ADVANCED MATERIALS

Supporting Information

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Supporting Information for

A Soft Solution Chemistry for Selective Formation of Ultralong Nanowires Bundles of Crystalline $Cd(OH)_2$ on Substrates

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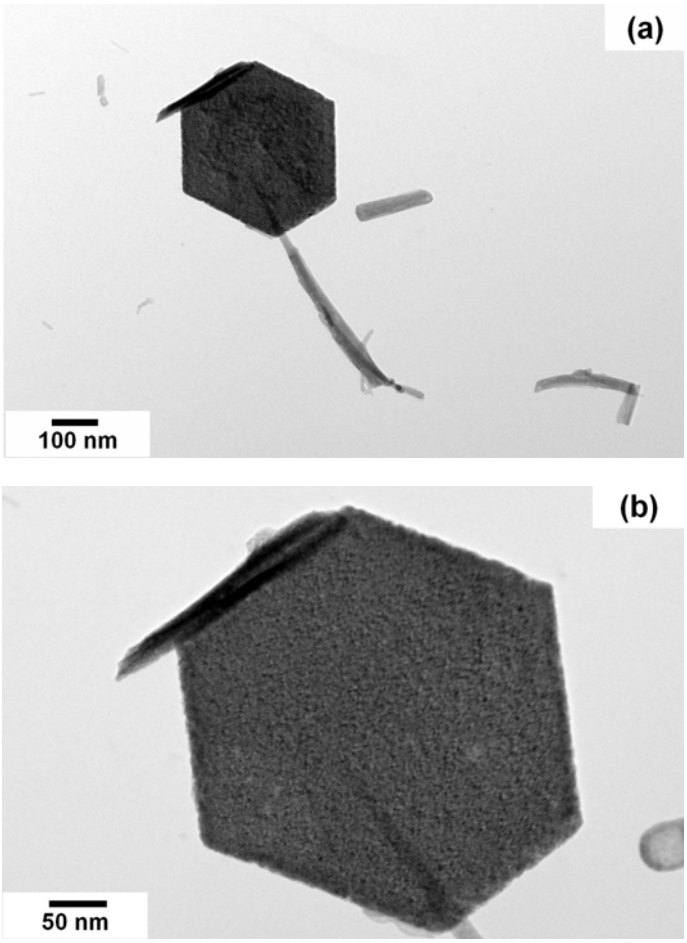

Figure S1. (a) and (b) TEM images of $Cd(OH)_2$ powder obtained in the reaction bath by homogeneous reaction

For the $Cd(OH)_2$ powder, obtained by homogeneous growth in the bath, we noticed a dominant formation of hexagonal plates along with a small amount of nanowires. The length of the hexagonal edge is around 200 nm. These hexagonal plates might have been formed by the Ostwalds ripening mechanism, in which the smaller particles are consumed by larger particles during growth process. Thus some of the nanowires might be merged in the larger particles to form hexagonal plates.

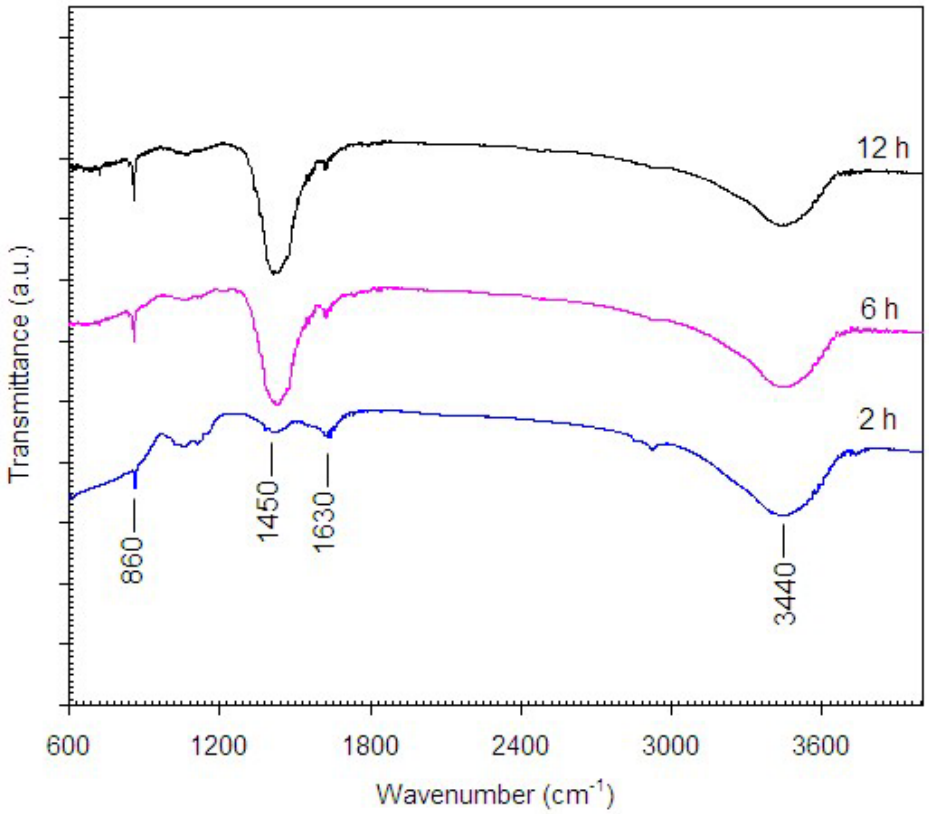

Figure S2. FT-IR spectra of the as-prepared nanowires bundles obtained on Si substrate at different deposition periods.

Figure S2. shows the FTIR spectra of $Cd(OH)_2$ nanowires bundles on Si substrates obtained at different deposition periods. The FT-IR spectra of $Cd(OH)_2$ nanowires at different deposition periods displays peaks centered at 860, 1450, 1630 and 3440 cm^{-1}.

i) absorptions at 860 cm^{-1} is due to the Cd–O–H bending [1],
ii) absorptions at 1450 cm^{-1} is due to intercalated anions NO_3^-,
iii) The peak at 1630 cm^{-1} and the broad band centered at 3440 cm^{-1} are assigned to the bending modes of water and O–H stretching [2].

However it can be seen from figure that, for low deposition period the absorption peak of NO_3^- is very weak which is increased with deposition period. The FTIR spectra indicate that $Cd(OH)_2$ is formed at initial deposition period and as the deposition period increased the NO_3^- anoins have been intercalated in the nanowires bundles.

[1] X. Wang, L. Andrews, *J. Phys. Chem. A* **2005**, *109,* 3849.
[2] K. Nakamoto (Trans: D. Huang, R.Wang) *Infrared Spectra of inorganic and coordination compound*; 4th Chemical Industry Press: Beijing, **1991**; p 251.

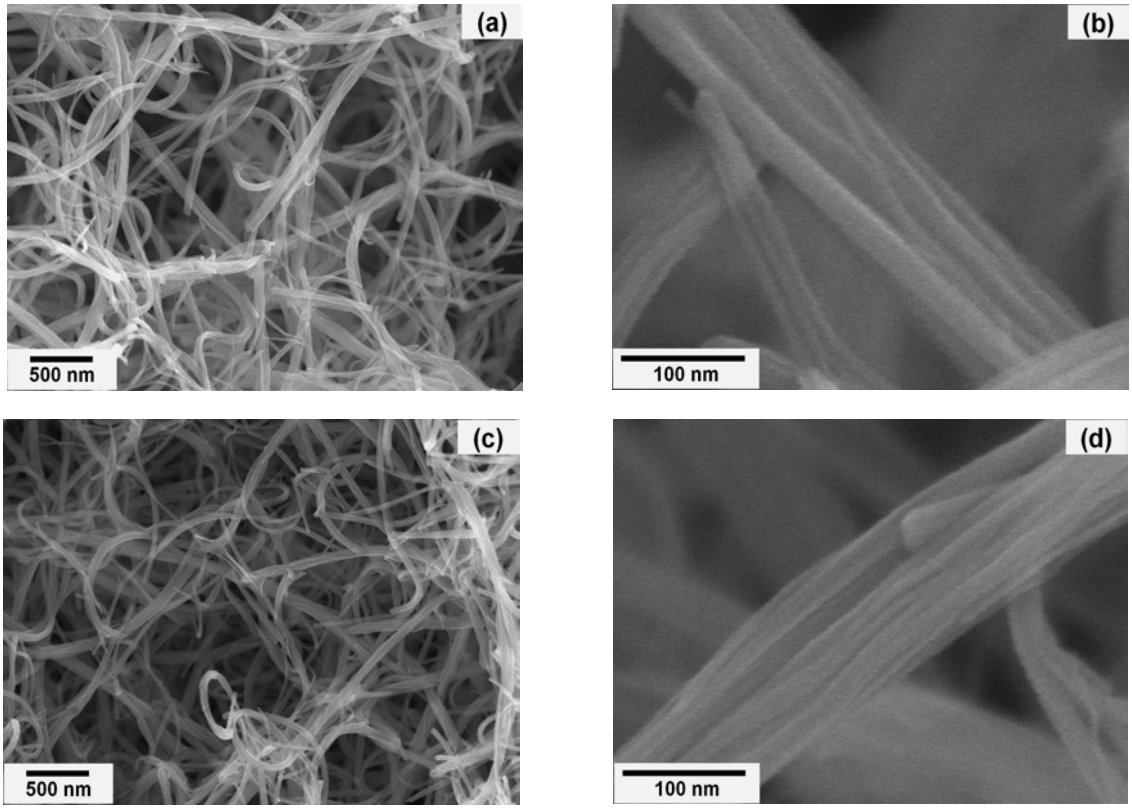

Figure S3. FE-SEM images of $Cd(OH)_2$ nanowires obtained by the similar preparative conditions onto ITO substrate (a) and (b), and Si substrates (c) and (d).

The Figure S3 shows that the similar type of nanowires bundles formation was observed onto the ITO and Si substrates. Thus, this method can be applied to various substrates to obtain the nanowire bundles.

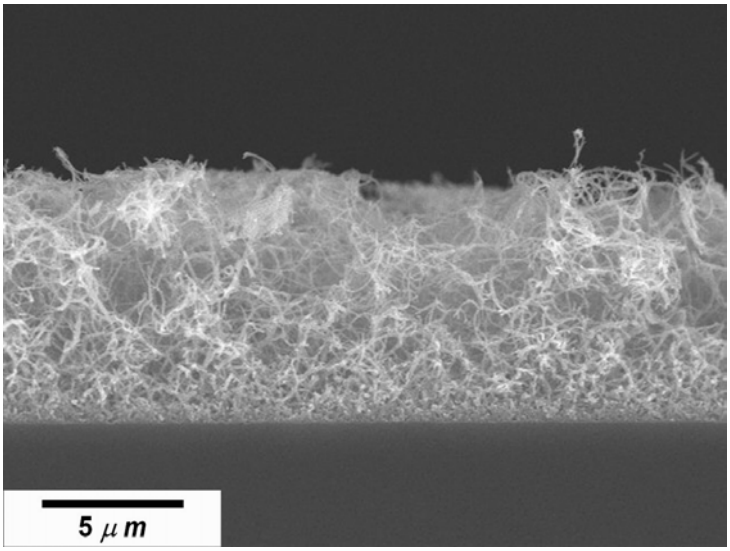

Figure S4. The cross-sectional SEM image of $Cd(OH)_2$ nanowires on glass substrate.

The film thickness of these nanowires layer on the glass substrate was obtained as thick as *ca.* 8 μm and could be readily decreased or increased by changing synthesis conditions such as concentration of the cadmium salt and deposition period.

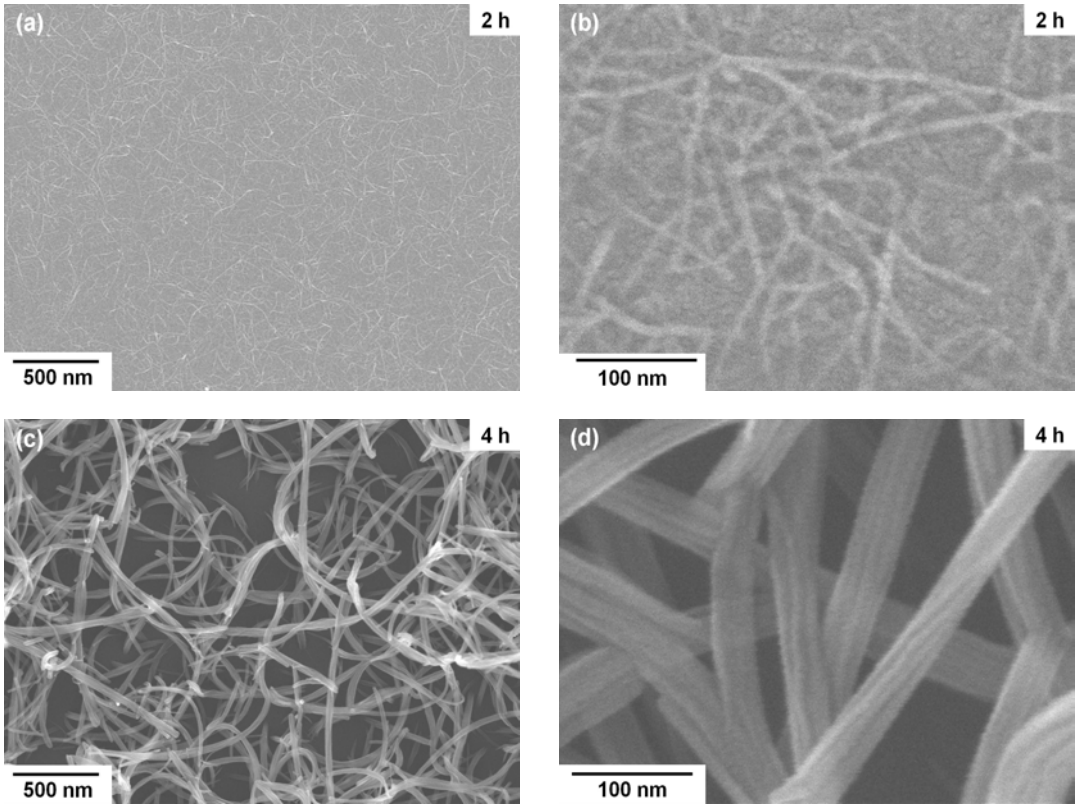

Figure S5. FE-SEM images of $Cd(OH)_2$ nanowires obtained at from 0.1 M cadmium nitrate solution at diff erent deposition periods (a) and (b) 2 h, (c) and (d) 4 h.

The sample obtained with the shortest time of 2 h in this study displays the single nanowires having diameters of 7 – 9 nm as seen in the right picture of Figure S5 (b); it could be interpreted that at this stage the smaller nanowires are formed and present as separated prior to being aggregated into the bundles structure. As the deposition period was increased to 4 h, there appeared a drastic change in the structural morphology of the $Cd(OH)_2$ nanowires in that the separately-present smaller nanowires have been converted into the form of nanowires bundles, as observed in Figure (d).