Electronic Supplementary Material (ESI) for RSC Advances.

A novel poly (2-mercaptobenzothiazole) coated magnetic nanoadsorbent derived from ZIF-8 for preconcentration/determination of palladium and silver

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Short title: Synthesis and application of a novel magnetic nanoadsorbent

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Table S1

The proposed model for the adsorption optimization.

Sequential Model Sum of Squares [Type I]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Mean vs Total	1.329E+005	1	1.329E+005			
Linear vs Mean	539.71	3	179.90	1.08	0.3857	
2FI vs Linear	12.13	3	4.04	0.020	0.9960	
Quadratic vs 2FI	2509.69	3	836.56	58.27	< 0.0001	Suggested
Cubic vs Quadratic	30.40	4	7.60	0.40	0.8009	Aliased
Residual	113.16	6	18.86			
Total	1.361E+005	20	6803.32			

"Sequential Model Sum of Squares [Type I]": Select the highest order polynomial where the additional terms are significant and the model is not aliased.

Lack of Fit Tests

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Linear	2628.53	11	238.96	32.42	0.0006	
2FI	2616.39	8	327.05	44.37	0.0003	
Quadratic	106.71	5	21.34	2.90	0.1341	Suggested

Table S2

ANOVA results for the adsorption optimization.

ANOVA for Response Surface Quadratic Model

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	3061.53	9	340.17	23.70	< 0.0001	significant
A-pH	*251.56*	*1*	*251.56*	*17.52*	*0.0019*	
B-Sorbent a	*172.11*	*1*	*172.11*	*11.99*	*0.0061*	
C-Uptake tir	*116.04*	*1*	*116.04*	*8.08*	*0.0175*	
AB	*9.24*	*1*	*9.24*	*0.64*	*0.4409*	
AC	*2.64*	*1*	*2.64*	*0.18*	*0.6769*	
BC	*0.24*	*1*	*0.24*	*0.017*	*0.8987*	
A^2	*1742.44*	*1*	*1742.44*	*121.37*	*< 0.0001*	
B^2	*875.92*	*1*	*875.92*	*61.01*	*< 0.0001*	
C^2	*288.31*	*1*	*288.31*	*20.08*	*0.0012*	
Residual	143.56	10	14.36			
Lack of Fit	*106.71*	*5*	*21.34*	*2.90*	*0.1341*	*not significa*
Pure Error	*36.85*	*5*	*7.37*			
Cor Total	3205.09	19				

Table S3

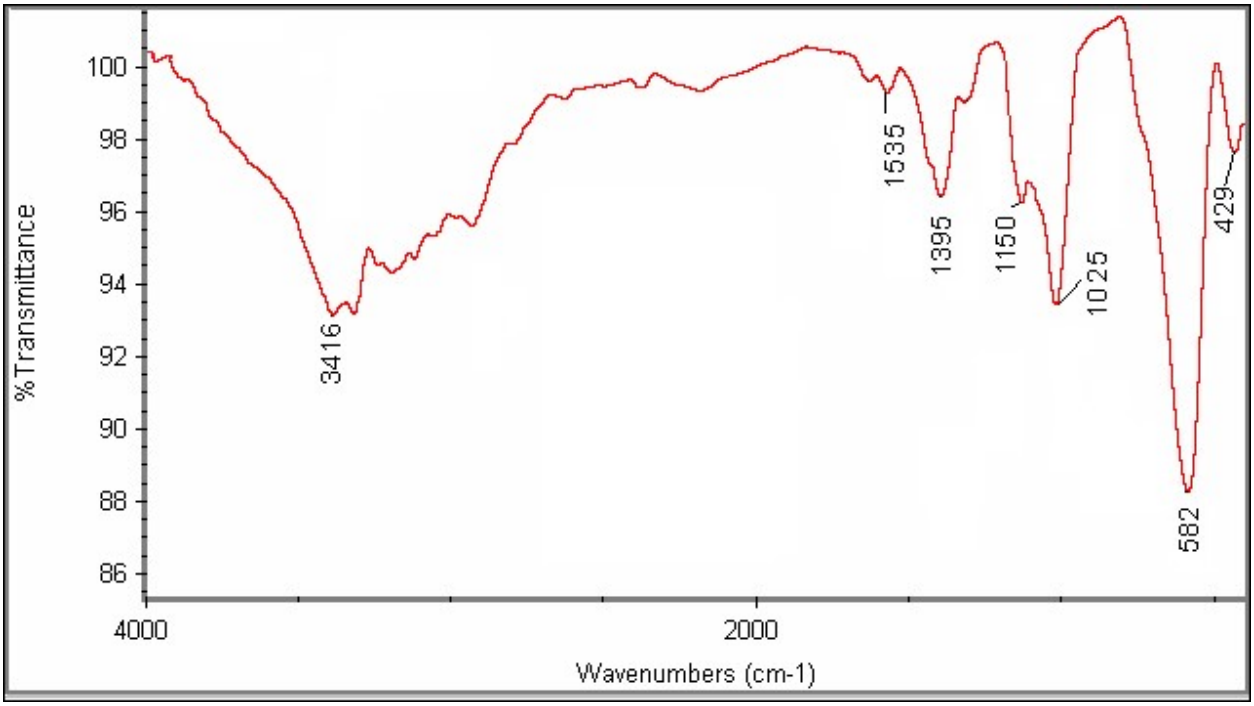
ANOVA results for the desorption optimization.

Analysis of variance table [Partial sum of squares - Type III]

Source	Sum of Squares	df	Mean Square	F Value	p-value Prob > F	
Model	5225.85	14	373.28	13.70	< 0.0001	significant
A-Time (min)	*1627.27*	*1*	*1627.27*	*59.72*	*< 0.0001*	
B-Eluent volu	*192.67*	*1*	*192.67*	*7.07*	*0.0179*	
C-Conc. of Ti	*49.12*	*1*	*49.12*	*1.80*	*0.1994*	
D-Conc. of H	*1465.71*	*1*	*1465.71*	*53.79*	*< 0.0001*	
AB	*0.25*	*1*	*0.25*	*9.175E-003*	*0.9250*	
AC	*0.37*	*1*	*0.37*	*0.014*	*0.9084*	
AD	*8.03*	*1*	*8.03*	*0.29*	*0.5952*	
BC	*0.11*	*1*	*0.11*	*4.078E-003*	*0.9499*	
BD	*9.68*	*1*	*9.68*	*0.36*	*0.5601*	
CD	*4.00*	*1*	*4.00*	*0.15*	*0.7070*	
A^2	*129.54*	*1*	*129.54*	*4.75*	*0.0456*	
B^2	*569.81*	*1*	*569.81*	*20.91*	*0.0004*	
C^2	*1478.78*	*1*	*1478.78*	*54.27*	*< 0.0001*	
D^2	*187.34*	*1*	*187.34*	*6.88*	*0.0192*	
Residual	408.72	15	27.25			
Lack of Fit	*324.00*	*10*	*32.40*	*1.91*	*0.2457*	*not significan*
Pure Error	*84.71*	*5*	*16.94*			
Cor Total	5634.57	29				

Fig. S1: FT-IR spectrum of (a) MZIF-8, and (b) MPC@PMBT nano-adsorbents.

(a)



(b)

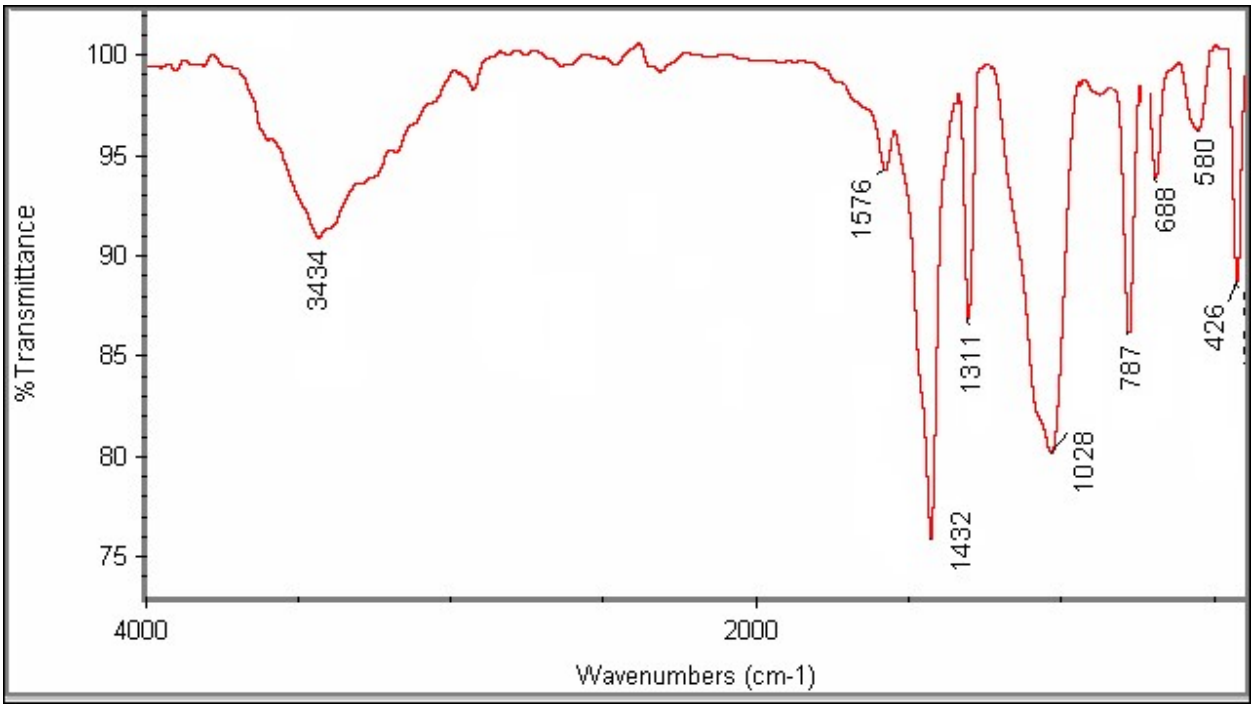


Fig. S2: Reusability study of the MPC@PMBT nanomaterial.

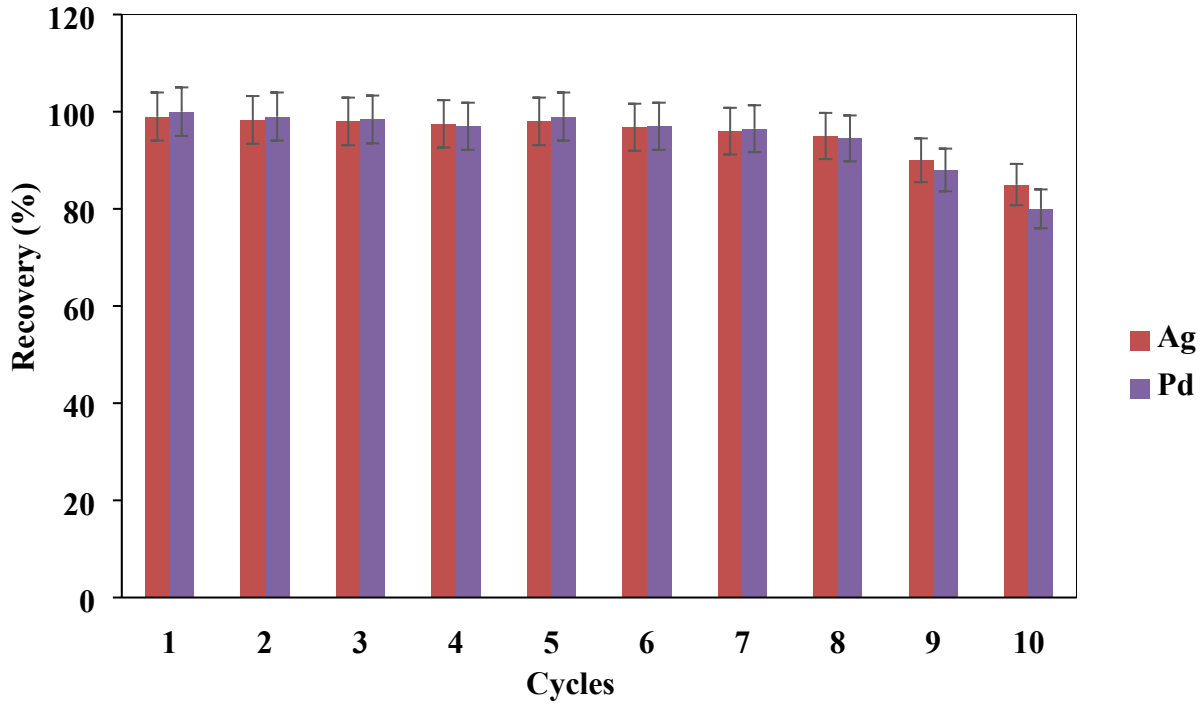


Fig. S3: Effect of sample volume.

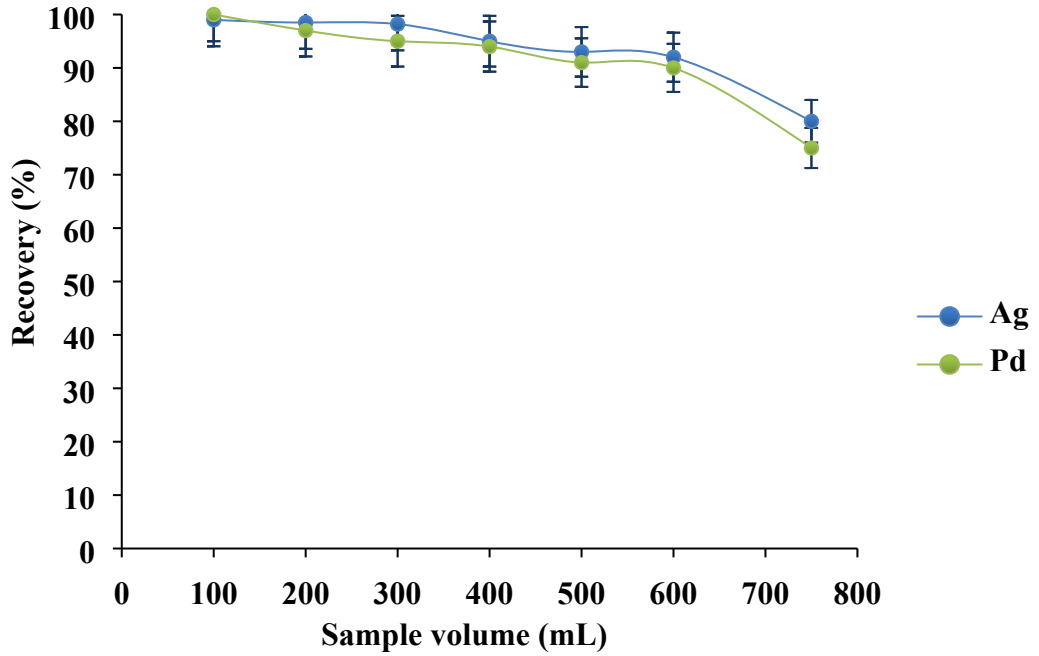


Fig. S4: The calibration plots of Ag and Pd without performing the preconcentration process.