

Supporting Information for

Competitive adsorption mechanisms of Cd(II), Cu(II) and Pb(II) on bioinspired mesoporous silica revealed by complementary adsorption/isothermal titration calorimetry studies

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I. **Speciation diagrams of Cd(II), Cu(II) and Pb(II) in the experimental conditions**

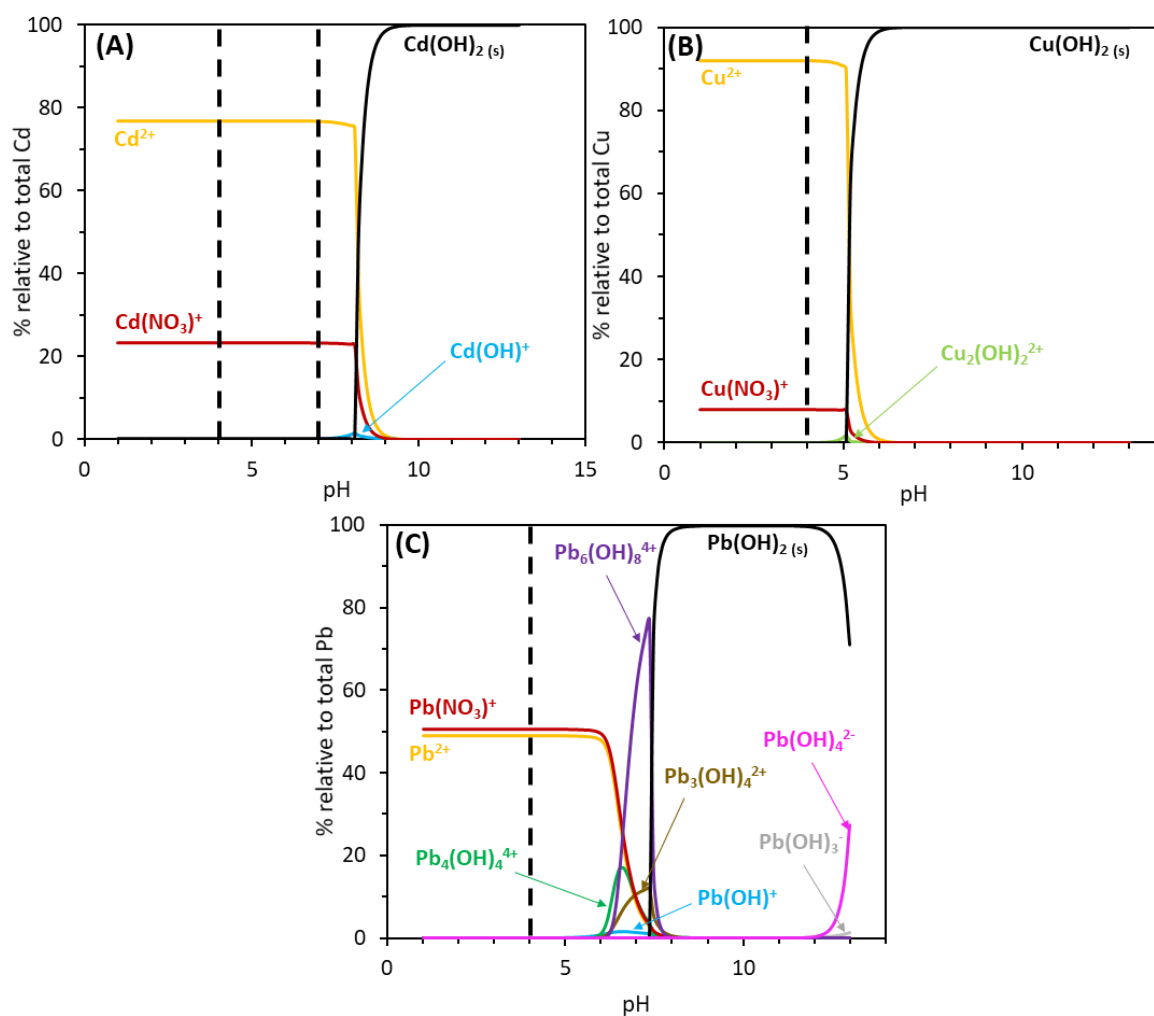


Figure S1 : Speciation diagrams of Cd(II) (A), Cu(II) (B) and Pb(II) (C) ($[\text{M}(\text{II})] = 20 \text{ mM}$; $[\text{NO}_3^-] = [\text{Na}^+] = 0.1 \text{ M}$; $[\text{total carbonates}] = 1 \times 10^{-5} \text{ M}$; only the compounds representing at least 1% of total M(II) appear). Dashed lines are visual indicators of the pH values (4 or 7) used in this study.

II. Adsorption isotherms for Cd(II), Cu(II) and Pb(II) on raw SBA-15

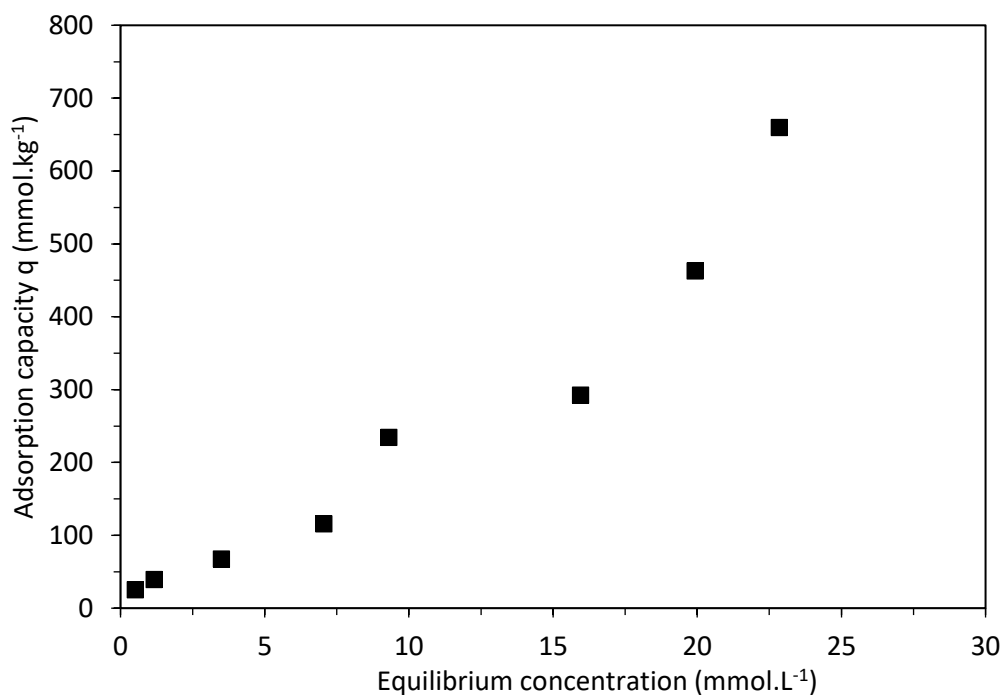


Figure S2 - Adsorption isotherms of Cd(II) on SBA-15 ($C_0 = 0.8$ to 27 mmol_{Cd}.L⁻¹; 10 g.L⁻¹ SBA-15; media: 0.1 M NaNO₃; stirring speed: 500 rpm; 25 ± 1 °C; contact time: 120 min; pH: 7). Experimental error: 6% .

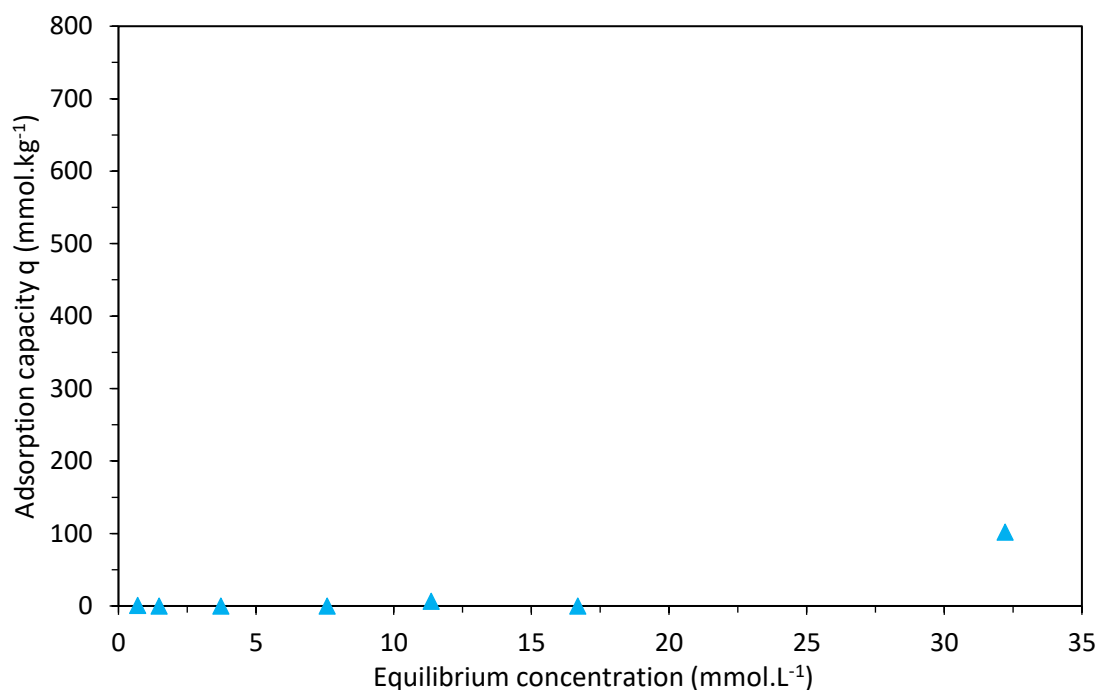


Figure S3 - Adsorption isotherms of Cu(II) on SBA-15 ($C_0 = 0.7$ to 33 mmol_{Cu}.L⁻¹; 10 g.L⁻¹ SBA-15; media: 0.1 M NaNO₃; stirring speed: 500 rpm; 25 ± 1 °C; contact time: 120 min; pH: 4). Experimental error: 4% .

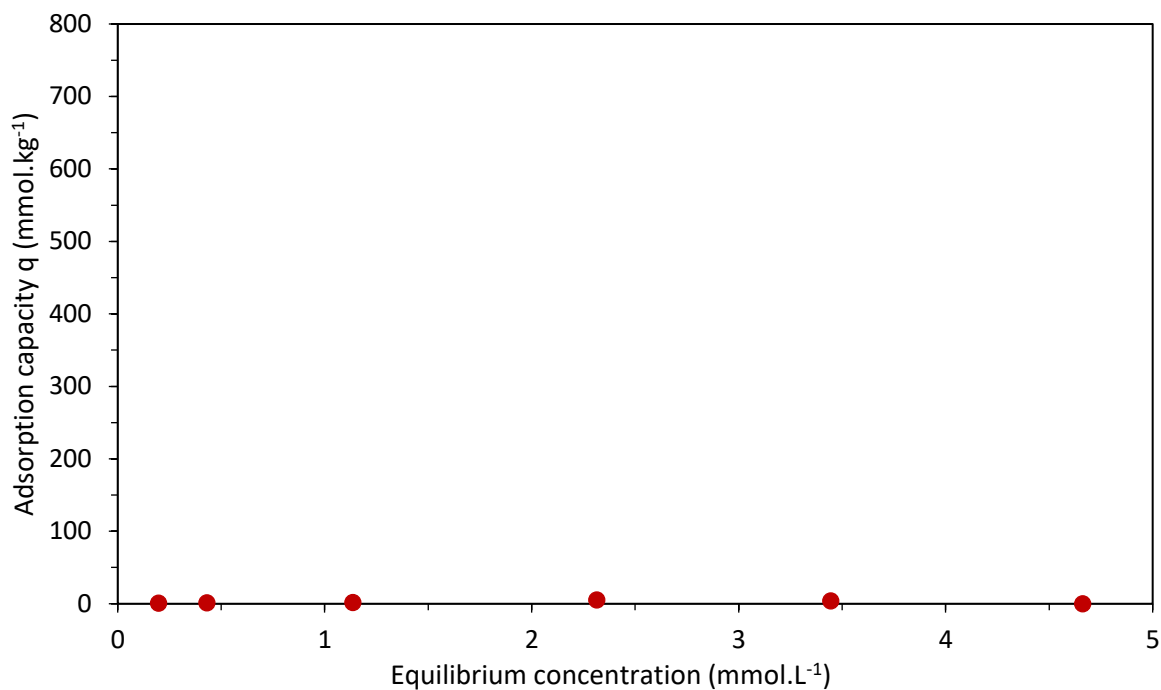


Figure S4: Adsorption isotherms of Pb(II) on SBA-15 ($C_0 = 0.2$ to $6 \text{ mmol}_{\text{pb}}.\text{L}^{-1}$; $10 \text{ g}.\text{L}^{-1}$ SBA-15; media: 0.1 M NaNO_3 ; stirring speed: 500 rpm ; $25 \pm 1 \text{ }^\circ\text{C}$; contact time: 120 min ; $\text{pH} : 4$). Experimental error: 4%.

III. Kinetics of Cu(II) and Pb(II) adsorption on SBA-GSH at pH 4

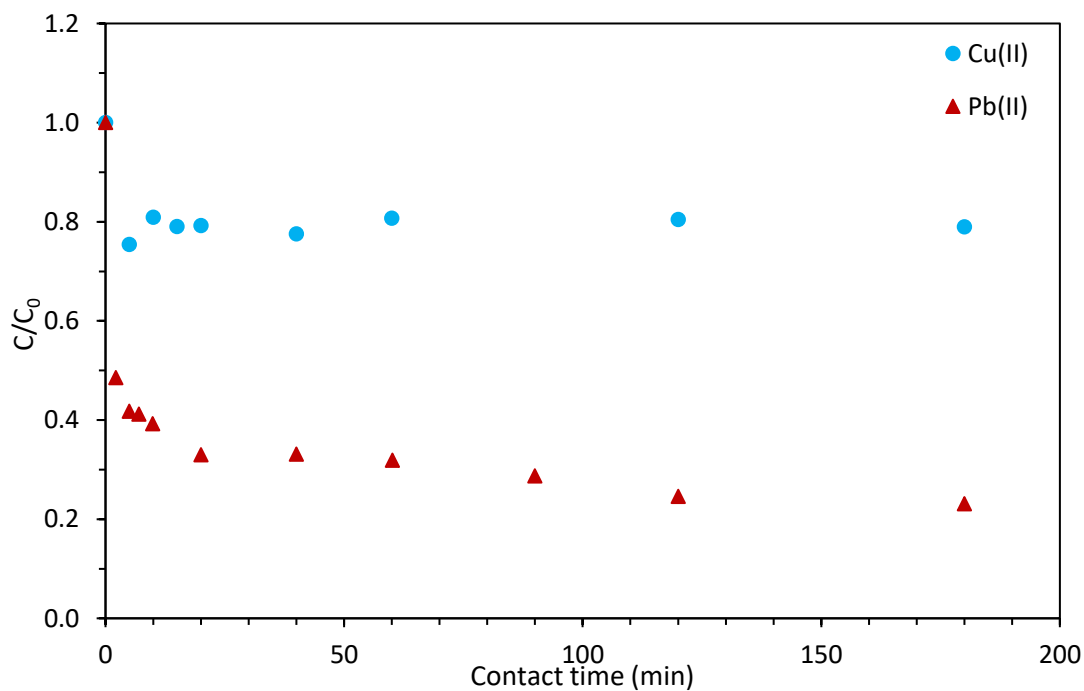


Figure S5: Cu(II) and Pb(II) adsorption kinetics on SBA-GSH ($C_0 = 8 \text{ mmol}.\text{L}^{-1}$; $10 \text{ g}.\text{L}^{-1}$ SBA-GSH; media: 0.1 M NaNO_3 ; stirring speed: 500 rpm ; $25 \pm 1 \text{ }^\circ\text{C}$; $\text{pH} : 4$). Experimental error: 4%. Data for Cd(II) can be found in reference [40]

IV. Adsorption isotherm for Cd(II) on SBA-GSH at pH = 4

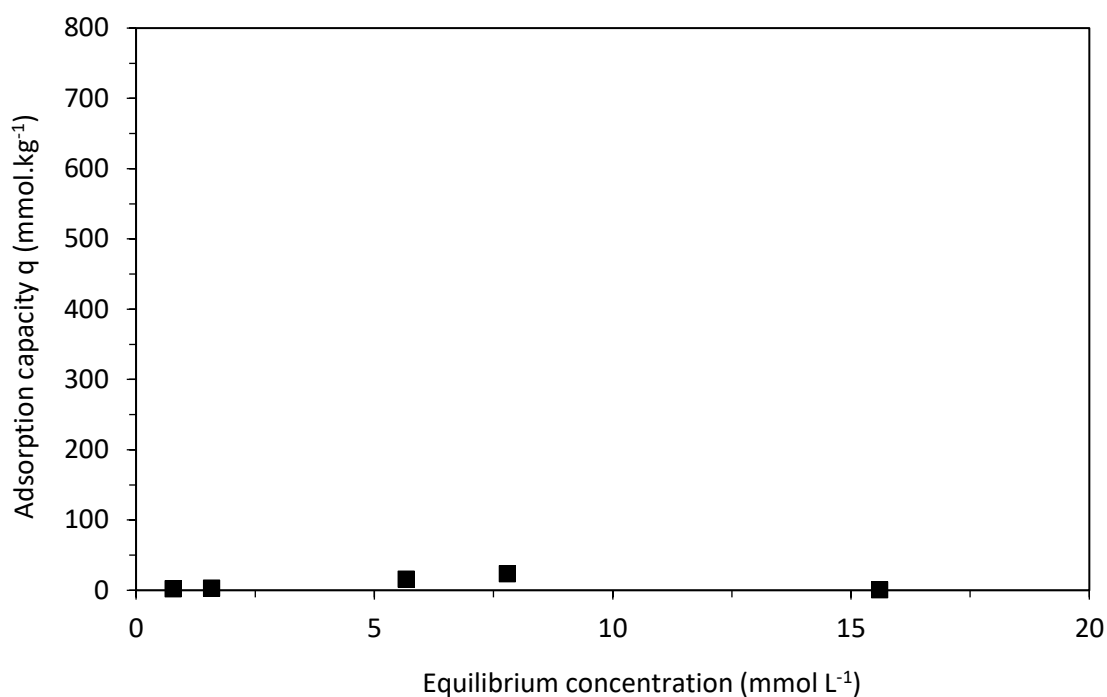


Figure S6: Adsorption isotherms of Cd(II) on SBA-GSH ($C_0 = 0.8$ to $16 \text{ mmol}_{\text{Cd}}.\text{L}^{-1}$; $10 \text{ g}.\text{L}^{-1}$ SBA-GSH; media: 0.1 M NaNO_3 ; stirring speed: 500 rpm ; $25 \pm 1 \text{ }^\circ\text{C}$; contact time: 120 min ; pH: 4). Experimental error: 3%.

V. Control experiment: dilution of the 0.1 M NaNO_3 solvent into a suspension of SBA-GSH in 0.1 M NaNO_3

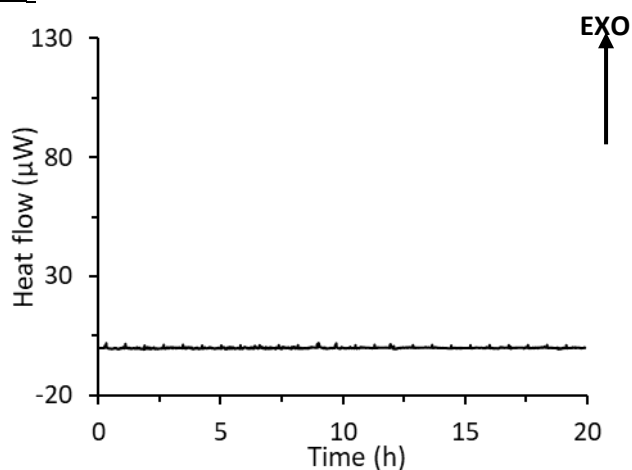


Figure S7: Thermal profile for 0.1 M NaNO_3 dilution into a suspension of SBA-GSH (25°C ; 25 injections of $10 \mu\text{L}$; media: 0.1 M NaNO_3 ; glass ampoule with a $10 \text{ g}.\text{L}^{-1}$ suspension). EXO defines the direction of exothermic signal.

VI. Variations of the cumulative enthalpy of dilution for single-metal and two-metal systems

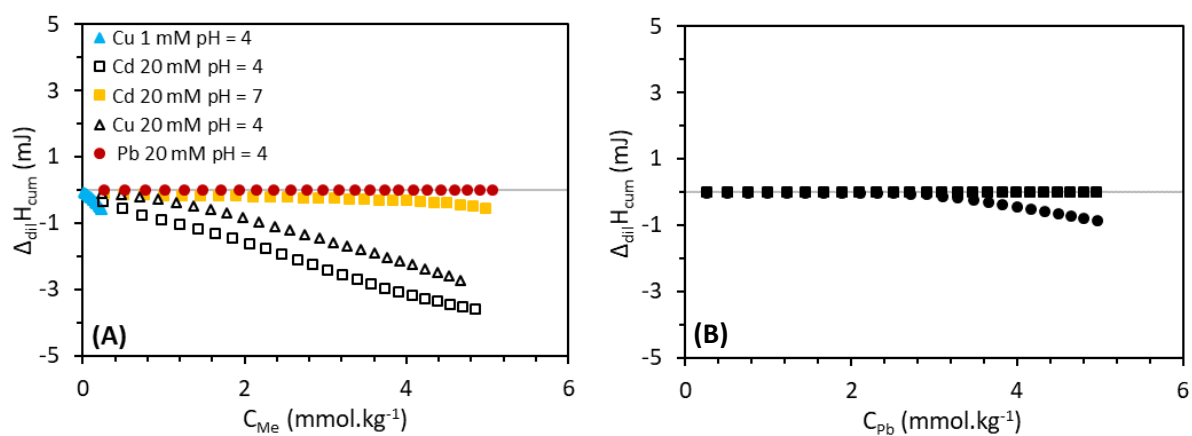


Figure S8: Variations of the cumulative enthalpy of dilution for single-metal (A) and two-metal (B) systems (25°C; 25 injections of 10 μL ; media : 0.1 M NaNO_3 ; glass ampoule with 0.1 M NaNO_3).