Electronic Supplementary Material (ESI) for Inorganic Chemistry Frontiers.

Supporting Information:

Direct Molecular Confinement in Layered Double Hydroxides: From Fundamentals to Advanced Photo-luminescent Hybrid Materials

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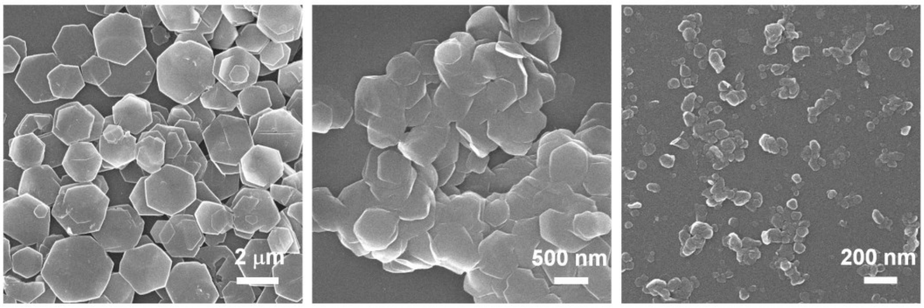

Fig. S1 The SEM images of as-prepared Mg_2Al-L (left), Mg_2Al-M (mid), and Mg_2Al-S (right).

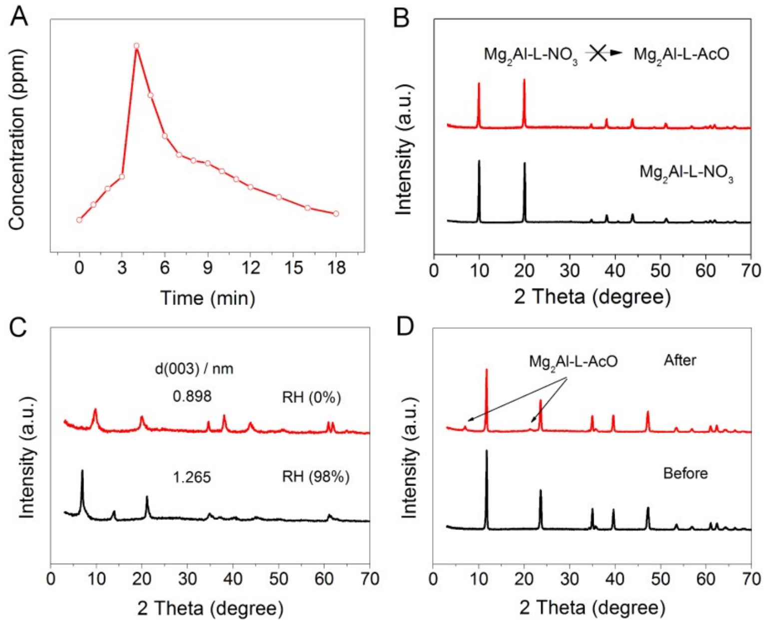

Fig. S2 A) The concentration curve of CO_2 during acetates intercalation reaction, B) the powder XRD patterns of Mg_2Al-L-NO_3 before and after reaction, C) the powder XRD patterns of Mg_2Al-L-AcO at different relative humidity (RH), and D) the powder XRD patterns of Mg_2Al-L before and after reaction in water.

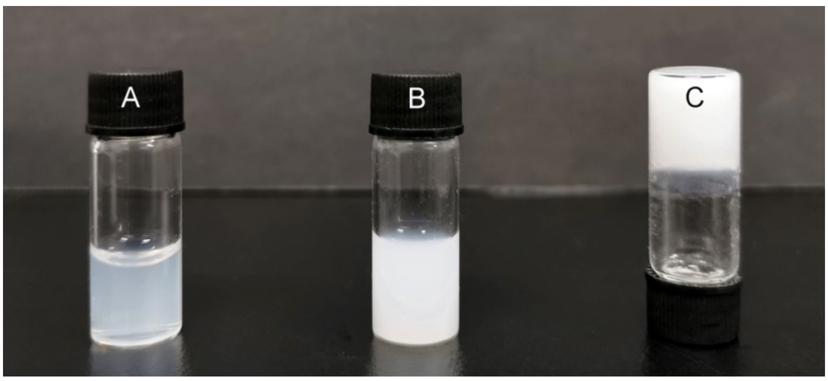

Fig. S3 The photographs of Mg_2Al-M-AcO in water at different concentrations: A) c = 1 mg mL^{-1}, B) c = 10 mg mL^{-1}, and C) c = 20 mg mL^{-1}.

Table S1. The experimental parameters and yields of the intercalation reactions.

	LDHs	Organic acid	pKa	*n* (mmol)	*V* or *m*	Yield	
The direct method	Mg_2Al-L	Acetic acid	4.76	2.463	141 µL	103 mg	92.03 %
	Mg_2Al-M			1.231	71 µL	94 mg	83.54 %
	Mg_2Al-S			1.026	59 µL	88 mg	78.62 %
	Zn_2Al-L			1.642	78 µL	76 mg	52.19 %
	Ni_2Fe-L			3.284	188 µL	80 mg	52.63 %
	Co_2Al-L			1.642	78 µL	93 mg	66.27 %
	Tris-LDH			0.616	35 µL	96 mg	83.70 %
	Mg_2Al-L	Chloroacetic acid	2.86	2.463	147 µL	105 mg	83.29 %
		Dichloroacetic acid	1.30	2.463	203 µL	125 mg	89.16 %
		Propionic acid	4.87	3.284	245 µL	105 mg	89.22 %
		Acrylic acid	4.26	2.463	169 µL	98 mg	83.84 %
		p-Fluorobenzoic acid	4.14	2.873	403 mg	127 mg	87.71 %
		p-Toluic acid	4.35	2.873	391 mg	104 mg	72.64 %
		p-Nitrobenzoic acid	3.44	2.873	480 mg	120 mg	76.98 %
		p-Hydroxybenzoic acid	4.48	2.873	397 mg	100 mg	69.46 %
		p-phthalic acid	3.54	1.231	205 mg	106 mg	87.33 %
The stepwise method	Mg_2Al-L	Trichloroacetic acid	0.70	2.586	259 µL	134 mg	86.82 %
		Glycolic acid	3.83	2.586	197 mg	106 mg	89.79 %
		Lactic acid	3.86	3.284	245 µL	114 mg	91.98 %
		Oxalic acid	1.27	3.284	296 mg	92 mg	86.66 %
		Propanedioic acid	2.85	3.284	342 mg	97 mg	88.77 %
		Succinic Acid	4.19	3.284	388 mg	99 mg	88.10 %
		Benzoic Acid	4.20	3.284	401 mg	117 mg	85.15 %
		Methanesulfonic acid	-1.92	0.821	53 µL	110 mg	86.80 %
		Ethanesulfonic acid	-1.68	1.231	136 mg	70 mg	52.84 %
		Isethionic acid	-1.60	0.739	93 mg	111 mg	79.83 %
		2-Acrylamido-2-methyl-propane sulfonic acid	--	1.231	255 mg	140 mg	81.22 %
		p-Toluenesulfonic acid	-2.80	1.231	234 mg	124 mg	78.50 %
		1,2-Ethanedisulfonic acid	--	0.616	117 mg	100 mg	60.48 %
		1,5-Naphthalenedisulf-onic acid	--	1.642	473 mg	120 mg	58.36 %
		Methylenediphosphon-ic acid	--	0.739	130 mg	97 mg	78.61 %
		Phenylphosphonic acid	--	1.642	260 mg	110 mg	72.29 %
		TPE carboxylic acid	--	0.821	309 mg	185 mg	76.51 %

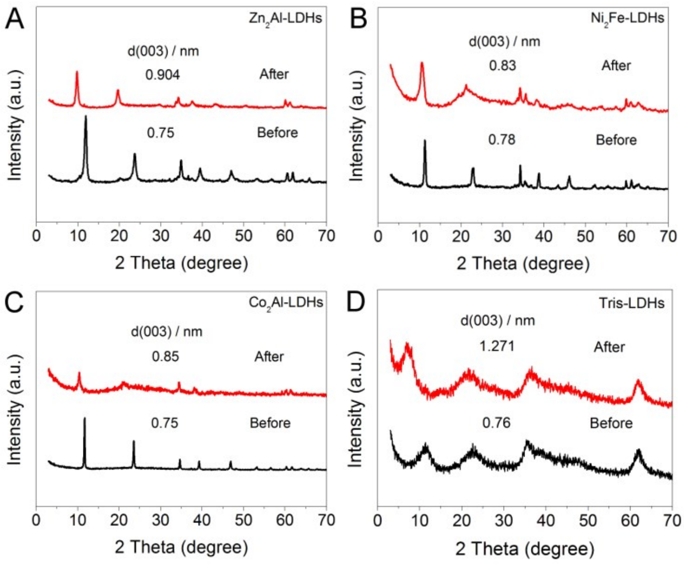

Fig. S4 The powder XRD of A) Zn_2Al-LDHs, B) Ni_2Fe-LDHs, C) Co_2Al-LDHs, and D) Tris-LDHs before and after acetate intercalation.

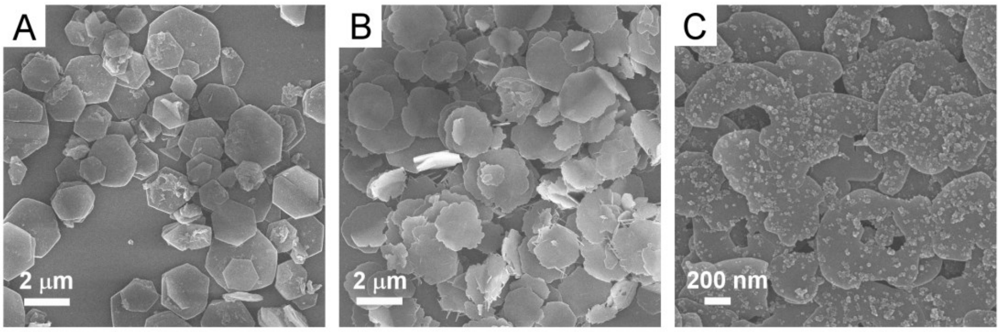

Fig. S5 The SEM images of A) Zn_2Al-LDHs, B) Ni_2Fe-LDHs, C) Co_2Al-LDHs after acetate intercalation.

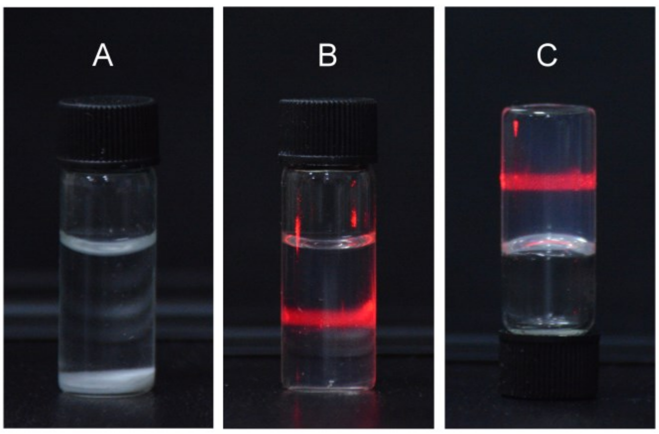

Fig. S6 The photographs of A) Tris-LDHs dispersed in water (*c*: 10 mg mL^{-1}), B) Tris-LDHs-AcO in water (*c*: 10 mg mL^{-1}), and C) the gel state of Tris-LDHs-AcO in water (*c*: 25 mg mL^{-1}).

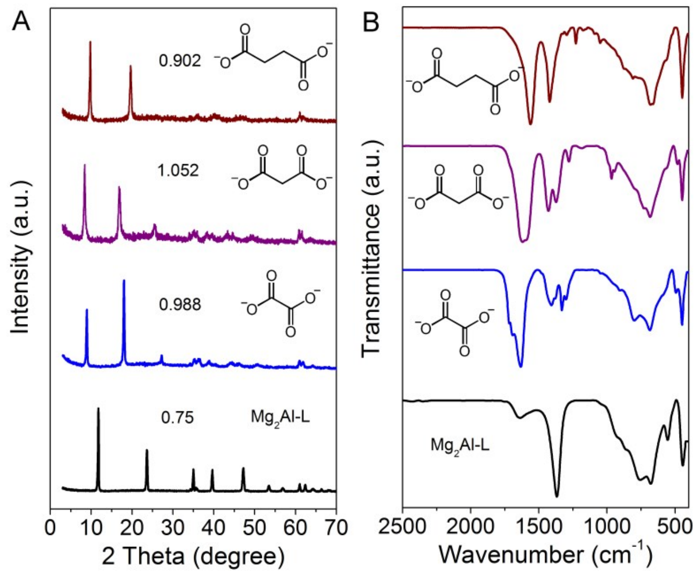

Fig. S7 A) The powder XRD and B) the FT-IR of Mg_2Al-L intercalated with different aliphatic dicarboxylates.

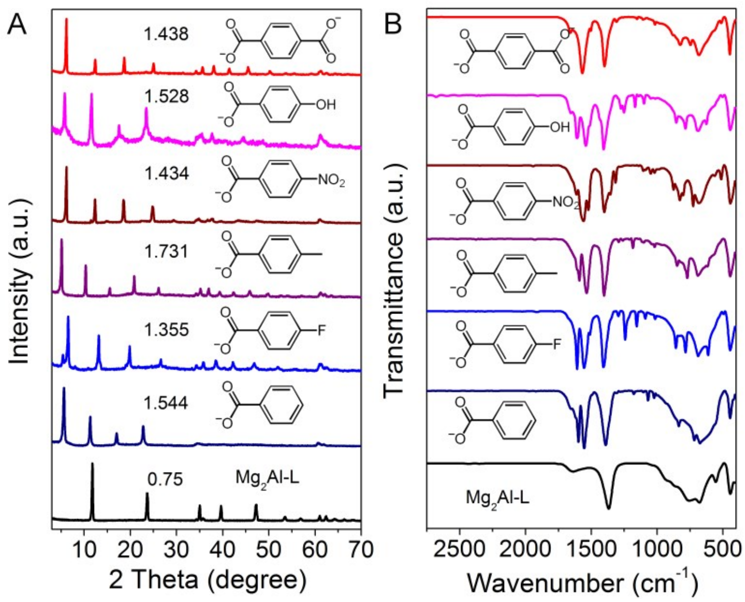

Fig. S8 A) The powder XRD and B) the FT-IR of Mg_2Al-L intercalated with different aromatic carboxylates.

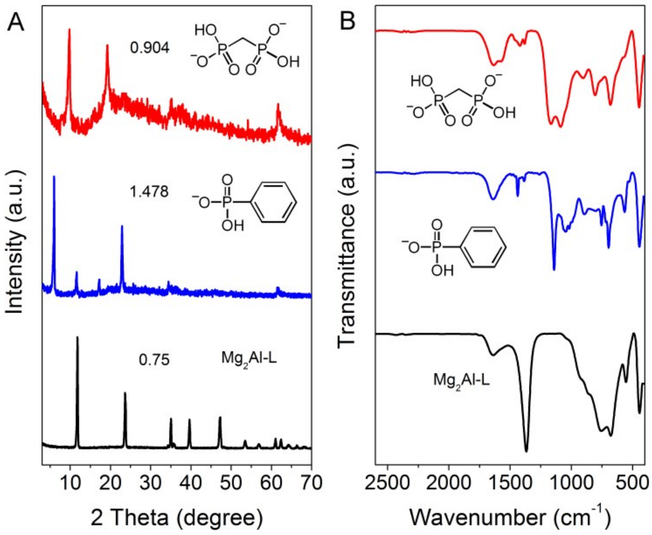

Fig. S9 A) The powder XRD and B) the FT-IR of Mg_2Al-L intercalated with different phosphonates.

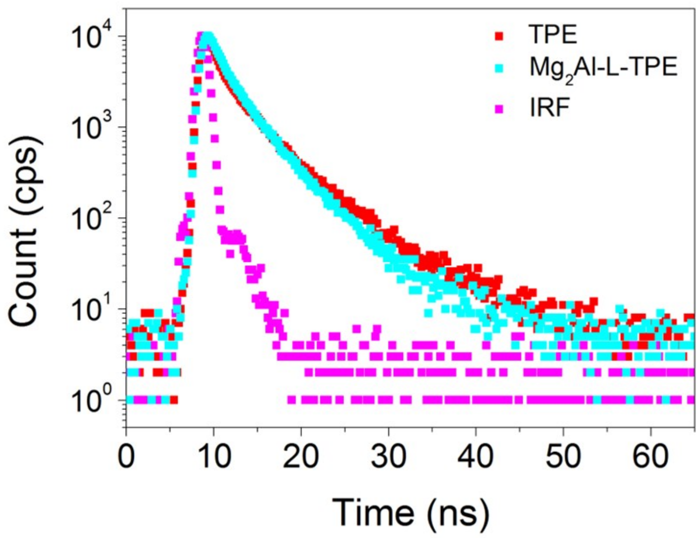

Fig. S10 The fluorescence decay curves of TPE carboxylates and the Mg_2Al-L-TPE hybrid, where the lifetime τ is obtained by fitting the equation $I_t = I_0 + B_1 \cdot \exp(-t/\tau_1) + B_2 \cdot \exp(-t/\tau_2)$, and $\tau = B_1 \cdot \tau_1^2 + B_2 \cdot \tau_2^2 / (B_1 \cdot \tau_1 + B_2 \cdot \tau_2)$.

Table S2. The fluorescence lift time and absolute quantum yield of TPE carboxylates and the Mg_2Al-L-TPE hybrid.

	Life time (ns)						Quantum yield (%)
	I_0	B_1	B_2	τ_1	τ_2	τ	
TPE carboxylates	1.804	0.239	0.046	1.42	5.41	3.10	16.88
Mg_2Al-L-TPE	2.017	0.183	0.047	1.72	4.68	2.94	23.72