

Supplementary data

Chitosan-poly(m-phenylenediamine) membrane for efficient gold recovery from acidic aqueous solution

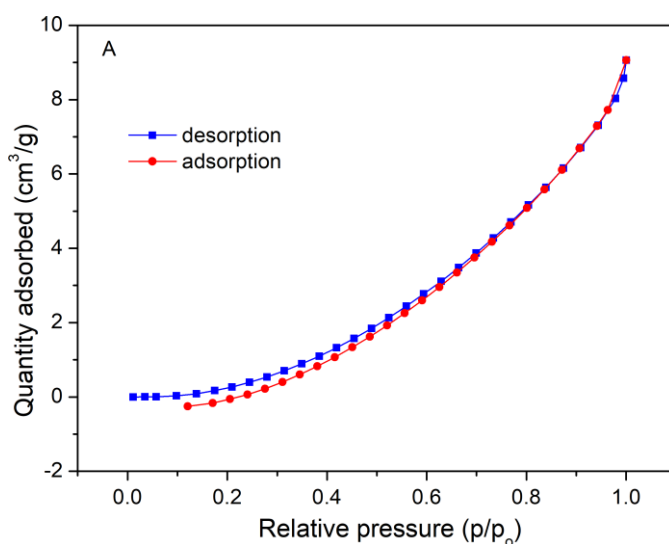
Zhongmin Feng, Chuanyu Zhu, Yupu Meng and Zhuqing Wang*

Anhui Key Laboratory of Photoelectric-Magnetic Functional Materials, Anqing

Normal University, Anqing 246133, China

*** Corresponding Author:**

Zhuqing Wang. Tel./fax: +86-556-5708025. Address: Anhui Key Laboratory of Photoelectric-magnetic functional materials, Anqing Normal University, Anqing 246133, China. E-mail address: wangzhuqing@vip.163.com (Z. W).



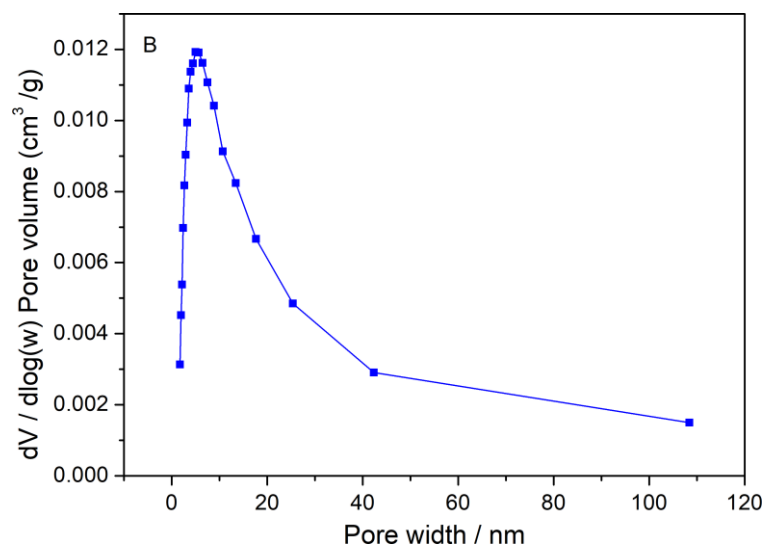


Fig. S1 (A) N₂ adsorption-desorption isotherm and (B) pore width distribution of CS/PmPD membrane.

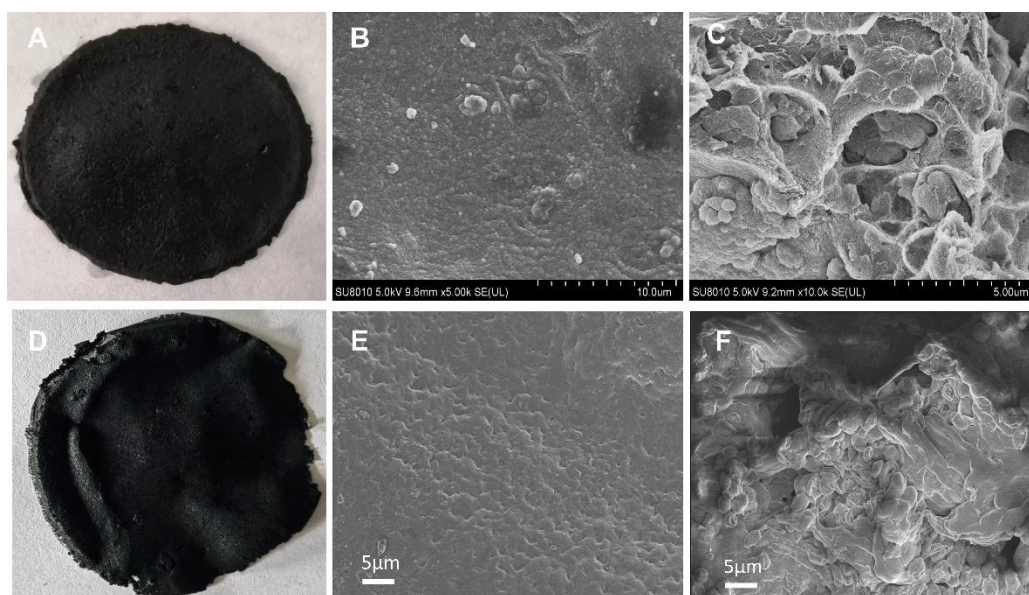


Fig. S2 (A) Digital photo of CS/PmPD membrane before adsorption; SEM images of (B) surface and (C) cross-section of the CS/PmPD membrane; (D) Digital photo of CS/PmPD membrane after four adsorption/desorption cycles; SEM images of (E) surface and (F) cross-section of the CS/PmPD membrane after four adsorption/desorption cycles.

Table S1. Adsorption capacity of different materials for Au(III).

Materials	Temperature (K)	pH	Adsorption capacity for Au(III) (mg/g)	Refs.
Clay minerals	298	4	108.3	10
Amberjet™ 4200	298	5	164.4	25
AT-A2 proteins	323	5	285.7	26
DAVF-PT	298	2	528	27
NH ₂ -ZIF-8	298	3	357	28
APS-LCP	298	4	261.4	29
CysR	298	2.6	714.3	30
Silica gel	298	2.5	459	31
MOFs	298	1	495	32
GH-D-P	303	3	357.2	33
UiO-66-TU	298	7	495	34
CDF-CS	298	7	478.4	12
JNU-1	298	2 M HCl	1124	35
PTB	310	2.8	2244	36
PTL	333	3	1034	37
Fe-BTC/PpPDA	298	2-11	934	38
GA-CS	298	-	500	39
DAVFs-CS	298	2	322	40
CS/PmPD	298	3	410	Our work

Table S2 shows the unit-price of raw materials employed in preparation of the CDF-CS, Cu-TFT-Him, and CS/PmPD membrane. Table S3 shows the cost of the used adsorbent to recover 500 mg of gold from the solution. Assuming that the conversion rate of the reaction is 50%, the products of CDF-CS and Cu-TFT-Him are 400 mg and 43 mg, respectively. Based on calculations, the amount of the used adsorbent to recover 500 mg of gold from the same solution is 1.05 g of CDF-CS (\$ 0.603), 0.65 g of Cu-TFT-Him (\$ 6.440), and 1.22 g of CS/PmPD (\$ 0.161), respectively.

Table S2 The selling price of raw materials required for the preparation of adsorbents

CS/PmPD	Dosage	unit-price \$/ kg(L)	Cu-TFT-Him	Dosage	unit-price \$/ kg(L)	CDF-CS	Dosage	unit-price \$/ kg(L)
mPD	1.0 g	27.90	DMF	10 mL	23.60	FeCl ₃ ·6H ₂ O	2.7 g	9.58
(NH ₄) ₂ S ₂ O ₈	2.3 g	13.50	C ₃ H ₅ N	1 mL	69.20	FeCl ₂ ·4H ₂ O	1.0 g	297.20
CS	0.5 g	40.20	Cu(NO ₃) ₂ ·H ₂ O	0.036 g	624.70	CS	1.93 g	40.20
C ₄ H ₆ O ₆	0.4 g	8.10	CH ₃ OH	25 mL	9.58	C ₄ H ₁₂ N ₂ S ₂	1.35 g	52.50
C ₂ H ₅ OH	20 mL	16.40	C ₈ F ₄ N ₂	0.12 g	820.80	C ₂ H ₄ O ₂	200 mL	138.75
[EMIM]Ac	2 mL	657.60				C ₂ H ₅ OH	40 mL	16.40
						CH ₃ OH	25 mL	9.58

Table S3 The cost of the used adsorbent to recover 500 mg of gold

Adsorbent	Dosage / g	Cost / \$
CS/PmPD	1.22	0.161
Cu-TFT-Him	0.65	6.440
CDF-CS	1.05	0.603

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