Supporting Information

Fabrication of Ultrathin CuO Nanowires Augmenting Oriented Attachment Crystal Growth Directed Self-Assembly of Cu(OH)_2 Colloidal Nanocrystals

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Table S1: The dimension analysis of Cu(OH)_2 nanowires at different stirring time intervals.

| Stirring time | Average Length (nm) ± SD | Average Diameter (nm) ± SD |
|---------------|--------------------------|---------------------------|
| 5 min         | 201.9±13.0               | 2.4± 0.4                  |
| 10 min        | 222.2±17.1               | 2.4± 0.4                  |
| 15 min        | 285.4±28.9               | 5.2± 1.2                  |
| 30 min        | 352.1±26.7               | 5.5± 1.2                  |
| 45 min        | 440.6±24.5               | 5.1± 0.7                  |
| 1 h           | 457.3±27.0               | 5.0± 0.9                  |
| 2 h           | 480.9±31.4               | 5.0± 1.0                  |
| 3 h           | 499.6±25.5               | 5.9± 0.9                  |
| 4 h           | 518.2±24.7               | 5.0± 1.1                  |
| 5 h           | 550.7±22.6               | 5.0± 1.0                  |
| 6 h           | 545.6±16.8               | 5.3± 1.6                  |

Note: Average lengths of nanowires were calculated by taking nanowires with maximum lengths and nanowires with minimum lengths, thus SD represents the deviation of nanowires lengths.

Table S2: Length and diameter of Cu(OH)_2 NWs with respect to different aging time after 4hrs of stirring.

| Trial # | Aging time [h] | Average Length (nm) ± SD | Average Diameter (nm) ± SD |
|---------|----------------|--------------------------|---------------------------|
| 1       | 6              | 658.7±32.6               | 6.4± 2.1                  |
| 2       | 6              | 659.3±72.9               | 7.2± 2.3                  |
| 3       | 6              | 685.7±48.5               | 7.1± 2.2                  |
| 4       | 24             | 680.0±43.9               | 5.1± 2.0                  |
| 5       | 24             | 676.9±86.4               | 5.5± 1.5                  |
| 6       | 24             | 665.9±66.0               | 5.2± 2.1                  |
Note: Average lengths of nanowires were calculated by taking nanowires with maximum lengths and nanowires with minimum lengths, thus SD represents the deviation of nanowires lengths.

Figure S1: TEM images of fully grown Cu(OH)$_2$ nanowires at different stirring time intervals followed by different aging time intervals (a) 1 hr stirring followed by 6 hrs aging (b) 1 hr stirring followed by 24 hrs aging (c) 4 hrs stirring followed by 6 hrs aging (d) 4 hrs stirring followed by 24 hrs aging.

Figure S2: Time dependent SAED pattern along with powder XRD traces of Cu(OH)$_2$ colloidal nanocrystals at the stirring time of 15 min.
Figure S3: The simulated and experimental powder XRD patterns of Cu(OH)$_2$ nanowires and it’s Orthorhombic crystal unit cell obtained from the Crystallographic Open Database (COD #9007849)

Table S3: XPS analysis of before annealed and after annealed NWs

| Sample      | Peak                  | Position BE (eV)±0.10 eV | FWHM (eV)±0.20 eV | Atomic Con. (%) |
|-------------|-----------------------|---------------------------|-------------------|-----------------|
| Cu(OH)$_2$ NWs | Cu 2p$_{1/2}$; Cu 2p$_{3/2}$ | 934.9, 955.0              | 6.05              | 31.82           |
|             | O 1S                  | 530.5                     | 4.47              | 62.54           |
| CuO NWs     | Cu 2p$_{1/2}$; Cu 2p$_{3/2}$ | 933.1, 953.0              | 3.02              | 40.5            |
|             | O 1S                  | 528.7, 530.5              | 0.94              | 42.96           |

Figure S4: The simulated and experimental powder XRD patterns of CuO nanowires and it’s Monoclinic crystal unit cell obtained from the Crystallographic Open Database (COD #9016326)

Table S4: Length and diameter of CuO NWs produced upon annealing Cu(OH)$_2$ nanowires, which were made at 4 hours stirring followed by 6 hours and 24 hours aging respectively. The powder samples of Cu(OH)$_2$ nanowires were annealed at 300 °C, an hour.

| Trial | Aging time [h] | Average Length (µm) ± SD | Average Diameter (nm) ± SD |
|-------|----------------|--------------------------|---------------------------|
| 1     | 6              | 5.6±0.4                  | 27.5±6.0                  |
| 2     | 6              | 5.5±0.3                  | 31.6±10.7                 |
| 3     | 6              | 5.4±0.3                  | 24.6±6.9                  |
| 4     | 24             | 7.7±0.4                  | 29.4±4.4                  |
| 5     | 24             | 7.1±0.3                  | 24.2±4.4                  |
| 6     | 24             | 7.5±0.3                  | 26.0±8.6                  |

Note: Average lengths of nanowires were calculated by taking nanowires with maximum lengths and nanowires with minimum lengths. SD represents the deviation of nanowires lengths.