Supporting information

Two-dimensional optical waveguiding and luminescence vapochromic properties of 8-hydroxyquinoline zinc (Znq$_2$) hexagonal microsheets

Jiangsu Key Laboratory for Carbon-Based Functional Materials and Devices, Institute of Functional Nano and Soft Materials (FUNSOM), Soochow University, Suzhou, Jiangsu 215123, China.
Contents

1. Materials.

2. Synthesis of colloidal Znq₂ hexagonal microsheets

3. Characterization of Znq₂ hexagonal microsheets

4. Figure S1. XRD patterns of Znq₂ microsheets and powder.

5. Figure S2. The packing arrangement of Znq₂ molecules in unit cell.

6. Table S3. Calculated total facet areas of different crystal faces of Znq₂

7. Figure S4. XRD patterns of Znq₂ microsheets, and upon exposure to HCl vapor (blue), NH₃ vapor (yellow) and back to green color (green)

8. Figure S5. Emission wavelength of the repeated vapochromic behavior of Znq₂ microsheets

9. References
1. Materials.

Methanol (CH$_3$OH, HPLC grade) and Dimethylsulfoxide (DMSO, A.R.) were purchased from the Sinepharm Chemical Reagent Co., Ltd. Bis(8-quinolinolato)zinc(Ⅱ)hydrate(Znq$_2$) was obtained from TOKYO Chemical industry Co., Ltd and without further purification. Ultrapure water with a resistivity of 18.2 MΩ.cm$^{-1}$, produced by using a Milli-Q apparatus (Millipore), were used in all experiments.

2. Synthesis of colloidal Znq$_2$ hexagonal microsheets

In a typical preparation process for Znq$_2$ nanosheet, 1mL Methanol was rapidly mixed with a stock solution (3mL) containing Znq$_2$ (0.018g, 5×10$^{-5}$ mol) in Dimethylsulfoxide (DMSO) under shaking. After that, 1mL poor solvent deionized water was rapidly injected into the prepared solution under shaking. After injection, the colour turned yellow to cream-coloured with obvious Mie scattering. Finally, the precipitates were centrifugally separated from the colloidal suspension without further purification.

3. Characterization

The morphologies and sizes of the samples were examined using field-emission scanning electron microscopy (FESEM, FEI Quanta 200F) at acceleration voltages of 15 kV. Prior to analysis, the samples were coated with a thin gold layer using an Edwards Sputter Coater. TEM images were obtained using a Philips CM 200 electron microscope operated at 80 kV. One drop of the as-prepared colloidal dispersion was deposited on a carbon-coated copper grid, and dried under high vacuum. The X-ray diffraction (XRD) patterns were measured by a D/max 2400 X-ray diffractometer with Cu Kα radiation (λ=1.54050 Å) operated in the 2θ range from 3 to 30°, by using the samples filtered on the surface of a quartz substrate. The photoluminescence (PL) and excitation spectra of the samples were measured on a HORIBA OBTN YVON FLUOROMAX-4 spectrofluorimeter with a wavelength resolution of 1 nm. The samples were both deposited on the surface of a quartz substrate. The fluorescence microscopy images were obtained using a Leica DMRB fluorescence microscopy with a spot-enhanced charge couple device (CCD, Diagnostic Instrument, Inc.). The samples were prepared by placing a drop of dispersion onto a cleaned quartz slide. Laser confocal
fluorescent microscopy (Leica, TCS-SP5) equipped with near ultraviolet and blue laser (405 and 458 nm) was used for fluorescent images.

**Figure S1.** XRD patterns of Znq$_2$ microsheets and powder.

**Figure S2.** (a) The view of the unit cell of Znq$_2$ crystal along a axis, i.e., (100) direction. (b) The view of the unit cell along c axis, i.e., (001)
direction. (c) The view of the unit cell along $b$ axis, i.e., (010) direction.

(d) The view of the unit cell at other angle.

Table S3 Calculated total facet areas of different crystal faces of Znq$_2$

<table>
<thead>
<tr>
<th>$hkl$</th>
<th>$d_{hkI}/\AA$</th>
<th>Distance</th>
<th>% Total facet area</th>
</tr>
</thead>
<tbody>
<tr>
<td>(100)</td>
<td>12.44</td>
<td>8.04</td>
<td>50.66</td>
</tr>
<tr>
<td>(011)</td>
<td>4.95</td>
<td>20.20</td>
<td>14.85</td>
</tr>
<tr>
<td>(102)</td>
<td>5.63</td>
<td>17.75</td>
<td>13.20</td>
</tr>
<tr>
<td>(110)</td>
<td>5.06</td>
<td>18.24</td>
<td>8.11</td>
</tr>
<tr>
<td>(002)</td>
<td>5.48</td>
<td>32.97</td>
<td>7.44</td>
</tr>
</tbody>
</table>

Figure S4. XRD patterns of Znq$_2$ microsheets, and upon exposure to HCl vapor (blue), NH$_3$ vapor (yellow) and back to green color (green)
Figure S5. Emission wavelength of the repeated vapochromic behavior of Znq$_2$ microsheets

References