Table S1. Adsorption kinetic models, equations and parameters for single and binary metal systems.

Models	Equations	Parameters
pseudo-first-order	$q_t = q_e\left(1-e^{-k_1 t}\right)$	q_e (mg g^{-1}) is the adsorption amounts of metal ion by E–CMBC at equilibrium, and q_t (mg g^{-1}) is the adsorption amounts of metal ion at time t (min); the parameters k_1 (min^{-1}), k_2 (g mg^{-1} min^{-1}), and k_3 (min^{-1}) are the adsorption rate constants, respectively.
pseudo-second-order	$q_t = \frac{k_2 q_e^{\,2} t}{1+k_2 q_e t}$	
Avrami fractional-order	$q_t = q_e\left[1-e^{-(k_3 t)^n}\right]$	

Table S2. Adsorption isotherm models, equations and parameters for single and binary metal systems.

Models	Equations	Parameters
Langmuir	$q_e = \frac{q_m K_L c_e}{1+K_L c_e}$	q_e (mg g^{-1}) is the adsorption capacity at equilibrium, q_m (mg g^{-1}) is the maximum adsorption capacity, c_0 (mg L^{-1}) is the initial concentration, and c_e (mg L^{-1}) is the concentration at equilibrium. K_L (L mg^{-1}) is the Langmuir constant related to the affinity of the binding sites, K_F is the Freundlich constant related to sorption capacity, n is the empirical parameter.
Freundlich	$q_e = K_F \mathrm{c_e}^{1/n}$	

Table S3. Adsorption kinetic model parameters for Cd^{2+}, Cu^{2+} and Ni^{2+} on E–CMBC in binary–metal system.

system	pseudo-first-order		pseudo-second-order		Avrami fractional-order	
Cd^{2+}-Ni^{2+}						
	q_e (mg g^{-1})	31.80	q_e (mg g^{-1})	32.71	q_e (mg g^{-1})	33.43
Cd^{2+}	k_1 (min^{-1})	0.22	k_2 (g mg^{-1} min^{-1})	0.013	k_3 (min^{-1})	0.36
	R^2	0.74	R^2	0.94	R^2	0.99
	q_e (mg g^{-1})	25.74	q_e (mg g^{-1})	26.52	q_e (mg g^{-1})	26.64
Ni^{2+}	k_1 (min^{-1})	0.19	k_2 (g mg^{-1} min^{-1})	0.013	k_3 (min^{-1})	0.24
	R^2	0.86	R^2	0.97	R^2	0.96
Cu^{2+}-Ni^{2+}						
	q_e (mg g^{-1})	29.4	q_e (mg g^{-1})	29.96	q_e (mg g^{-1})	30.34
Cu^{2+}	k_1 (min^{-1})	0.33	k_2 (g mg^{-1} min^{-1})	0.027	k_3 (min^{-1})	1.51
	R^2	0.59	R^2	0.92	R^2	0.98
	q_e (mg g^{-1})	17.76	q_e (mg g^{-1})	17.94	q_e (mg g^{-1})	18.07
Ni^{2+}	k_1 (min^{-1})	0.43	k_2 (g mg^{-1} min^{-1})	0.086	k_3 (min^{-1})	9.59
	R^2	0.79	R^2	0.90	R^2	0.88
Cu^{2+}-Cd^{2+}						
	q_e (mg g^{-1})	43.24	q_e (mg g^{-1})	45.05	q_e (mg g^{-1})	46.25
Cu^{2+}	k_1 (min^{-1})	0.14	k_2 (g mg^{-1} min^{-1})	0.005	k_3 (min^{-1})	0.12
	R^2	0.75	R^2	0.94	R^2	0.98

Table S4. Adsorption isotherm model parameters for Cd^{2+} and Ni^{2+} on E–CMBC in Cd^{2+}–Ni^{2+} system.

system	Langmuir model			Freundlich model		
	q_m (mg g^{-1})	K_L (L mg^{-1})	R^2	q_m (mg g^{-1})	K_L (L mg^{-1})	R^2
Cd^{2+}-Ni^{2+}						
Cd^{2+}	32.63	12.56	0.94	21.45	0.11	0.85
Ni^{+2}	26.93	39.39	0.96	19.90	0.074	0.78