

Article

Aminopolycarboxylic Acids-Functionalized Chitosan-Based Composite Cryogels as Valuable Heavy Metal Ions Sorbents: Fixed-Bed Column Studies and Theoretical Analysis

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Supporting Information

Table S1. Parameters corresponding to Thomas and Yoon-Nelson models fitted for each HMI on CS_{EDTA}-CPL column.

HMI	Thomas			Yoon-Nelson		
	k_{TH} (L/min·mg)	q_0 (mg/g)	R^2	k_{YN} (mL/min·mg)	τ (min)	R^2
Co(II)	$1.55 \cdot 10^{-4}$	79.57	0.9365	$3.83 \cdot 10^{-2}$	66.43	0.9365
Zn(II)	$6.29 \cdot 10^{-5}$	130.03	0.8888	$1.55 \cdot 10^{-2}$	108.56	0.8888
Cd(II)	$4.10 \cdot 10^{-5}$	158.72	0.8173	$1.01 \cdot 10^{-2}$	132.51	0.8173
Pb(II)	$3.31 \cdot 10^{-5}$	166.78	0.7950	$8.16 \cdot 10^{-3}$	139.24	0.7950
Ni(II)	$3.52 \cdot 10^{-5}$	249.53	0.8594	$8.68 \cdot 10^{-3}$	208.34	0.8594

Table S2. Sorption performance of various sorbents reported in the literature compared with that of our CS_{EDTA}-CPL sorbents.

Sorbent	Metal ion	pH	Sorption operation conditions	q ₀ , mg/g	Refs.
Zeolite-supported nanoscale zero-valent iron	Pb(II) Cd(II)	6	batch	85.37 48.63	[1]
Iron coating zeolite	Pb(II) Cd(II) Zn(II)	6.5	batch	6.54 4.20 3.72	[2]
Iron coating zeolite	Pb(II) Cd(II) Zn(II)	6.5	column	1.03 0.93 0.83	[2]
Lemon peel-based biomaterial	Cd(II) Co(II) Ni(II) Pb(II)	5	batch	7.34 5.63 5.73 8.17	[3]
PVP hydrogel	Ni(II) Zn(II) Cd(II)	8	batch	7.52 26.78 4.35	[4]
P(VP-co-MA) hydrogel	Ni(II) Zn(II) Cd(II)	8	batch	60.15 48.92 29.82	[4]
FAU-type zeolite	Pb(II) Cd(II) Zn(II) Co(II)	Not specified	batch	109.9 53.5 36.8 12.2	[6]
Mesoporous magnetite nanoparticles	Pb(II) Cd(II) Ni(II)	5.5	batch	85 79 66	[7]
Copper-imprinted CS-based cryogel	Ni(II) Zn(II)	4.5 5	batch	77.67 84.14	8
CS _{EDTA} -CPL	Co(II) Zn(II) Cd(II) Pb(II) Ni(II)	4.5	column	79.57 130.03 158.72 166.78 249.53	this study

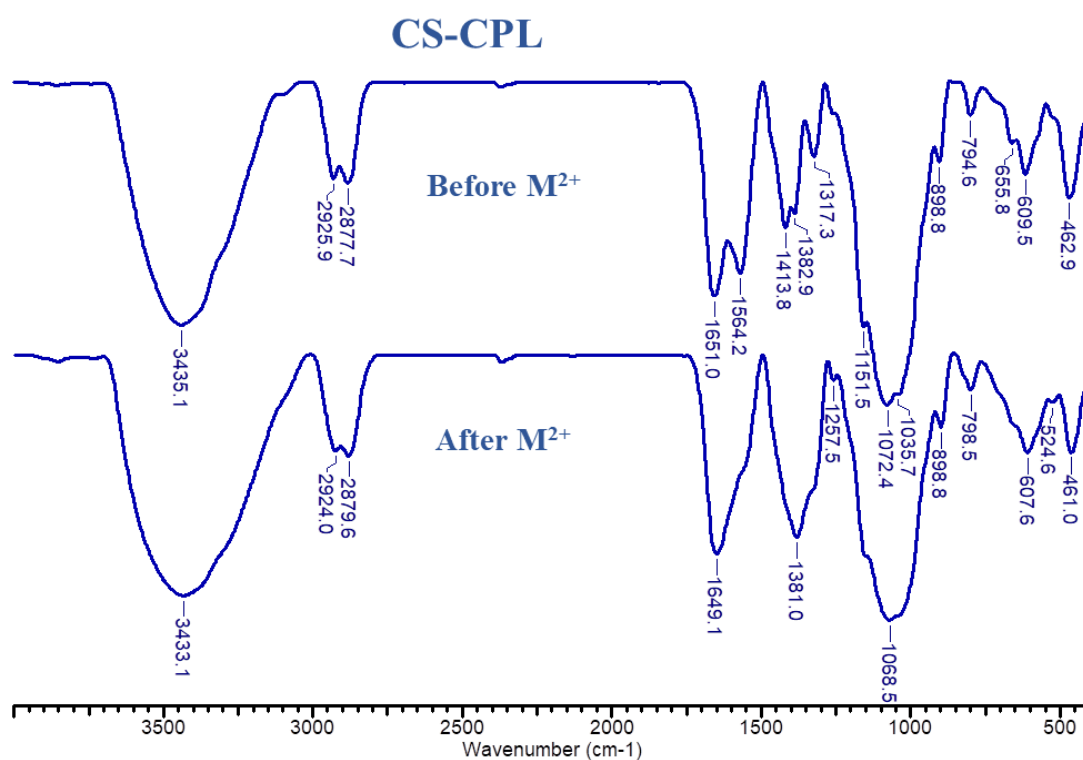


Figure S1. FT-IR spectra of CS-CPL composites before and after interaction with HMIs.

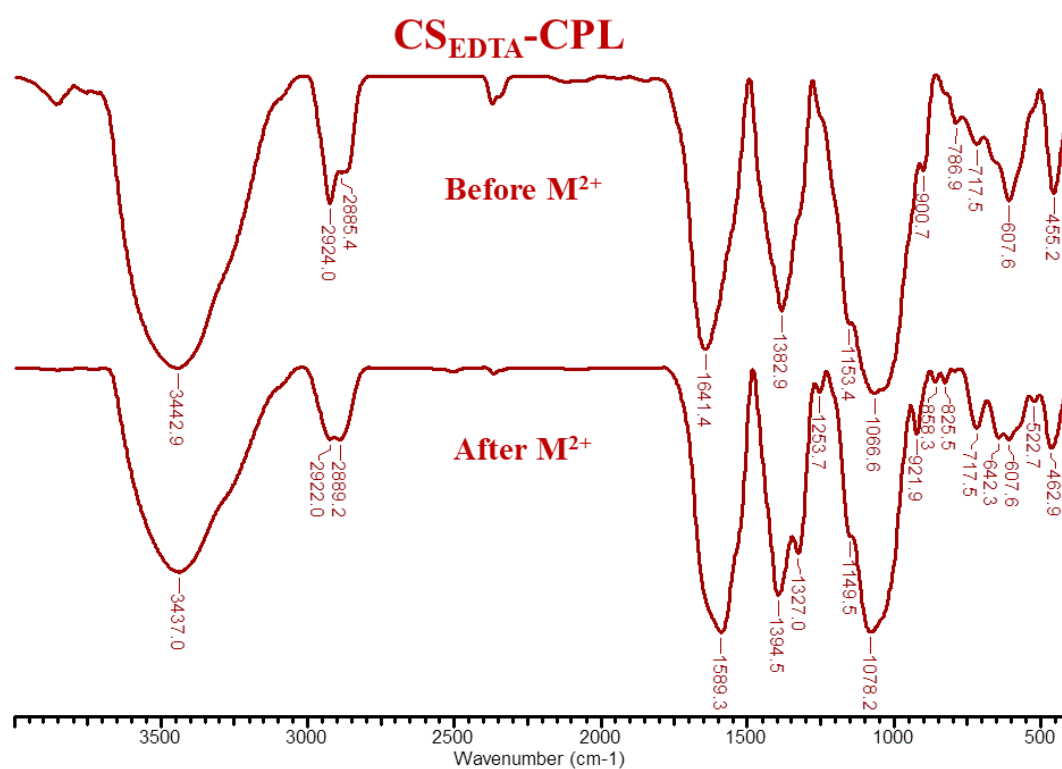


Figure S2. FT-IR spectra of CS_{EDTA}-CPL composites before and after interaction with HMIs.

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