

## Supporting Information

**Synthesis and characterization of polymerized acrylamide coupled with acrylamido-2-methyl-1-propane sulfonic acid-montmorillonite structure as novel nano-composite for Cd (II) removal from aqueous solutions**

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**Table S1.** Isotherm parameters for Cd (II) adsorption at different temperatures (adsorbent dosage 0.20 g/L, pH 5.0, stirring 160 rpm and contact time 105 min).

Sample	T (k)	Langmuir isotherm model			Freundlich isotherm model		
		k <sub>L</sub> (L/mg)	b (mg/g)	R <sup>2</sup>	K <sub>F</sub> (mg/g)	n	R <sup>2</sup>
AAm-AMPS/MMT	298	0.21	200	0.999	142.2	24.2	0.790
	313	0.36	250	0.999	189.2	34.5	0.785
	328	1.5	333.3	0.999	261.8	111.1	0.705

**Table S2.** Kinetic parameters of pseudo-first- and pseudo-second-order models for the adsorption of Cd (II) at different temperatures (adsorbent dosage 0.20 g/L, pH 5.0, stirring 160 rpm and contact time 105 min).

Sample	T (k)	Pseudo first-order kinetic model			Pseudo second-order kinetic model		
		k <sub>1</sub> (min <sup>-1</sup> )	q <sub>e</sub> (mg/g)	R <sup>2</sup>	k <sub>2</sub> (gmg <sup>-1</sup> Lmin <sup>-1</sup> )	q <sub>e</sub> (mg/g)	R <sup>2</sup>
AAm-AMPS/MMT	298	4.6 × 10 <sup>-3</sup>	279.9	0.985	4.4 × 10 <sup>-5</sup>	333.3	0.958
	313	4.6 × 10 <sup>-3</sup>	225.4	0.989	9.4 × 10 <sup>-5</sup>	333.3	0.983
	328	0.0115	217.3	0.983	1.2 × 10 <sup>-4</sup>	333.3	0.980

**Table S3.** Effect of pH change on the adsorption capacities (numerical values of Figure 7)

pH	Adsorption capacity, mg/g, by MMT	Adsorption capacity, mg/g, by AMPS-MMT	Adsorption capacity, mg/g, AAm-AMPS-MMT
3	22.4	29.7	119.5
4	28.2	65.5	144.4
5	42.9	95.8	175
6	31.7	83.8	169.2
7	30.8	80	160.7
8	24.9	70.7	135.3
9	20	62.3	112.2
10	15.2	51.3	86.1
R2	0.808	0.872	0.948

**Table S4.** Effect of adsorbent dose on adsorption capacities (numerical values of Figure 8)

Adsorbent dosages, g/L	Adsorption capacity, mg/g, by MMT	Adsorption capacity, mg/g, by AMPS-MMT	Adsorption capacity, mg/g, AAm-AMPS-MMT
0.1	8.6	68	145.7
0.15	12.3	74.1	150.9
0.2	34.4	89.2	163.2
0.25	40.5	92.9	166.5
0.3	44.9	97.5	169.4
0.35	52.4	104.1	173.4
0.4	58.7	108.9	179.2
0.45	64.9	115.8	186.7
R2	0.897	0.836	0.957

**Table S5.** Effect of Cd (II) concentration on adsorption capacities (numerical values of Figure 9)

Initial Cd (II) concentrations	Adsorption capacity, mg/g, by MMT	Adsorption capacity, mg/g, by AMPS-MMT	Adsorption capacity, mg/g, AAm-AMPS-MMT
50	25	25	25
100	33.8	50	50
150	35.7	75	75
200	36.9	89.2	100
250	37.4	90.6	125
300	37.9	91.3	150
350	42.9	95.8	175
400	44.7	97.4	176
450	46.9	98.8	176.3
500	49.1	101.5	176.9
R2	0.96	0.936	0.932

**Table S6.** Effect of Cd (II) concentration on adsorption capacity of AAm-AMPS-MMT at different temperatures (numerical values of Figure 10)

Initial Cd (II) concentrations	Adsorption capacity, mg/g of AAm-AMPS- MMT at 298 k	Adsorption capacity, mg/g of AAm-AMPS- MMT at 313 k	Adsorption capacity, mg/g of AAm-AMPS- MMT at 328 k
400	176	200	200
450	176.3	213.5	225
500	176.9	216.8	250
550	177.6	218.2	268.9
600	179.2	220.7	270.7
650	179.9	222.6	272.3
700	180.8	224.7	274.1
750	183.6	226.3	276.1
R2	0.873	0.924	0.946

**Table S7.** Effect of operating time on adsorption capacities (numerical values of Figure 13)

Time, min	Adsorption capacity, mg/g, by MMT	Adsorption capacity, mg/g, by AMPS-MMT	Adsorption capacity, mg/g, AAm-AMPS-MMT
15	8.5	21.8	41.4
30	13.7	32.6	67.6
45	19.1	44.4	102
60	22.7	68.2	135.9
90	33.7	88.4	165.8
105	42.9	95.8	175
120	50.9	102.2	175
R2	0.941	0.958	0.939

**Table S8.** Effect of operating time on adsorption capacity of AAm-AMPS-MMT at different temperatures (numerical values of Figure 14)

Time, min	Adsorption capacity, mg/g of AAm-AMPS- MMT at 298 k	Adsorption capacity, mg/g of AAm-AMPS- MMT at 313 k	Adsorption capacity, mg/g of AAm-AMPS- MMT at 328k
15	70.3	128.9	167.6
30	90.7	142.1	177.8
45	112.5	166.3	201.8
60	133.1	181.9	219.7
75	146.9	200.9	238.3
90	168.4	211.7	259.2
105	183.6	226.3	276.1
120	187.9	233.5	284.2
135	191.3	236.9	288.1
R2	0.963	0.975	0.932