Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

Title: **Spontaneous Nanoparticle Formation coupled with Selective Adsorption in Magadiite**

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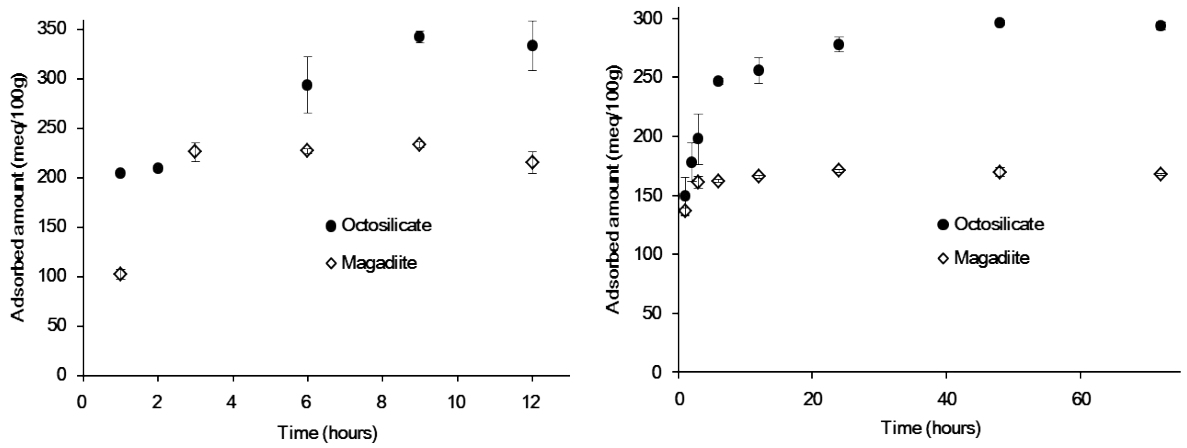


a) Cu^{2+} isotherms b) Pb^{2+} isotherms

Figure S1. Adsorption isotherms of magadiite and octosilciate with reaction times at an initial metal concentration of 1 mM in 1.0 wt% NaCl solution.

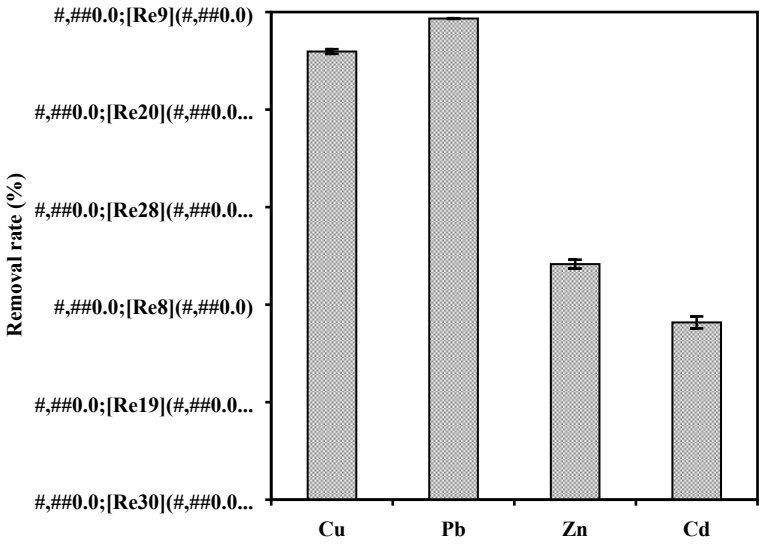
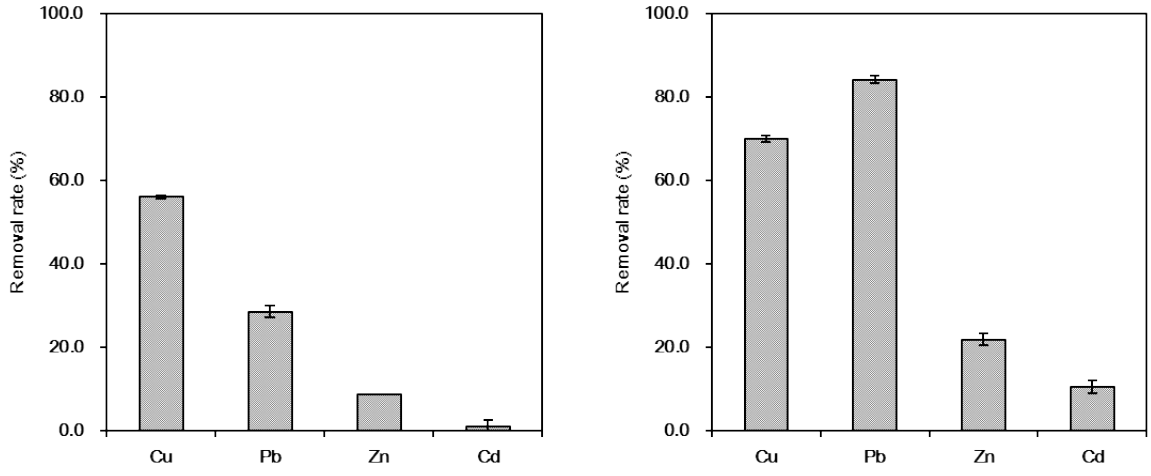
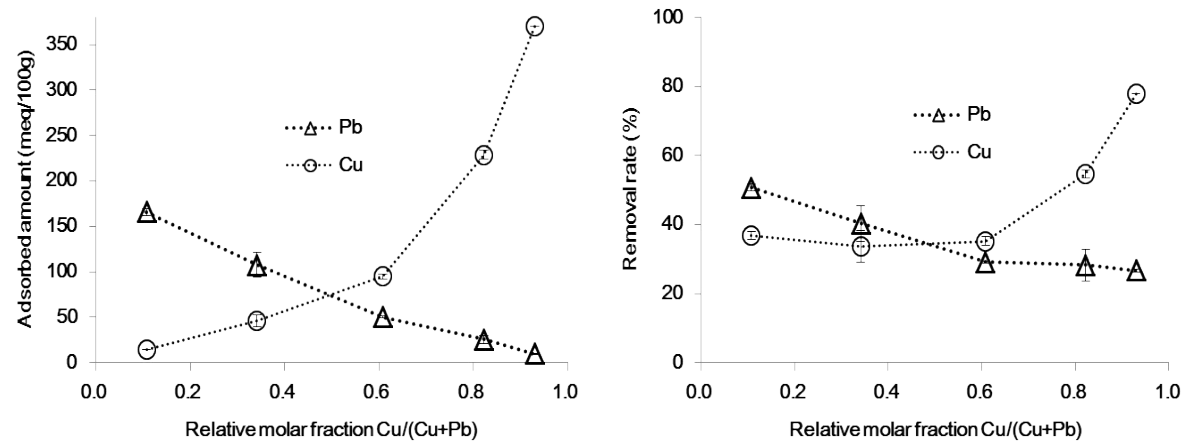


Figure S2. Adsorption performances of magadiite from the aqueous quaternary Cu-Cd-Zn-Pb solution at each metal cation concentration of 0.25 mM.

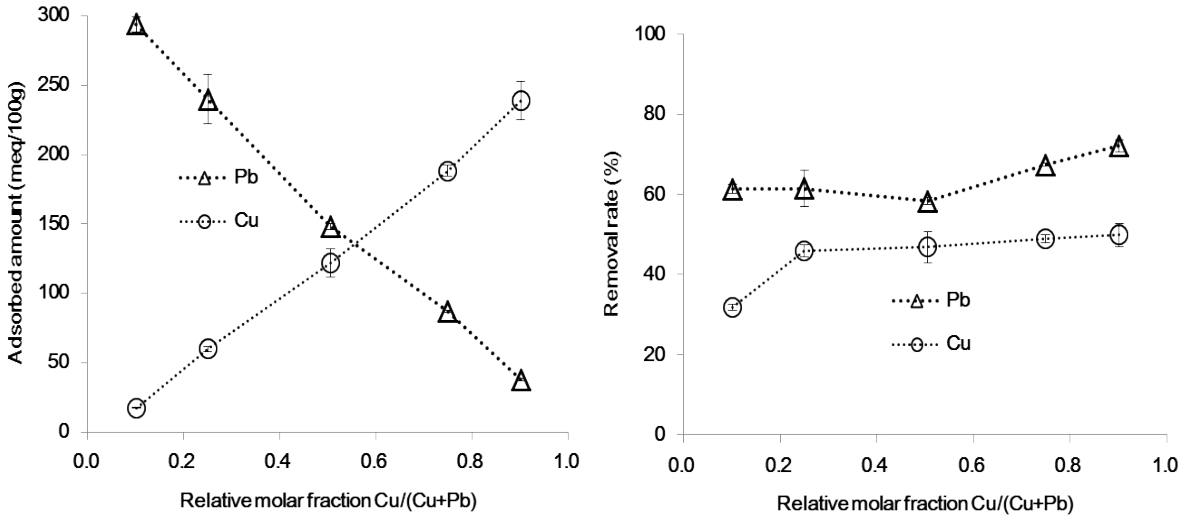


a) 1.0 wt% NaCl solution (b) aqueous soultion

Figure S3. Adsorption performances of octosilicate from the quaternary Cu-Cd-Zn-Pb solutions at each metal cation concentration of 0.25 mM.

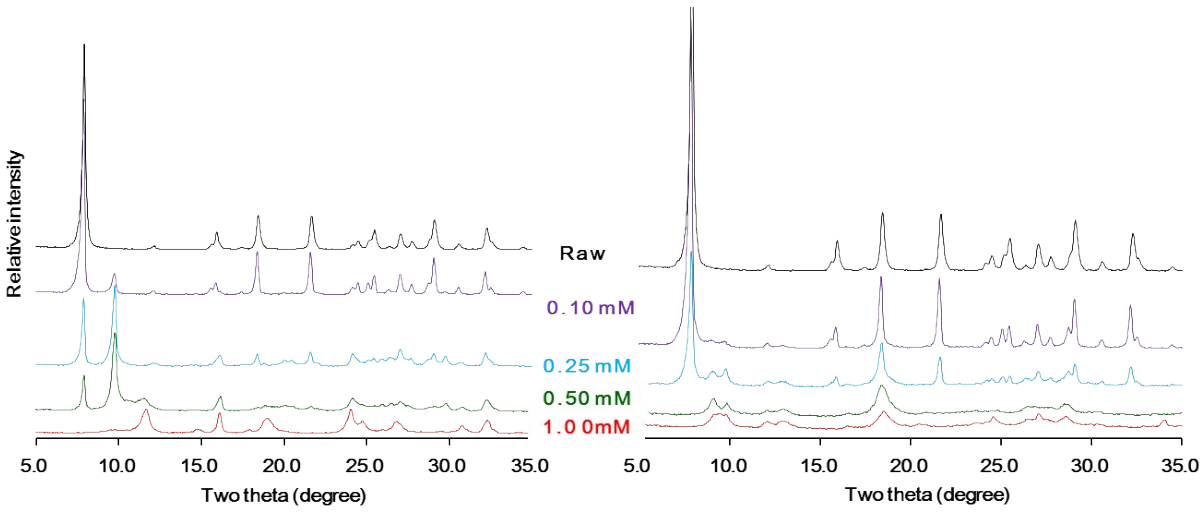


a) In NaCl solution



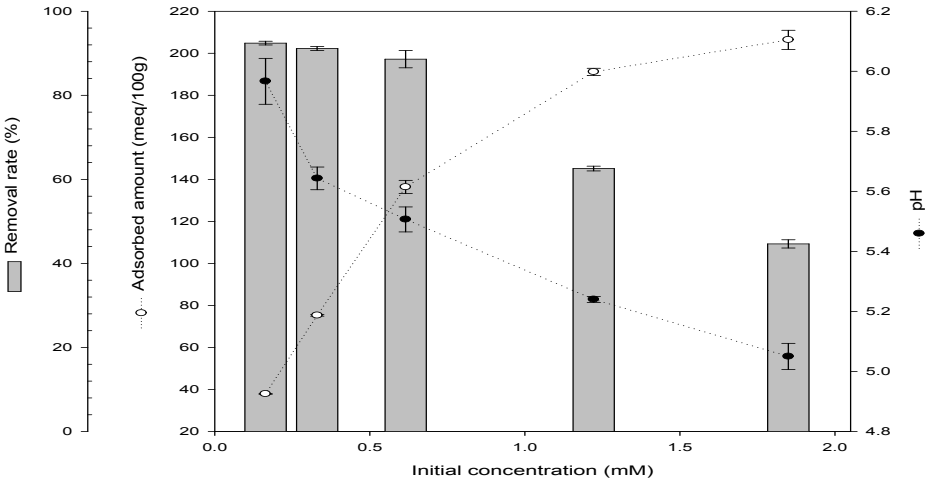
b) In aqueous solution

Figure S4. Competitive adsorption of octosilicate for Cu^{2+} and Pb^{2+} with different relative concentration ratios at a total metal cation concentration of 1.0 mM.

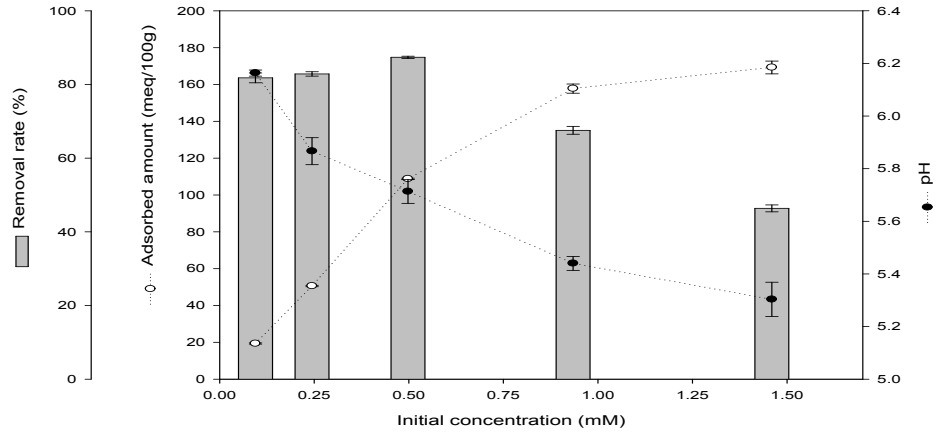


a) Treated with Cu^{2+} solutions b) Treated with Pb^{2+} solutions

Figure S5. Changes in XRD pattern of octosilicate treated with different concentrations of Cu^{2+} and Pb^{2+} for 6 hours in 1.0 wt% NaCl solutions, respectively.



a) Cu^{2+} adsorption



b) Pb^{2+} adsorption

c) Langmiur and Freundlich isotherm constants

	Langmuir			Freundlich		
	Q_{max} (mg/g)	K_L (L/mg)	r^2	K_F (mg/g)(L/mg)$^{1/n}$	1/n	r^2
Cu^{2+}	68.9655	0.2953	0.9997	17.6035	0.3589	0.8711
Pb^{2+}	200.0000	0.0475	0.9832	16.0563	0.5296	0.8016

Langmuir $\frac{C_e}{q_e} = \frac{1}{q_m K_L} + \frac{C_e}{q_m}$

q_e : the amount adsorbed at equilibrium (mg/g)
C_e : Equilibrium concentration of metal ions in solution (mg/L)
q_m, K_L : Langmuir constants

Freundlich $\ln q_e = \ln K_F + \frac{1}{n} \ln C_e$

q_e : the amount adsorbed at equilibrium (mg/g)
C_e : Equilibrium concentration of metal ions in solution (mg/L)
n, K_F : Langmuir constants

Figure S6. Adsorption isotherms of magadiite treated with different Cu^{2+} and Pb^{2+} concentrations for 6 hours in 1.0 wt% NaCl solutions, respectively.

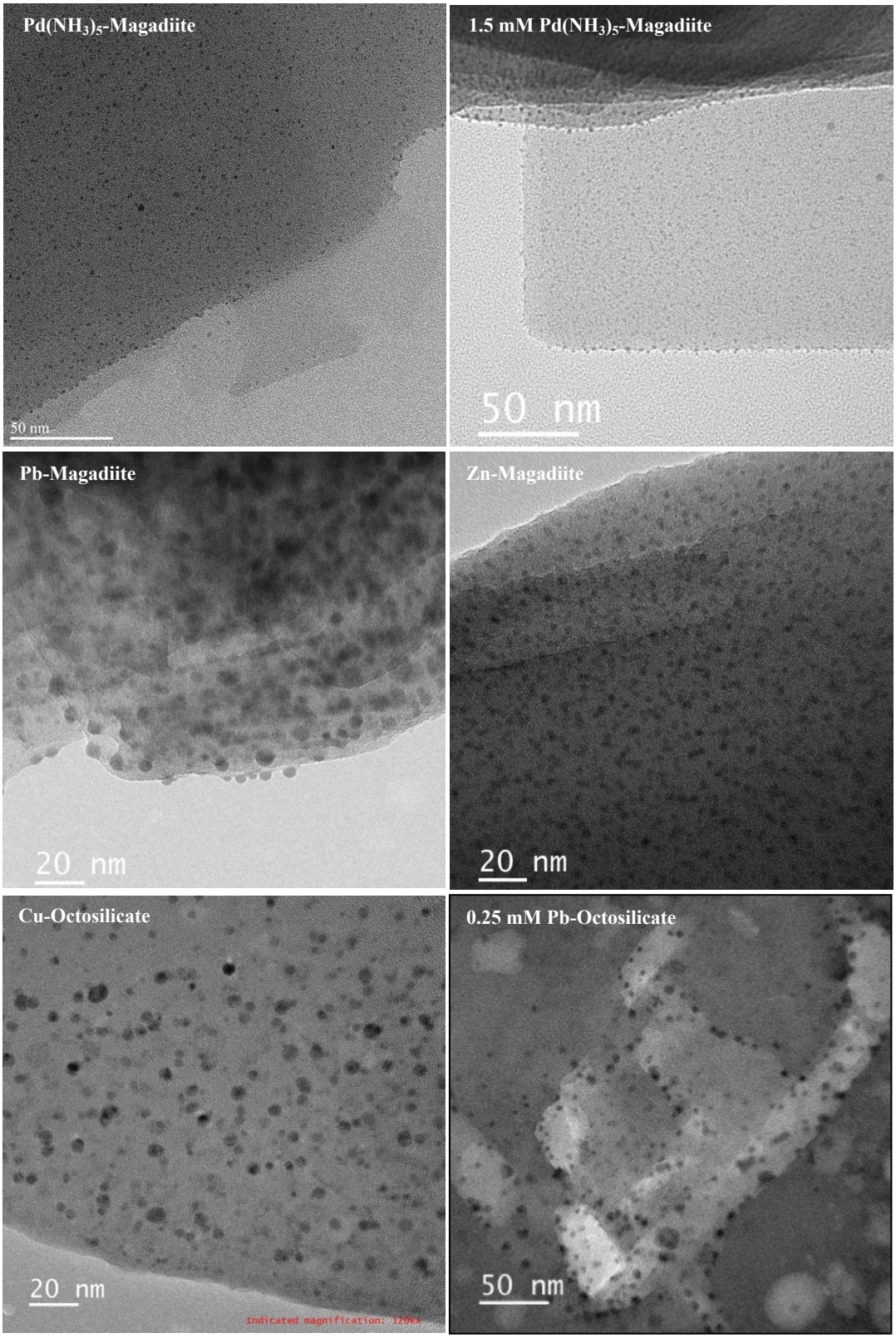


Figure S7. Various nanoparticles formed from the treatments with 1mM metal cation solutions unless specified. Magadiite was treated for 6 hours and octosilicate for 12 hours, respectively. The nanoparticle phases were identified by both XRD patterns and lattice images (not shown).