

SUPPORTING INFORMATION

Table S1. BET Surface Area and Total Pore Volume of ESM and TESM

biosorbent	BET surface area (m ² /g)	total pore volume(cm ³ /g)
ESM	2.131	0.02854
TESM	2.129	0.02475

Table S2. The Relevant Parameters of the Pseudo-first-order and the Pseudo-second-order Kinetics

target	pseudo-first-order model				pseudo-second-order model			
	q_e	q_e^*	k_1	r^2	q_e	q_e^*	k_2	r^2
Cr(VI)	45.98	96.78	0.3112	0.9704	99.01	96.78	0.0196	0.9996
Hg(II)	73.75	122.85	0.2402	0.9652	131.75	122.85	0.0056	0.9995
Ag(I)	69.10	94.02	0.2268	0.9841	101.52	94.02	0.0056	0.9990
Cu(II)	19.33	35.80	0.3155	0.9563	37.45	35.80	0.0355	0.9996
Cd(II)	10.10	20.19	0.2286	0.8818	21.32	20.19	0.0487	0.9976
Pb(II)	9.93	27.48	0.3121	0.7650	28.49	27.48	0.0598	0.9997

Table S3. Adsorption Capacities of Various Adsorbents for Cr(VI), Hg(II), Ag(I), Cu(II), Cd(II) and Pb(II).

adsorbents		adsorption capacity (mg/g)						Refs
		Cr(VI)	Hg(II)	Ag(I)	Cu(II)	Cd(II)	Pb(II)	
Thiol	TESM	113.64	138.89	129.87	46.73	23.7	32.47	This work
functionalized	Thiol-modified cellulose resins		23					1
adsorbents	Thiol modified silica gel		131.54				9.41	2
	Thiol functionalized silica/poly- styrene composite					10.43		3
	Thiol modified Fe ₃ O ₄ /SiO ₂		74					4
	Thiol cotton fiber			54-70	7-9	14-18	24-30	5
	Thiol functionalized hierarchically porous silica	36.40	140.10	100.10	62.03	83.30	101.30	6
Biosorbents	Lemna minor powder	28.17						7
	Elaeagnus tree leaves	10.90						8
	Wheat shell				10.8			9
	Coffee husk	6.96			7.5	6.85		10
	Macrofungus Pleurotus platypus			46.7				11
	Lichen (Cladonia furcata) biomass						12.3	12
	Garcinia mangostana L. fruit shell	3.15	3.56					13
	Powdered leaves of castor tree		37.2					14

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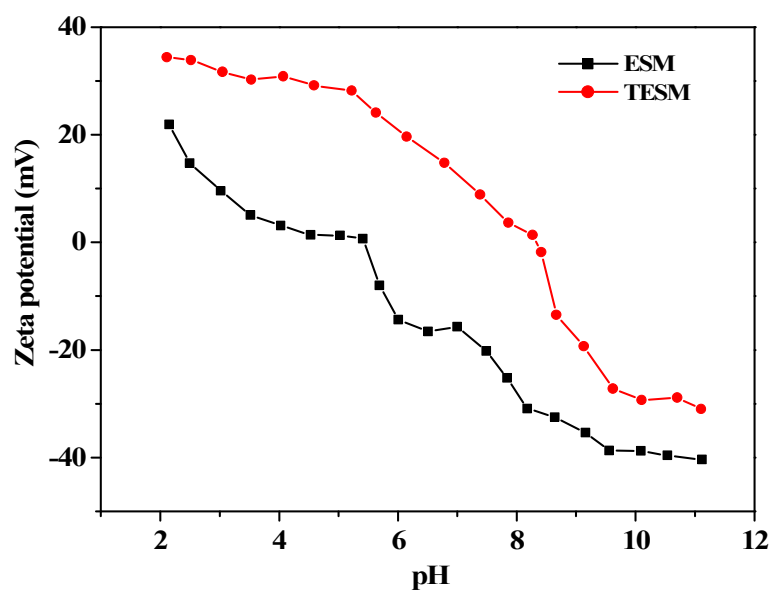
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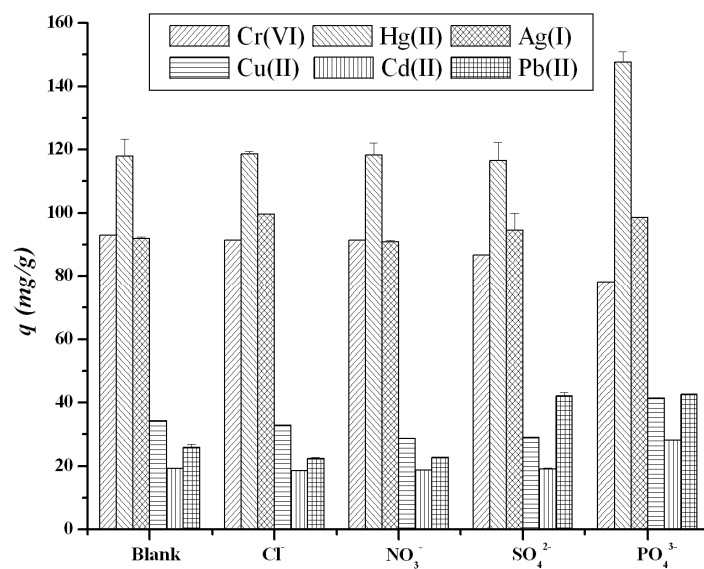
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Table S4. Effect of Foreign Cations on Adsorption Capacities of Target Heavy Metal Ions onto TESM

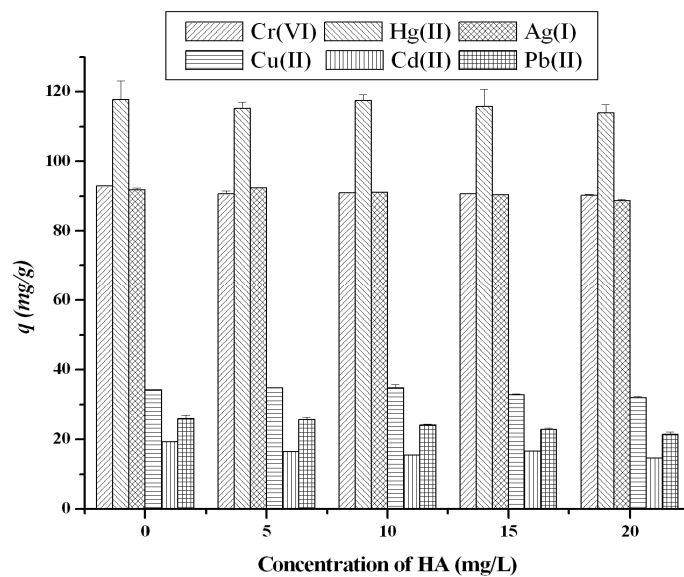
co-existing ions	at concentration (mg/L)	q (mg/g $\pm$ SD, n=2)					
		Cr(VI)	Hg(II)	Ag(I)	Cu(II)	Cd(II)	Pb(II)
Na ⁺	0	95.11 $\pm$ 0.09	117.89 $\pm$ 5.37	92.33 $\pm$ 0.11	34.90 $\pm$ 0.00	19.36 $\pm$ 0.25	26.68 $\pm$ 0.67
	5	93.96 $\pm$ 0.42	116.10 $\pm$ 4.95	92.00 $\pm$ 0.00	34.96 $\pm$ 0.90	18.90 $\pm$ 0.14	26.08 $\pm$ 1.10
	50	92.79 $\pm$ 0.30	118.45 $\pm$ 1.35	92.90 $\pm$ 0.14	34.50 $\pm$ 0.35	19.25 $\pm$ 0.41	27.73 $\pm$ 1.73
	100	92.42 $\pm$ 0.21	120.78 $\pm$ 2.82	92.68 $\pm$ 0.25	34.73 $\pm$ 0.60	19.42 $\pm$ 0.00	26.88 $\pm$ 0.39
	500	89.16 $\pm$ 0.30	117.49 $\pm$ 1.42	91.25 $\pm$ 0.14	33.80 $\pm$ 0.25	19.30 $\pm$ 0.17	25.83 $\pm$ 1.66
K ⁺	0	95.11 $\pm$ 0.09	117.89 $\pm$ 5.37	92.33 $\pm$ 0.11	34.90 $\pm$ 0.00	19.36 $\pm$ 0.25	26.68 $\pm$ 0.67
	5	95.37 $\pm$ 0.05	118.40 $\pm$ 5.48	93.38 $\pm$ 0.18	34.54 $\pm$ 0.48	19.67 $\pm$ 0.04	26.68 $\pm$ 1.38
	50	95.14 $\pm$ 0.00	117.85 $\pm$ 2.82	93.33 $\pm$ 0.32	34.31 $\pm$ 0.16	19.47 $\pm$ 0.07	27.80 $\pm$ 0.21
	100	92.75 $\pm$ 0.40	119.98 $\pm$ 2.33	92.18 $\pm$ 0.67	33.50 $\pm$ 0.11	19.33 $\pm$ 0.27	24.58 $\pm$ 0.67
	500	89.11 $\pm$ 0.42	116.23 $\pm$ 3.27	91.85 $\pm$ 0.07	32.90 $\pm$ 0.39	18.82 $\pm$ 0.28	23.03 $\pm$ 1.03
Ca ²⁺	0	95.11 $\pm$ 0.09	117.89 $\pm$ 5.37	92.33 $\pm$ 0.11	34.90 $\pm$ 0.00	19.36 $\pm$ 0.25	26.68 $\pm$ 0.67
	5	95.94 $\pm$ 0.00	117.56 $\pm$ 0.33	93.68 $\pm$ 0.11	33.61 $\pm$ 0.69	18.48 $\pm$ 0.03	27.28 $\pm$ 1.31
	50	91.25 $\pm$ 0.23	114.26 $\pm$ 5.97	93.18 $\pm$ 0.04	32.61 $\pm$ 0.69	17.89 $\pm$ 0.01	25.10 $\pm$ 0.85
	100	87.92 $\pm$ 0.25	117.88 $\pm$ 6.27	91.03 $\pm$ 0.18	31.83 $\pm$ 0.25	17.73 $\pm$ 0.01	23.93 $\pm$ 0.81
	500	77.88 $\pm$ 0.77	115.86 $\pm$ 3.01	90.38 $\pm$ 1.03	30.23 $\pm$ 0.21	17.14 $\pm$ 0.03	20.88 $\pm$ 1.31
Mg ²⁺	0	95.11 $\pm$ 0.09	117.89 $\pm$ 5.37	92.33 $\pm$ 0.11	34.90 $\pm$ 0.00	19.36 $\pm$ 0.25	26.68 $\pm$ 0.67
	5	95.69 $\pm$ 0.49	116.06 $\pm$ 2.96	92.88 $\pm$ 0.46	34.26 $\pm$ 0.48	19.22 $\pm$ 0.11	26.83 $\pm$ 1.38
	50	91.06 $\pm$ 0.09	115.72 $\pm$ 2.32	90.90 $\pm$ 1.41	32.61 $\pm$ 0.58	18.60 $\pm$ 0.11	24.85 $\pm$ 0.07
	100	87.13 $\pm$ 0.84	114.69 $\pm$ 0.01	87.88 $\pm$ 0.39	31.98 $\pm$ 0.35	18.09 $\pm$ 0.49	22.45 $\pm$ 0.00
	500	76.53 $\pm$ 0.54	116.64 $\pm$ 1.60	86.78 $\pm$ 0.53	29.96 $\pm$ 0.05	17.64 $\pm$ 0.14	19.25 $\pm$ 0.28
Fe ³⁺	0	95.11 $\pm$ 0.09	117.89 $\pm$ 5.37	92.33 $\pm$ 0.11	34.90 $\pm$ 0.00	19.36 $\pm$ 0.25	26.68 $\pm$ 0.67
	0.5	91.71 $\pm$ 0.49	117.07 $\pm$ 3.11	91.83 $\pm$ 0.04	32.63 $\pm$ 0.28	17.18 $\pm$ 0.39	23.65 $\pm$ 0.35
	1	90.33 $\pm$ 0.09	118.40 $\pm$ 3.91	91.25 $\pm$ 0.07	32.08 $\pm$ 0.14	16.48 $\pm$ 0.18	22.80 $\pm$ 0.28
	5	90.36 $\pm$ 0.84	117.12 $\pm$ 0.51	90.83 $\pm$ 0.25	28.30 $\pm$ 0.04	13.93 $\pm$ 0.53	20.65 $\pm$ 1.06
	10	89.88 $\pm$ 0.54	115.76 $\pm$ 5.07	90.20 $\pm$ 0.14	27.90 $\pm$ 0.04	12.13 $\pm$ 0.46	19.85 $\pm$ 0.07



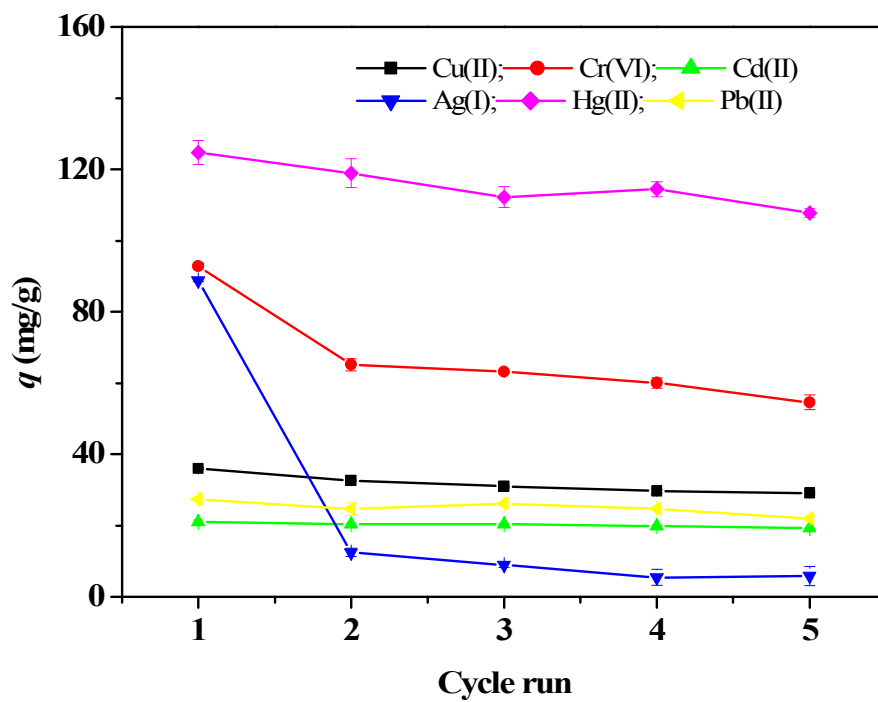
Supplemental Figure S1. Variation of zeta potentials of ESM and TESM with pH



Supplemental Figure S2. Effect of coexisting anions on the adsorption capacities of the target heavy metal ions.



Supplemental Figure S3. Effect of HA on the adsorption capacities of the target heavy metal ions.



Supplemental Figure S4. The adsorption capacity variation with recycle runs for the regenerated TESM as adsorbent for removal of target heavy metal ions using the identical conditions.