Supplementary information.

LDH-NPs characterization.

Table 1. Elemental analysis and chemical formulae of the LDH nanoparticles.

Sample	%Mg	%Al	Mg/Al	% H_2O[1]	% total[2]	Chemical Formula
LDH-Cl	20.3	9.8	2.3	13.7	44.8	$Mg_{0.70}Al_{0.30}(OH)_2Cl_{0.30}\cdot 0.61\ H_2O$
LDH-CO_3	19.6	10.0	2.2	14.7	45.7	$Mg_{0.69}Al_{0.31}(OH)_2(CO_3)_{0.16}\cdot 0.66\ H_2O$
LDH-DS	9.8	5.5	2.2	7.6	63.6	$Mg_{0.67}Al_{0.33}(OH)_2DS_{0.35}\cdot 0.72$ H2O

Comment: The chemical analysis of the samples indicated that single Mg–Al–LDH phases were obtained in each case.

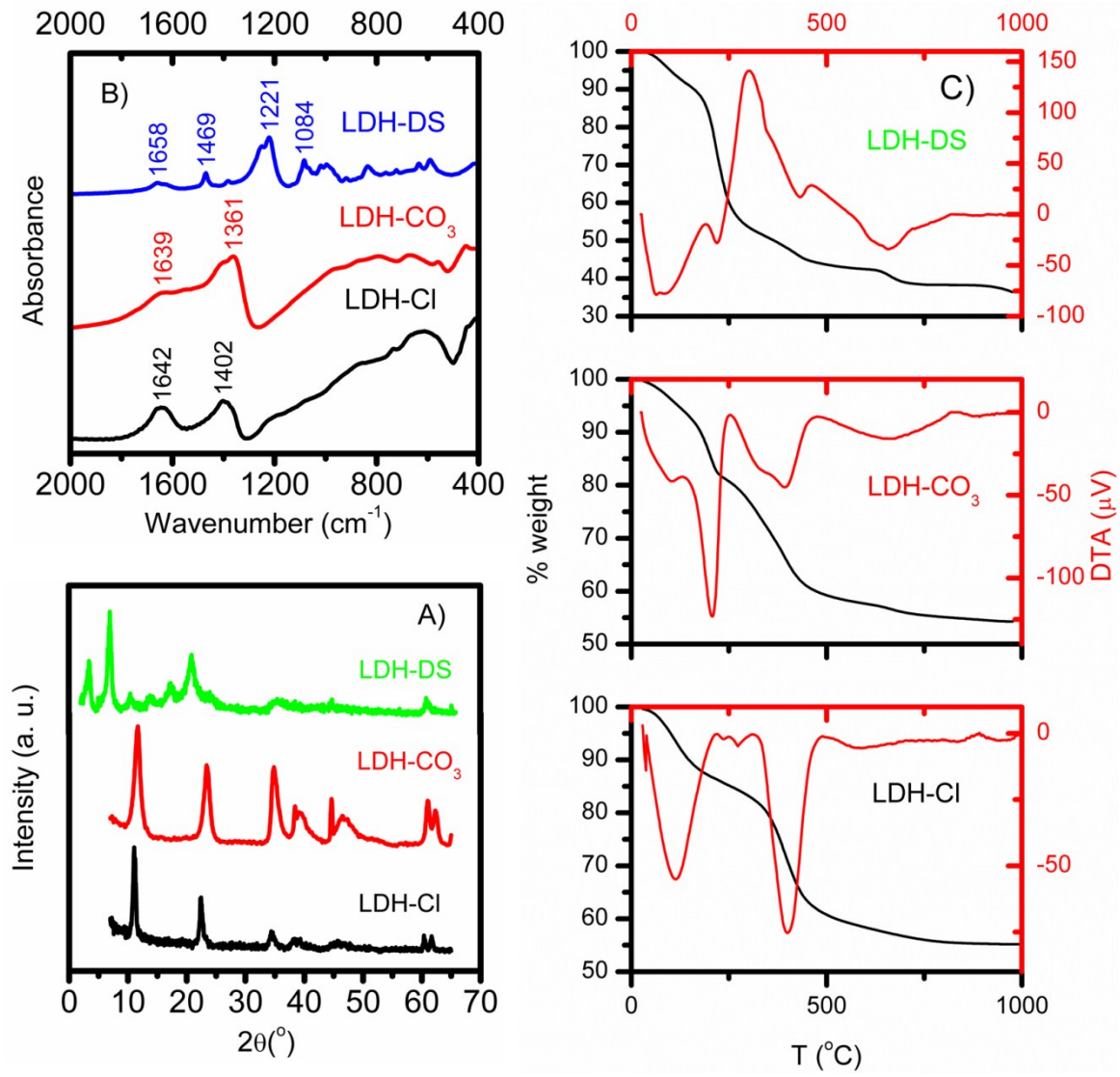

Figure S1: (Left) PXRD patterns (A) and FT-IR spectra (B) and (right) TG/DTA diagrams of LDH-Cl, LDH-CO_3 and LDH-DS samples.

Comment: PXRD patterns, FT-IR spectra and thermal analysis curves of the samples indicated the presence of pure LDH phases containing Cl^-, CO_3^{2-} and DS^- anions, respectively. The PXRD patterns portrayed typical LDH features; narrow and symmetric peaks at 2θ below 30º, and broad and asymmetric ones above this value. These peaks were indexed in a rhombohedral lattice and the *c* parameters obtained (24.0, 22.7 and 76.1 Å for LDH-Cl, LDH- CO_3 and LDH-DS, respectively). The FT-IR spectra of the solids presented bands corresponding to the hydroxilated layers (below 1000 cm^{-1}) and interlayer water (between 1639 and 1658 cm^{-1},

respectively). Thus, LDH-CO_3 spectra showed a band at 1361 cm^{-1}, which was assigned to the antisymmetrical stretching mode υ_3 *(E')* of the free carbonate anion. Finally, LDH-DS presented bands corresponding to CH bending (1469 cm^{-1}), SO_3^- antisymmetric and symmetric stretching (1221 cm^{-1} and 1084 cm^{-1}, respectively) and C-S stretching (634 cm^{-1}) vibrations.

Colloidal stability of LDH-NPs in biological fluids.

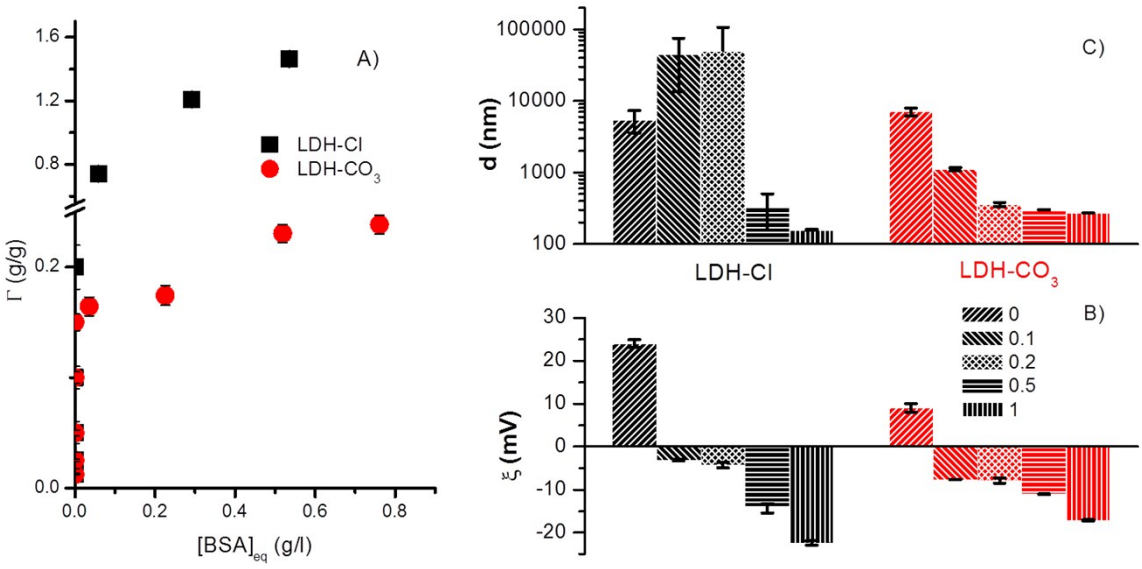

Figure S2: The effect of the adsorbed amount (Γ) of albumin on the colloidal stability in physiological solution determined from ζ potential and hydrodynamic diameter (d) of LDH-NPs intercalated with different anions: (black) Cl^- (LDH-Cl) and (red) CO_3^{2-} (LDH-CO_3) at different degrees of surface coverage (Γ/Γ_{max}).

Reactivity of LDH-NPs in biological fluids.

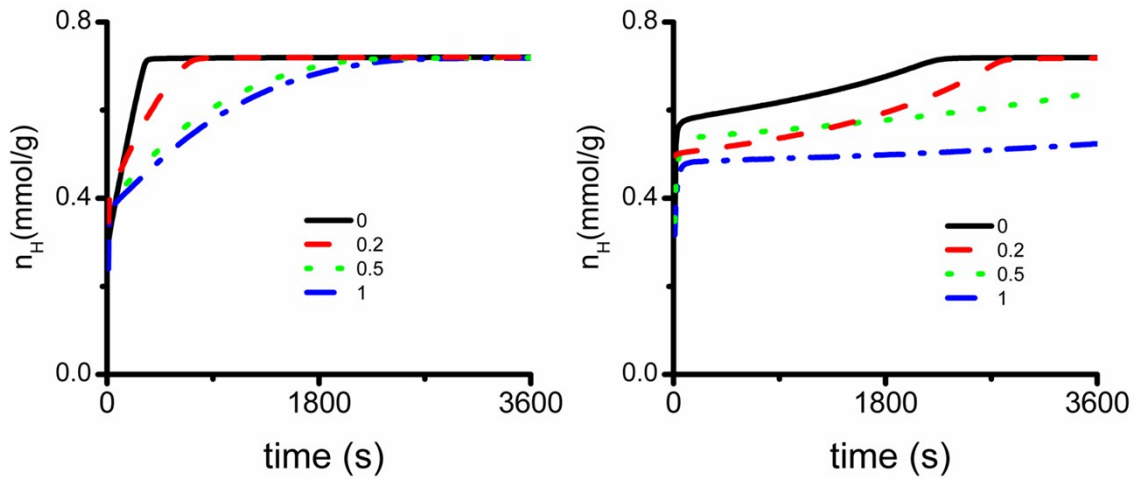

Figure S3: The effect of Γ/Γ_{max} on the reactivity determined from acid dissolution experiments of LDH-NPs intercalated with (left) Cl^- (LDH-Cl) or (right) CO_3^{2-} (LDH-CO_3) immersed in 5 mM NaCl pH 9.0 (0.250 g/L) at different Γ/Γ_{max}: (black) 0.0, (red) 0.2, (green) 0.5 and (blue) 1.0. The results are expressed as the amount of consumed H^+ (n_H) as a function of time