

Electronic Supporting Information

A highly efficient and magnetically retrievable functionalized nano-adsorbent for ultrasonication assisted rapid and selective extraction of Pd^{2+} ions from water samples

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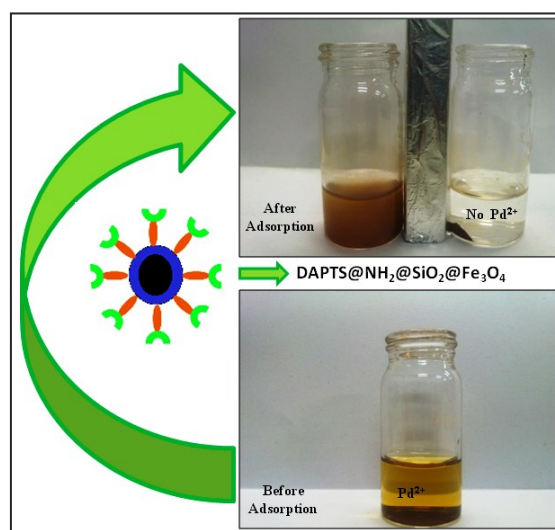


Fig S1. Adsorption of Pd^{2+} on nano-adsorbent and magnetic separation of nano-adsorbent.

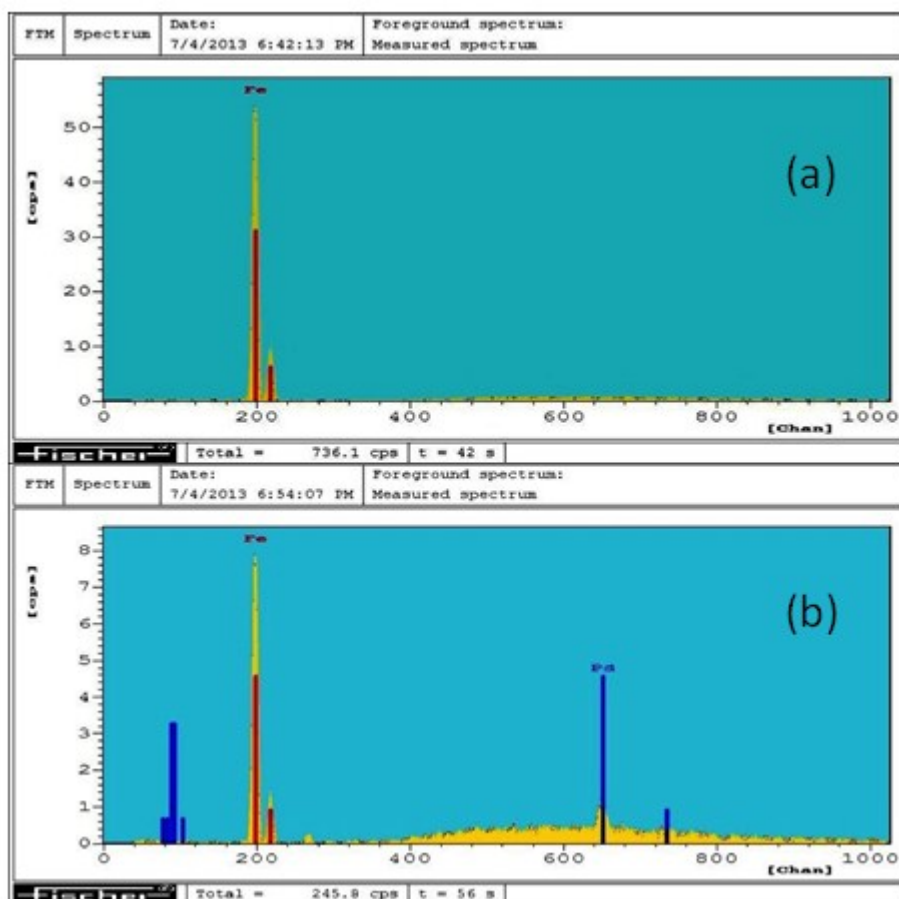


Fig S2. ED-XRF images of Nano-adsorbent (a) Before Pd^{2+} adsorption and (b) after Pd^{2+} adsorption.

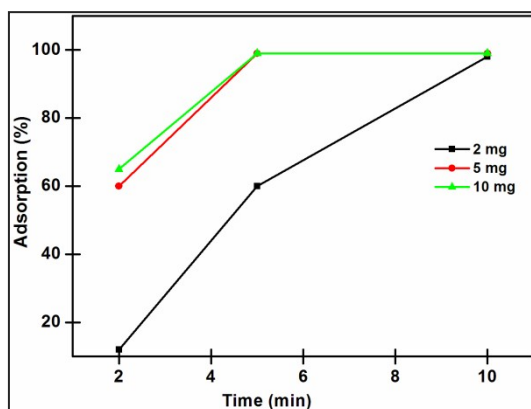


Fig S3. Effect of nano-adsorbent dosage with time on adsorption at 298 K. (Conditions: Sample volume 10 ml of Pd^{2+} (10 mg L^{-1})).

Table S1. Effect of eluting agent on recovery of Pd^{2+} ions (Experimental Conditions: initial Pd^{2+} concentration 100 mg L^{-1} , nano-adsorbent amount 5 mg, pH 4.0, ultrasonication assisted adsorption time 5 min, desorption time 2 min, eluent volume 2 and 5 ml).

S.No.	Eluting agent type	Eluent volume (ml)	Recovery (%)
1	0.01M HCl	5	39.0
2	0.02 M HCl	5	55.0
3	0.05 M HCl	5	60.0
4	0.1 M HCl	5	64.0
5	0.2 M Thiourea	5	60.0
6	0.5 M Thiourea	5	70.0
7	0.01 M HCl+ 0.1 M Thiourea	5	92.0
8	0.01 M HCl + 0.2 M Thiourea	5	99.2
9	0.01 M HCl + 0.2 M Thiourea	2	99.0
10	0.01 M HCl + 0.5 M Thiourea	5	99.4
11	0.01 M HCl + 0.5 M Thiourea	2	99.1

Table S2. Effect of Acid types on leaching of Fe from DAPTS@NH₂@SiO₂@Fe₃O₄ NPs (Experimental conditions: nano-adsorbent amount 5 mg, acid volume 10 ml, ultra-sonication time 60 min).

S.No	Acid type	Fe (µg/ml)
1	1.0 M HNO ₃	0.86
2	0.5 M HNO ₃	0.59
3	0.2 M HNO ₃	0.45
4	0.1 M HNO ₃	0.27
5	1.0 M H ₂ SO ₄	0.35
6	0.5 M H ₂ SO ₄	0.21
7	0.2 M H ₂ SO ₄	0.19
8	0.1 M H ₂ SO ₄	0.15
9	1.0 M HCl	0.20
10	0.5 M HCl	0.11
11	0.2 M HCl	0.04
12	0.1 M HCl	0.0

Table S3. Removal of Pd²⁺ in presence of co-existing ions and electrolytes [Experimental conditions: sample volume of binary solution 10 ml, Pd²⁺ concentration (1.0 µg/ml) amount of adsorbent 5 mg, adsorption equilibrium time 5 min, eluting agent 2 ml (0.01 M HCl + 0.2 M Thiourea), elution time 2 min].

S.No.	Interfering ion	Tolerance limit (µg/ml)	Recovery (%)
1	Na ⁺	2100	98.2
2	Ca ²⁺	300	97.1
3	Fe ²⁺	200	98.5
4	Fe ³⁺	180	98.2
5	Cu ²⁺	200	98.0
6	Co ²⁺	200	98.4
7	Ni ²⁺	200	98.8

8	Cd^{2+}	250	97.5
9	Zn^{2+}	250	97.8
10	Mg^{2+}	300	97.6
11	Cr^{3+}	250	98.4
12	K^{+}	3000	99.0
13	NH_4^{+}	2000	99.2
14	Pb^{2+}	250	98.7
15	Cl^{-1}	2100	98.6
16	SO_4^{2-}	2000	98.2
17	$\text{CH}_3\text{COO}^{-}$	2100	99.0
18	NO_3^{-}	2000	98.8