

Electronic Supplementary Information (ESI)

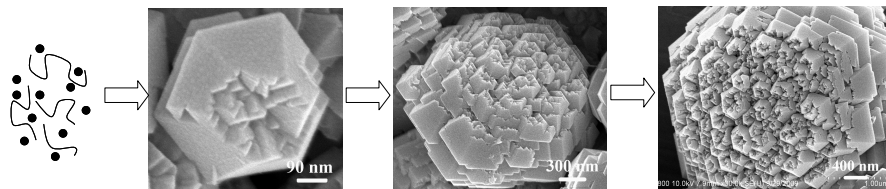
Synthesis and Mechanism Studies of Novel Drum-like Cd(OH)₂ Superstructures

Jingzhou Yin, Feng Gao*, Jianjun Wang, Qingyi Lu*

Experimental:

In a typical synthesis, 0.23 g of CdCl₂·2.5H₂O (analytically pure) was dissolved in 13 mL of deionized water with magnetic stirring, followed by the addition of 2.0 mL ammonia solution (25 %, analytically pure). Then, 5 mL of 2.8 g/L CMC (300-800 mPa·S, chemically pure) aqueous solution was dropwised into the solution containing cadmium chloride and ammonia. After 5 min stirring, the mixture was transferred to and sealed in a 50 mL Teflon-lined autoclave, kept at 80 °C for 4 h, and finally cooled to room temperature. The precipitate was collected by centrifugation (4 000 rpm, 3 min), washed alternately with deionized water and ethanol, and dried in air. The conversion of the as-prepared drum-like Cd(OH)₂ superstructures to CdO superstructures was carried out in an oven in air at 350 °C for 4 h.

Characterizations: Powder X-ray diffraction (XRD) measurements were performed on a SHIMADZU XRD-6000 X-ray diffractometer at Cu K_α radiation with 40 kV beam voltage and 30 mA beam current. The data were collected in the 10 ~ 70 ° range (2θ) with steps of 0.02 °. Scanning electron microscopy (SEM) images were obtained with a Hitachi S-4800 field-emission microscope. Transmission electron microscopy (TEM), High-resolution TEM (HRTEM) images and the corresponding selected area electron diffraction (SAED) pattern are captured on the JEM-2100 instrument microscopy at an acceleration voltage of 200 kV. The catalytic roles of Cd(OH)₂ and CdO in the thermal decomposition of AP were studied by differential scanning calorimeter (DSC) using STA 449C thermal analyzer at a heating rate of 20 °C·min⁻¹ in N₂ atmosphere over the temperature range of 20 - 500 °C. The mass percentage of Cd(OH)₂ or CdO to AP in the mixture is fixed at 2 %.



Scheme S11 Growth mechanism of the novel drum-like $\text{Cd}(\text{OH})_2$ structures

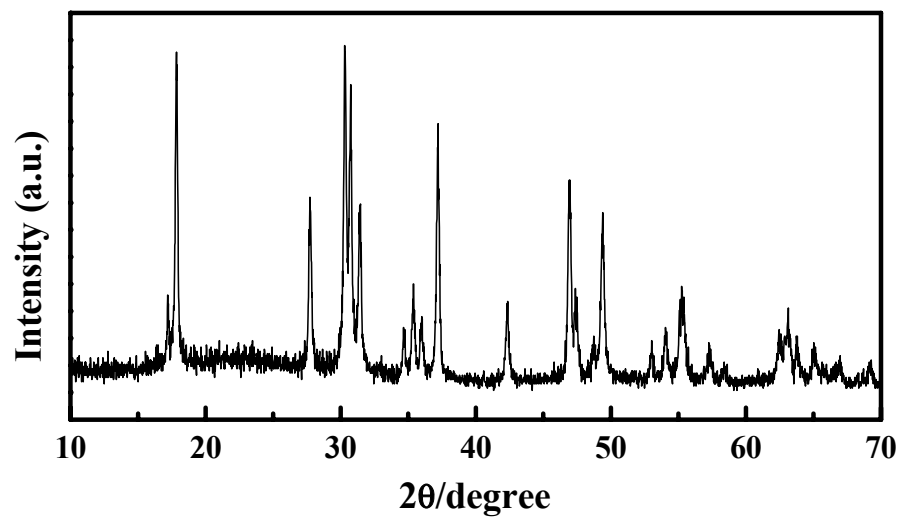


Figure S11 XRD pattern of the sample prepared at 80 °C for 4 h

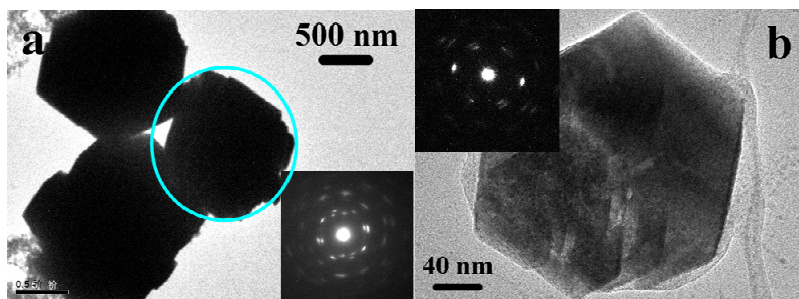


Fig. S12 TEM image and SAED pattern of the as-synthesized sample.

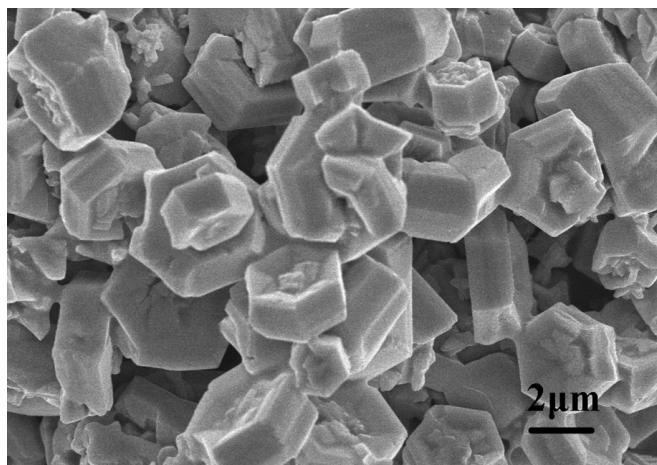


Fig. S13 An SEM image of the Cd(OH)₂ sample prepared without the addition of CMC solution.

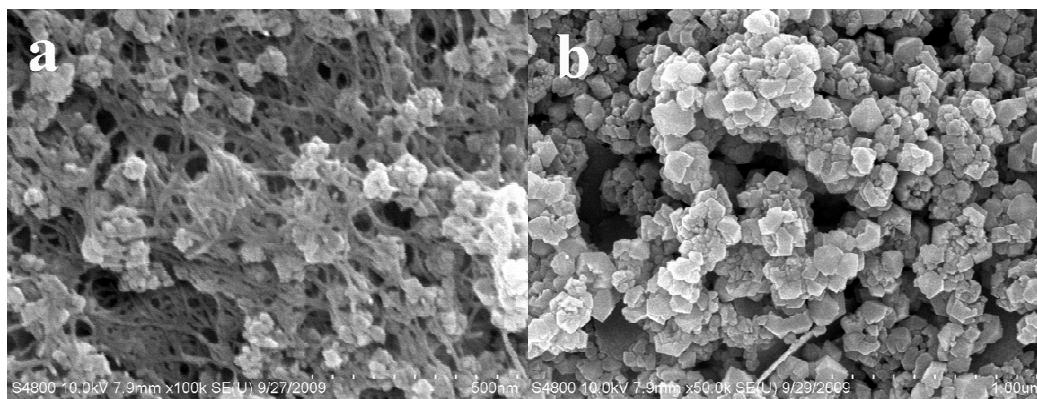


Fig. S14 SEM images of the Cd(OH)₂ samples obtained at 80 °C with (a) 0.8 ml; (b) 1.2 ml ammonia solution.

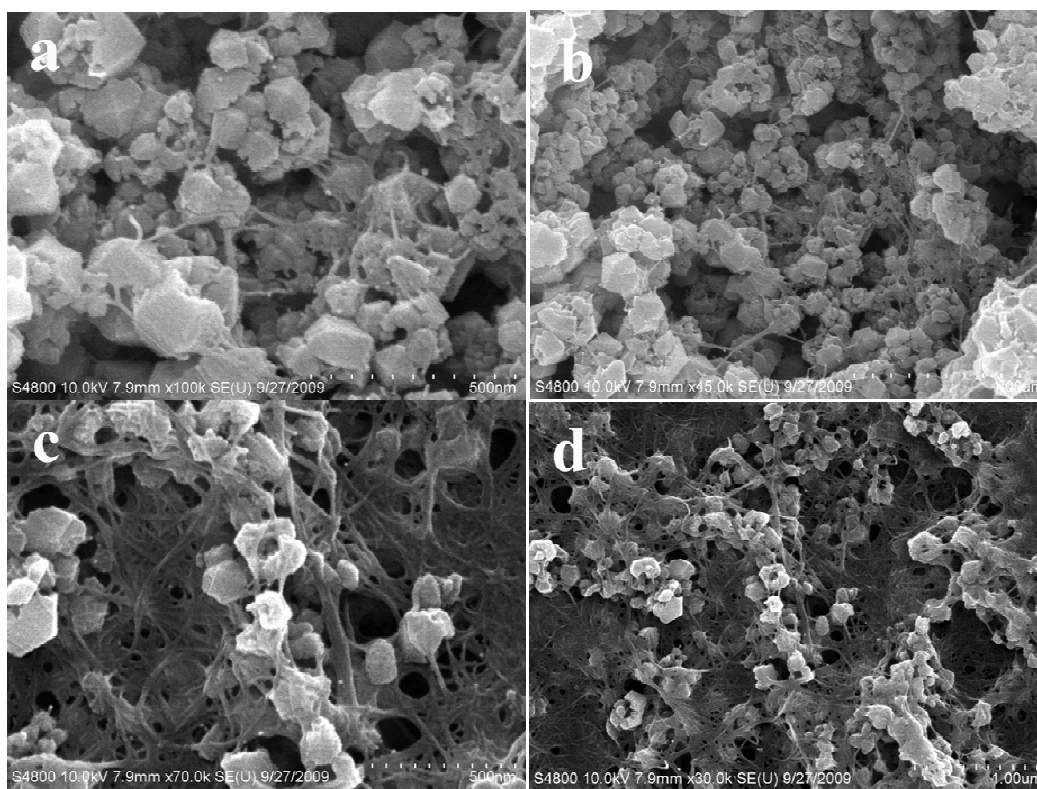


Fig. S15 SEM images of the Cd(OH)₂ samples prepared at different temperatures (a, b) 120 °C; (c, d) 160 °C.

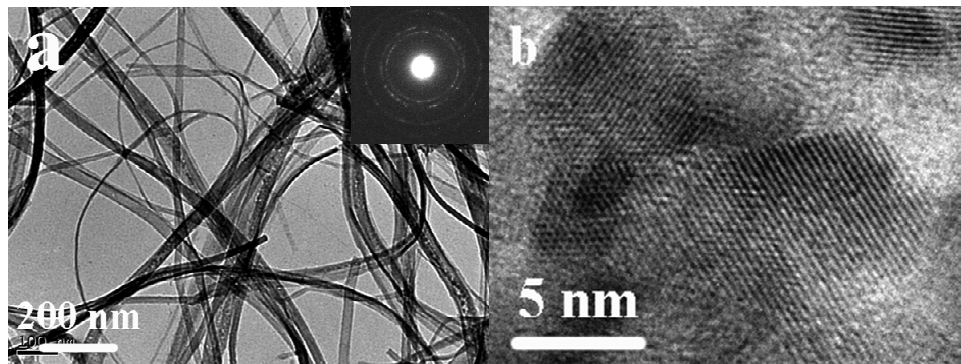


Fig. SI6 The TEM image, SAED pattern and HRTEM image of the $\text{Cd}(\text{OH})_2$ nanowires obtained at 200 °C

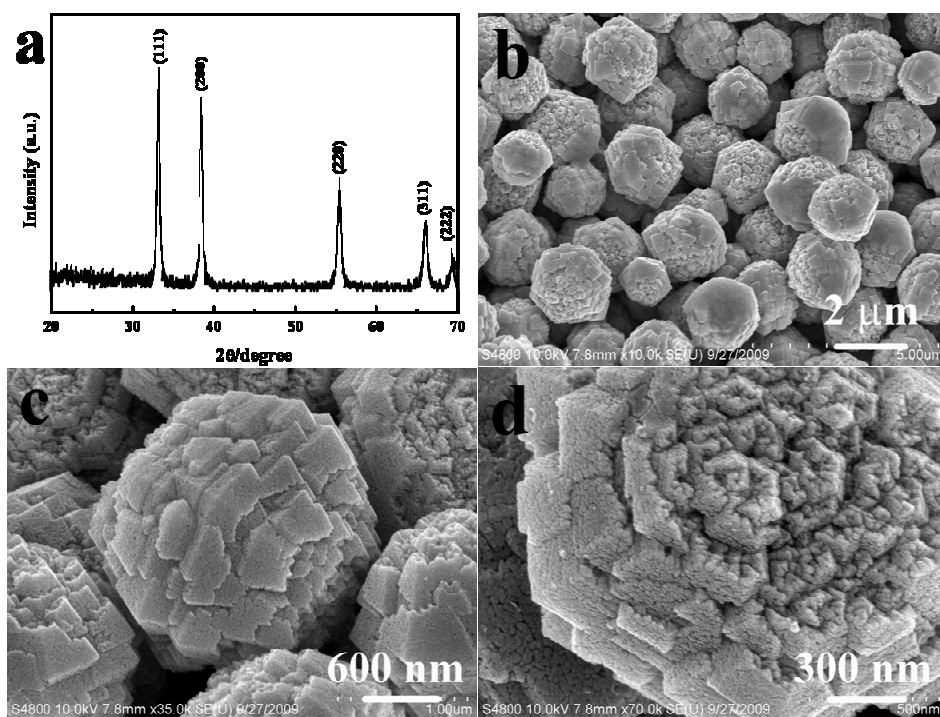


Fig. SI7 XRD pattern and SEM images of drum-like CdO superstructures.

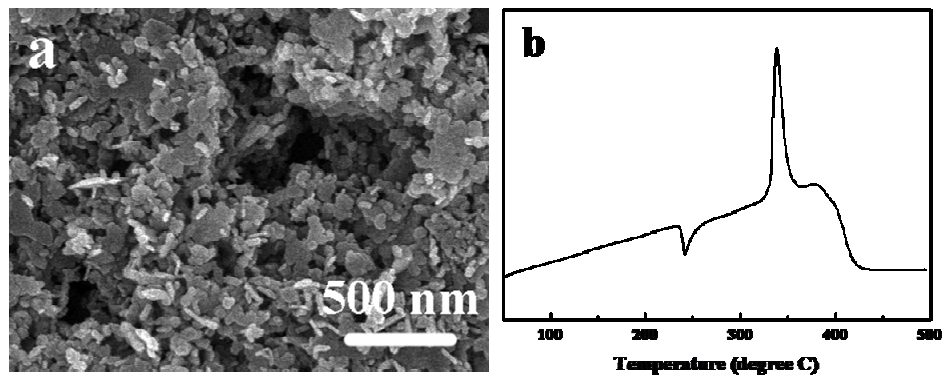


Fig. SI8 (a) an SEM image of $\text{Cd}(\text{OH})_2$ nanoplates and (b) DSC curves of the mixture of AP and $\text{Cd}(\text{OH})_2$ nanoplates.