3O_4@AB18C6

Optimized of desorption conditions

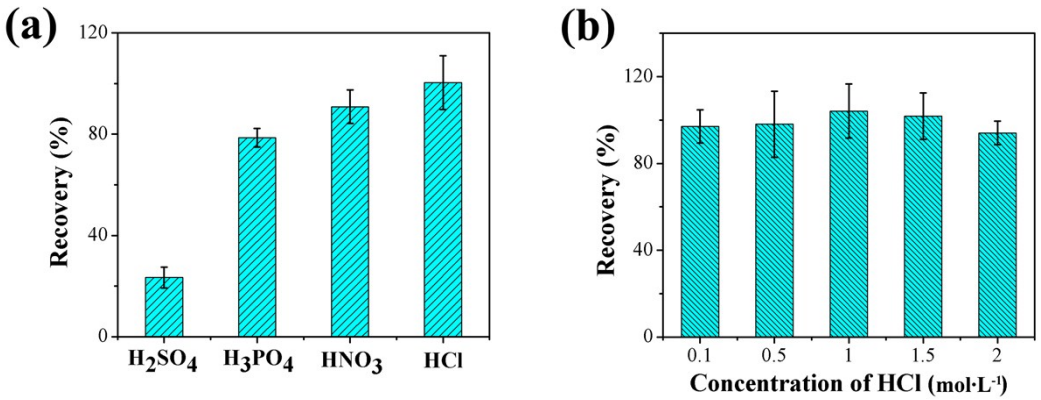


Fig.S3. Optimization of desorption condition (a) selection of desorption solvent (b) optimization of concentration of desorption solvent.

Reusing times detection

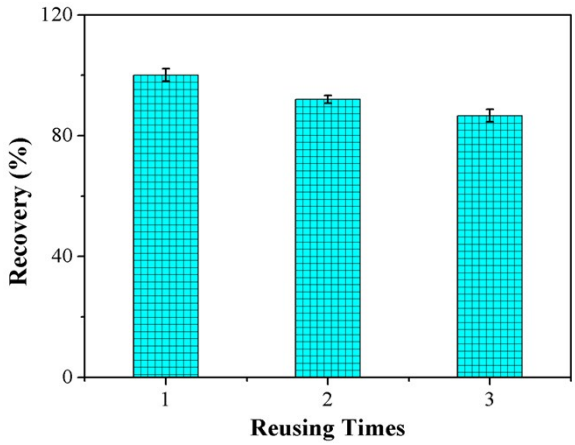


Fig.S4. Reusability of Fe_3O_4@AB18C6 in the MSPE extraction of Pb^{2+}

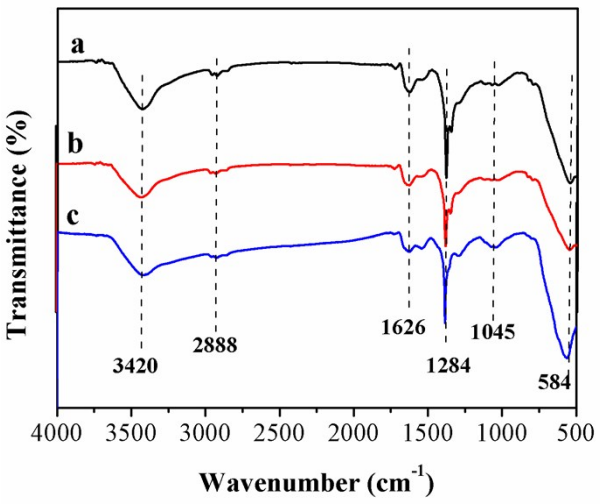


Fig.S5 FI-IR spectra of Fe_3O_4@AB18C6 after reusing (a) one time (b) two times (c) three times

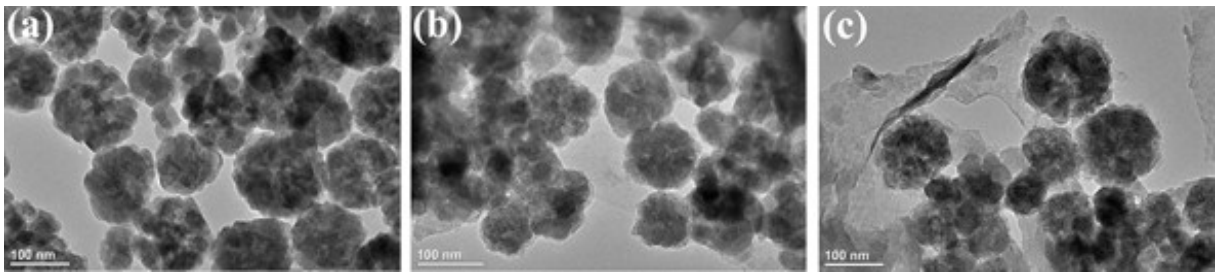


Fig.S6 TEM of Fe_3O_4@AB18C6 after reusing (a) one time (b) two times (c) three times

Method validation

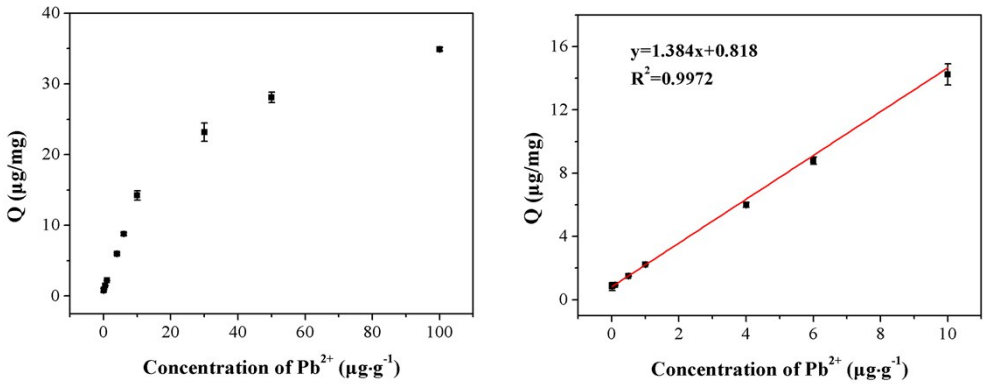


Fig.S7. Linear relation between concentration of Pb^{2+} and the absorption capacity of Fe_3O_4@AB18C6

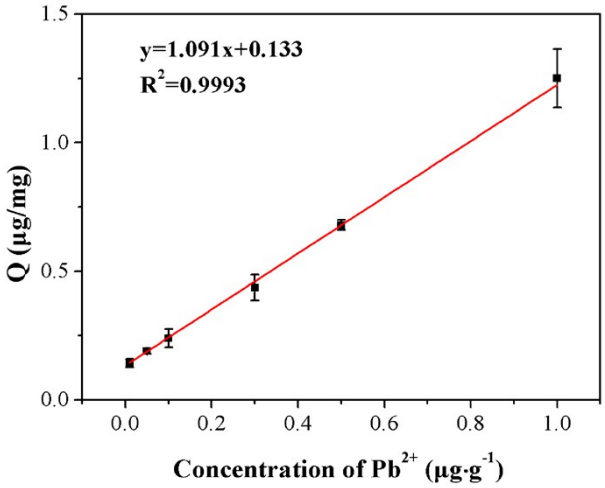


Fig.S8. Linear relation between concentration of Pb^{2+} and the absorption capacity of Fe_3O_4@AB18C6 in apple

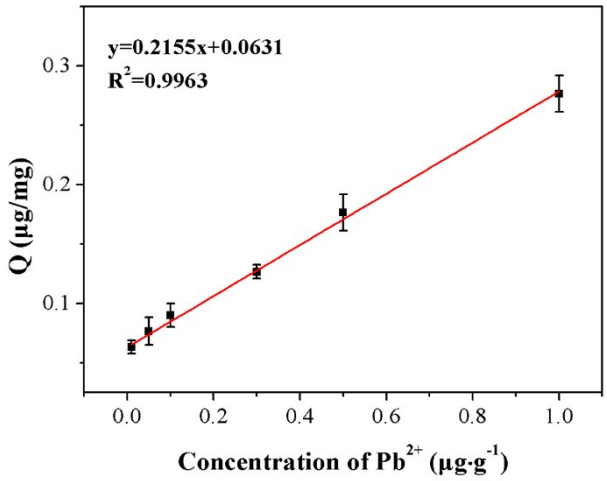


Fig.S9. Linear relation between concentration of Pb^{2+} and the absorption capacity of Fe_3O_4@AB18C6 in milk

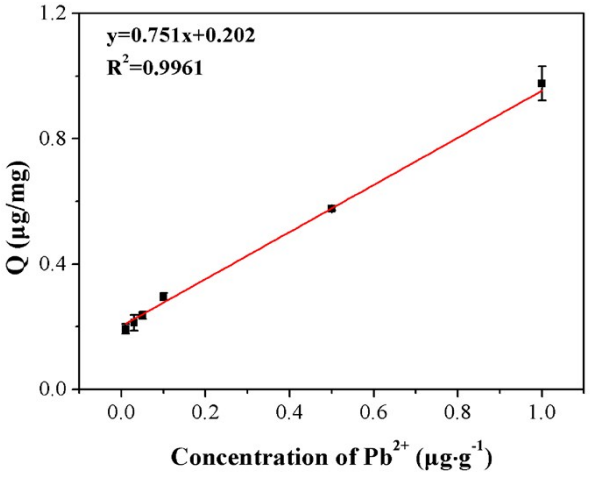


Fig.S10. Linear relation between concentration of Pb^{2+} and the absorption capacity of Fe_3O_4@AB18C6 in rice

Table S1 The relevant parameter of calibration curves by MSPE of Pb^{2+} in apple, milk and rice

Parameter	Apple	Milk	Rice
Linear equation	y= 1.091x+0.133	y=0.216x+0.063	y=0.751x+0.202
Linear rang ($\mu g \cdot g^{-1}$)	0.01–1	0.01–1	0.01–1
Correlation coefficients (R^2)	0.999	0.996	0.996
LOD ($ng \cdot g^{-1}$)	5.29	80.1	13.3
LOQ ($ng \cdot g^{-1}$)	15.8	240	39.9