Supplementary Material (ESI) for CrystEngComm

Supporting information

Large-scale, Uniform, Single-Crystalline $Cd(OH)_2$ Hexagonal Nanosheets for Cd-based Functional Applications

Hao Jiang,[ab] Junqing Hu,[c] Chunzhong Li,*[a] Feng Gu[a] and Jan Ma*[b]

[a] *Key Laboratory for Ultrafine Materials of Ministry of Education, School of Materials Science and Engineering, East China University of Science & Technology, Shanghai, 200237, People's Republic of China*

[b] *Temasek Laboratories, Nanyang Technological University, Singapore, 637553, Singapore*

[c] *State Key Laboratory for Modification of Chemical Fibers and Polymer Materials, College of Materials Science and Engineering, Donghua University, Shanghai, 200051, People's Republic of China*

** Electronic mail: czli@ecust.edu.cn (Chunzhong Li); asjma@ntu.edu.sg (Jan Ma);*

Phone: +86-21-64250949; Fax: +86-21-64250624.

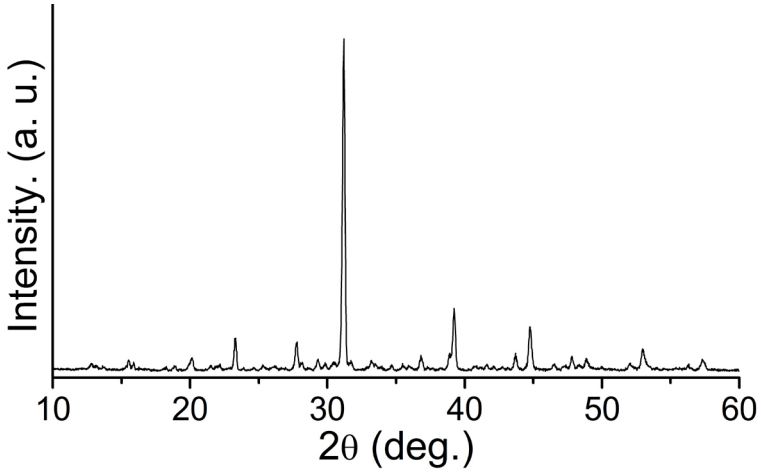

Figure S1 XRD pattern of the ultralong Cd-complex compounds nanowires.

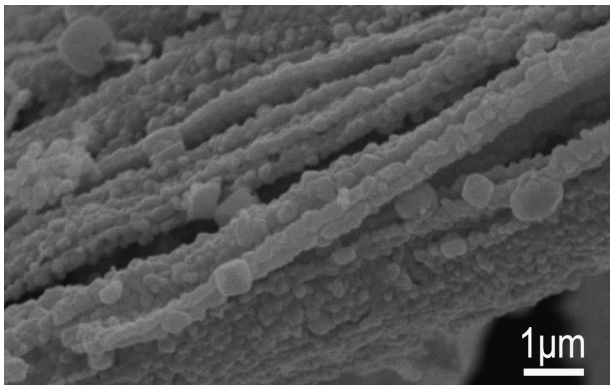

Figure S2 A SEM image of the ultra-long Cd-complex composites after annealing at 350 °C for 3 h.

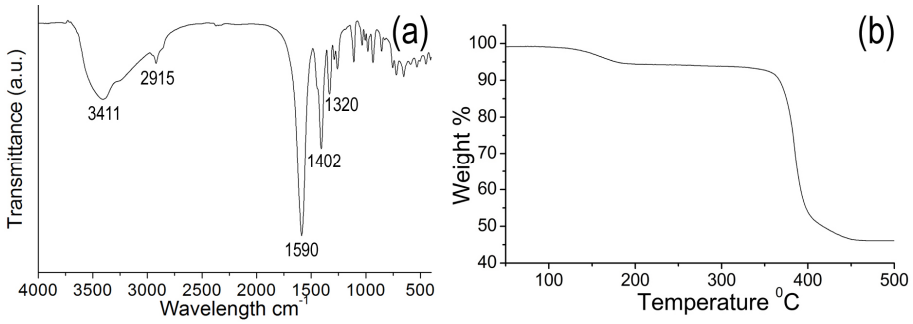

Figure S3 (a) FT-IR spectrum and (b) TG curve of the ultralong Cd-complex compounds nanowires

Figure S1 gives the XRD pattern of the ultralong Cd-complex compounds nanowires. The strong peak of the pattern indicates that the products are highly preferentially oriented, which is in agreement with the morphologies of the products. To further investigate the composition of Cd-complex compounds, the FT-IR and TG analysis have been carried out (Figure S3). From the TG curves, there are two main weight loss regions. The weigh loss (~ 4.8%) before

200°C is assigned to the evaporation of the adsorbed and intercalated water molecules. The decomposition of the Cd-complex starts at 200 °C and completes at 500°C with the weight loss of ~ 48.4%, which is in accordance to the decomposition of $Cd(EDTA)_{0.5}$ ($Cd(EDTA)_{0.5} \rightarrow CdO$, the theoretical weigh loss is 49.8%). The FT–IR spectrum of the compound are shown in Figure S3(b). The bands at 3411 cm^{-1} and 2915 cm^{-1} can be assigned to the stretching vibrations of O–H and $–CH_2$. A typical adsorption of –COO– can be observed at 1590 cm^{-1}. The bands at 1402 cm^{-1}, 1320 cm^{-1} are attributed to scissoring vibration of H_2O and stretching vibration of C–O. Furthermore, during the synthesis process, only two chemicals ($Cd(NO_3)_2{\cdot}4H_2O$ and EDTA-2Na) are used. Combining to the above discussion, the molecular formula of the products are supposed to $Cd(EDTA)_{0.5}$.

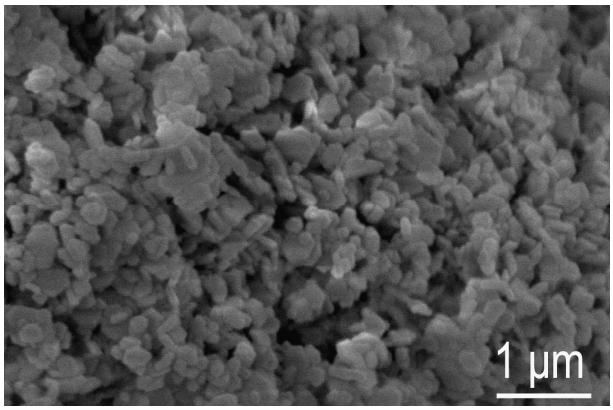

Figure S4 A SEM image of the $Cd(OH)_2$ nanoparticles prepared without the addition of EDTA-2Na.

In our present work, the formation of platelets is dependent on pH values-dominated dissolution of the wire precursor. With increasing of the pH value, the dissolution of Cd-complex compounds nanowires induced the formation of stable $Cd(OH)_2$ hexagonal platelets. Here, the XRD pattern and the corresponding SEM image have been provided, as shown in Figure S4, when the pH value is ~ 9.7, under hydrothermal reaction temperature of 180 °C for 12 h. From the XRD pattern (Figure S4(a)), all the peaks can be readily indexed to the mixed phases of $Cd(OH)_2$ and Cd-complex compound. The peaks marked with asterisk (*) are well in agreement with some of the XRD pattern Figure 1S. The SEM image (Figure 4S(b)) shows the products are composed of nanosheets and nanowires. Therefore, the intermediates consist of mixture of $Cd(OH)_2$ and Cd-complex compound. These results further prove the mechanism that the formation of hexagonal nanosheets is dependent on the dissolution of the wire precursor.

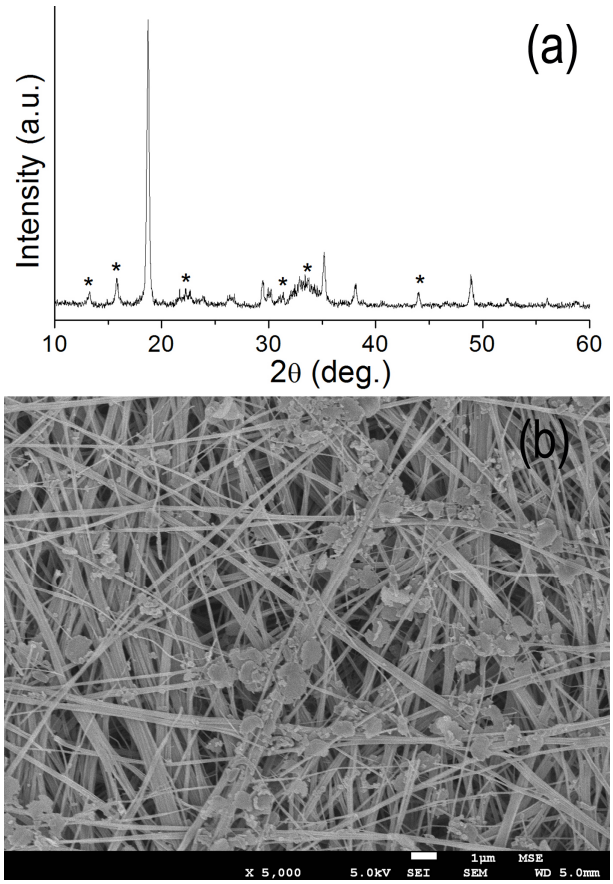

Figure S5 (a) the XRD pattern and (b) the corresponding SEM image of the products with the pH value of ~ 9.7 under hydrothermal reaction temperature of 180 °C for 12 h.