Electronic Supplementary Information

Precise size control of layered double hydroxide nanoparticles through reconstruction using tripodal ligands

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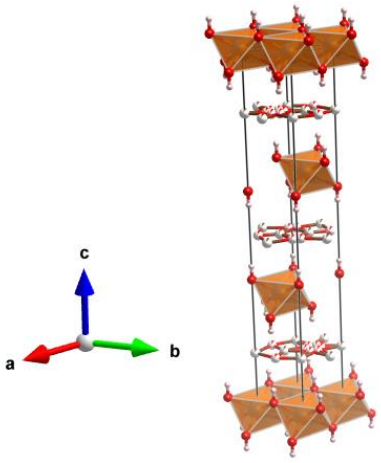
Theoretical Surface Area of an LDH sheet

Consider about an LDH sheet with unit cell size in lateral directions and the composition of $Mg_{0.667}Al_{0.333}(OH)_2 \cdot 0.167CO_3$. Interlayer water is ignored because BET surface area is measured for its dried state. The surface area on both top and bottom surfaces of a unit-cell-size sheet is $\sqrt{3}a^2 = 0.161 \times 10^{-18}$ m^2, where a = 0.305 nm. The mass of a unit-cell-size sheet is

$\{24.31 \times 0.667 + 26.98 \times 0.333 + 16.00 \times (2 + 0.167 \times 3) + 1.008 \times 2 + 12.01 \times 0.167\} / (6.02 \times 10^{23})$
$=11.50 \times 10^{-23}$ g.

The theoretical surface area is

$(0.161 \times 10^{-18}) / (11.50 \times 10^{-23}) = 1400$ m^2/g



Unit cell image of an LDH.

Table S1. FWHM of diffraction peaks of LDHNPs regrown in dilute THAM solutions.

[THAM]/M	FWHM of 003 peaks/deg	FWHM of 110 peaks/deg
as-synthesized	1.24	1.22
0.25	1.58	1.22
0.10	1.39	0.98
0	0.50	0.48

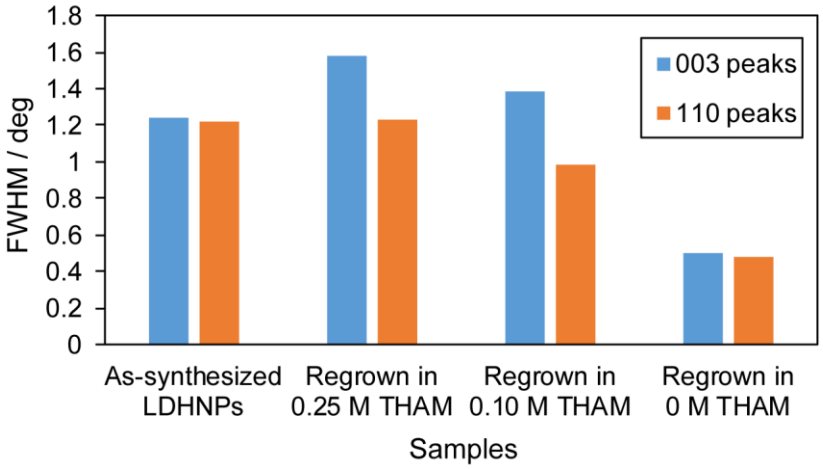


Fig. S1. FWHM of the diffraction peaks of LDHNPs regrown in dilute THAM solutions.

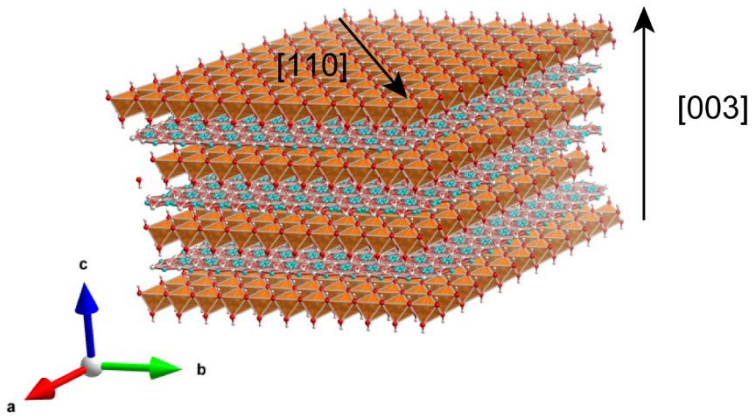


Fig. S2. Structural model of an LDH.

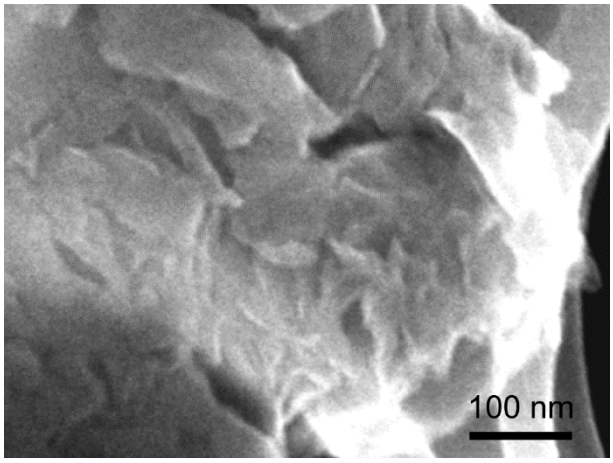


Fig. S3. SEM image of RLDH-1.0 without an ultrasonic treatment.

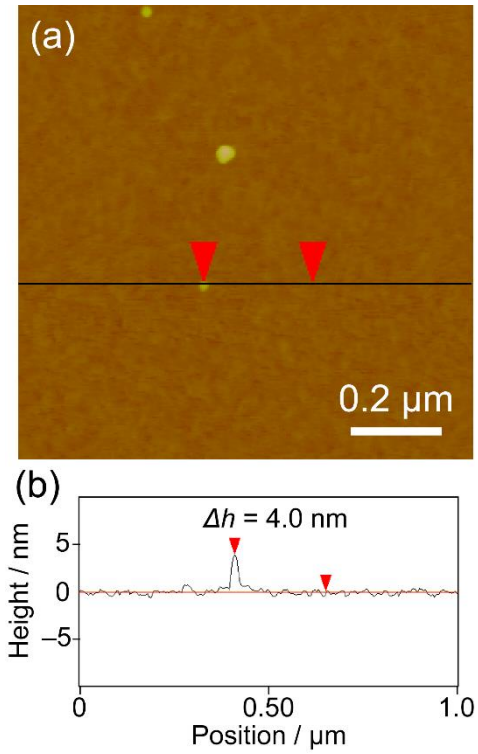


Fig. S4. (a) AFM image of RLDH-1.0. (b) The height profile on the line indicated in (a).

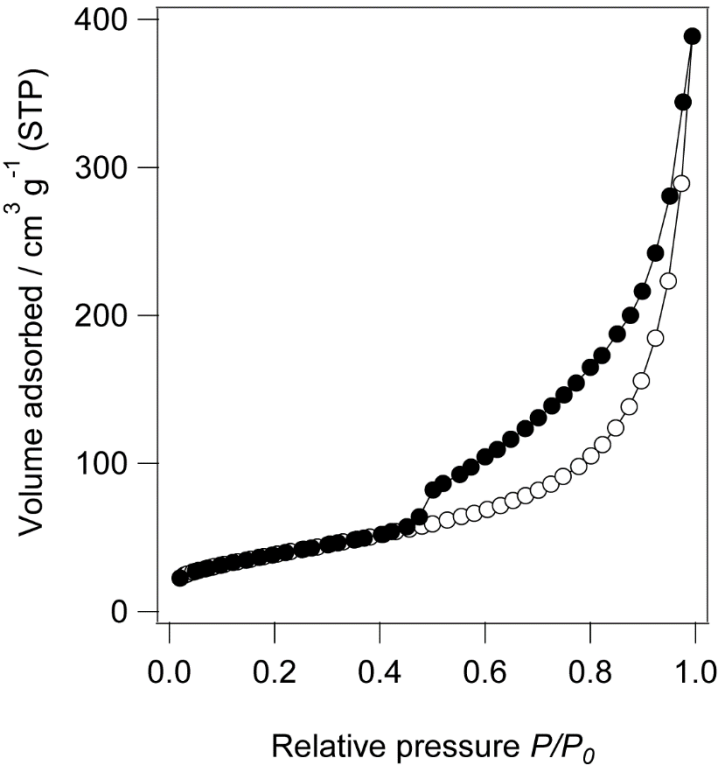


Fig. S5. N_2 adsorption–desorption isotherm of RLDH-1.0 without ultrasonic treatment.

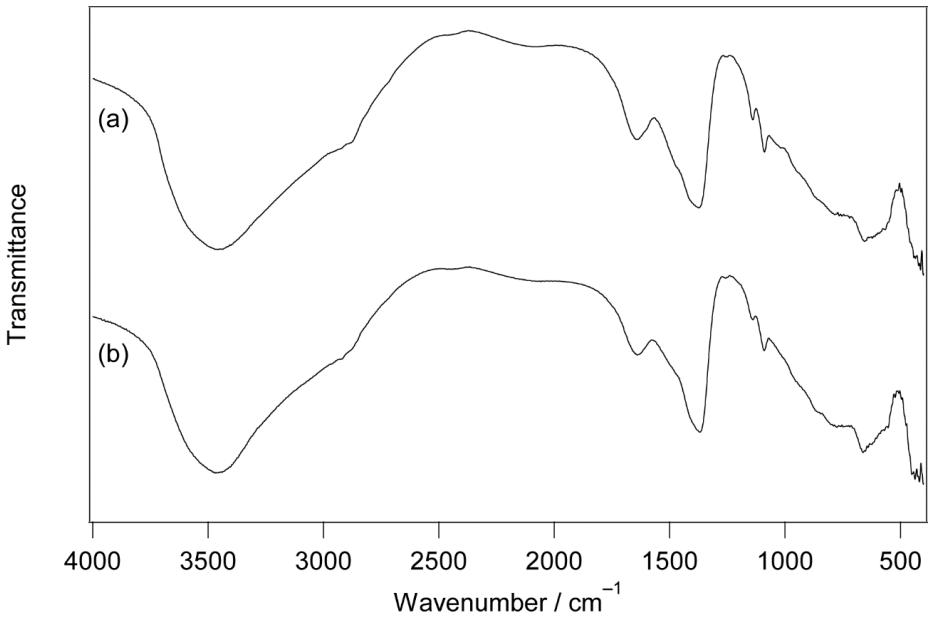


Fig. S6. FTIR spectra of (a) LDHNPs synthesized by the modified coprecipitation, using THAM and (b) those synthesized by the reconstruction method using THAM. No significant differences were observed between these spectra.

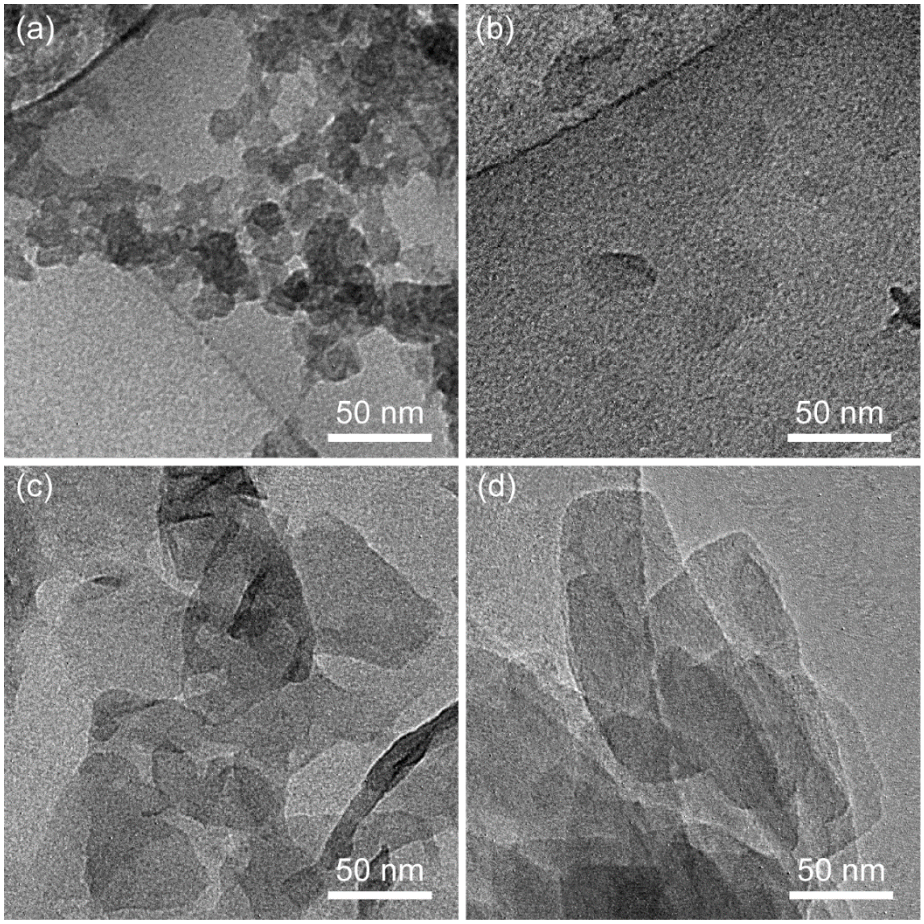


Fig. S7. TEM images of (a) RLDH-1.0, (b) RLDH-0.50, (c) RLDH-0.20, and (d) RLDH-0.

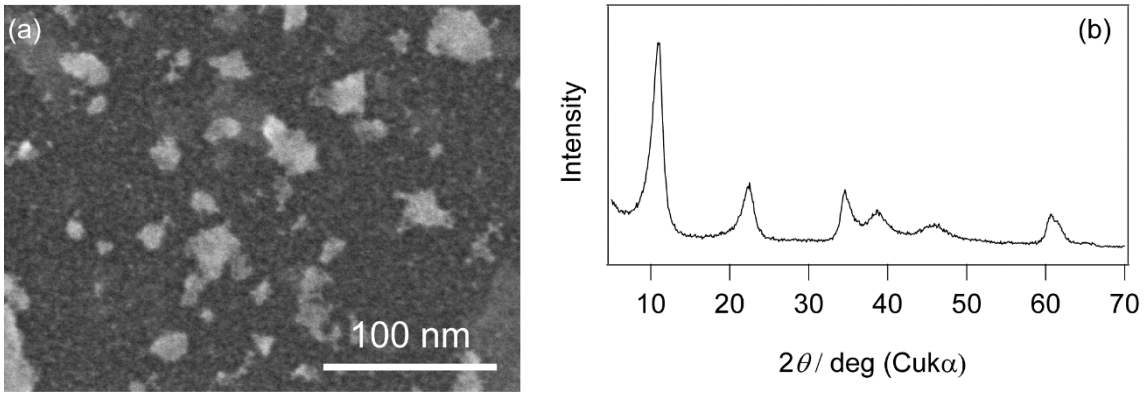


Fig. S8. (a) SEM image and (b) XRD pattern of LDHNPs reconstructed from MMO(85)-c by using pentaerythritol as a tripodal ligand.

Table S2. FWHM of diffraction peaks of LDHNPs prepared by the reconstruction method.

Sample	FWHM of 003 peaks/deg	FWHM of 110 peaks/deg
Original LDH particles	0.80	0.49
RLDH-0	0.70	0.27
RLDH-1.0	1.54	1.28
RLDH-0.50	1.14	0.86
RLDH-0.20	0.99	0.64

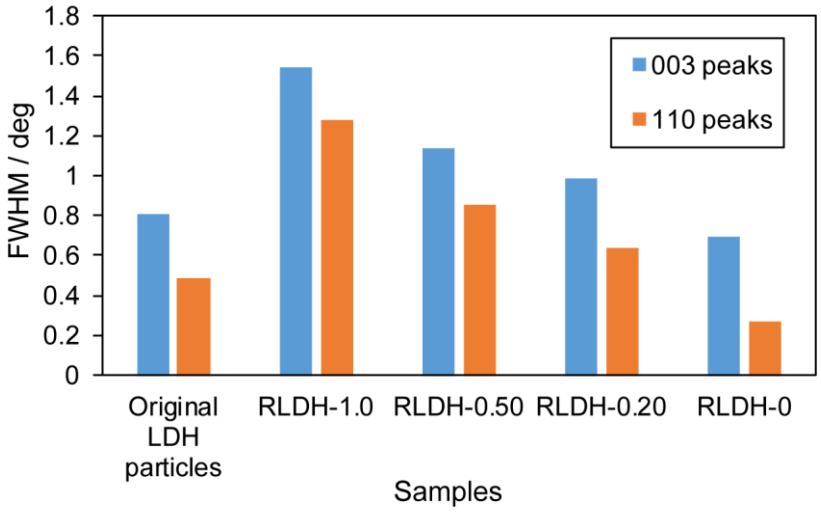


Fig. S9. FWHM of the diffraction peaks of LDHNPs prepared by the reconstruction method.

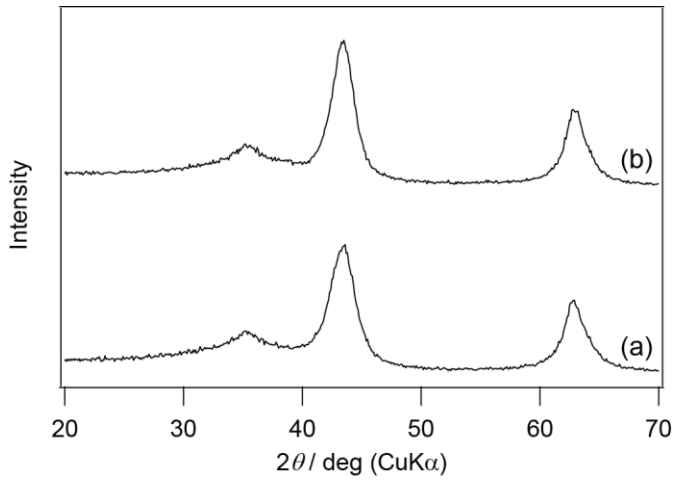


Fig. S10. XRD patterns of MMOs calcined at (a) 450 °C and (b) 550 °C.

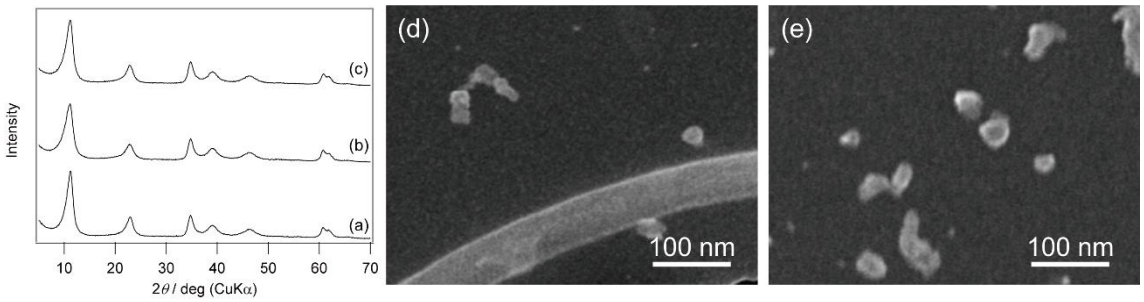


Fig. S11. XRD patterns of RLDH-1.0 prepared (a) from MMO calcined at 450 °C without stirring during reconstruction, (b) from MMO calcined at 450 °C with stirring, and (c) from MMO calcined at 550 °C without stirring. SEM images of RLDH-1.0 prepared (d) from MMO calcined at 450 °C with stirring, and (e) from MMO calcined at 550 °C without stirring.