Supporting information:

Mesoporous Ni₃N/NiO composite with core-shell structure for room temperature, selective and sensitive NO₂ gas sensing

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Table 1. Summary of the different sample (precursor - Ni(HCO₃)₂ or Ni(OH)₂) with different Urea:Ni mol ratio, Solvothermal or Hydrothermal temperature, Reaction time and Solution.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Urea:Ni mol ratio</th>
<th>Solution</th>
<th>Temperature</th>
<th>Reaction time</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>2:1</td>
<td>50 ml H₂O and 30 ml</td>
<td>100 °C</td>
<td>18 h</td>
<td>Ni(OH)₂</td>
</tr>
<tr>
<td>b</td>
<td>5:1</td>
<td>50 ml H₂O and 30 ml</td>
<td>100 °C</td>
<td>18 h</td>
<td>Ni(OH)₂</td>
</tr>
<tr>
<td>c</td>
<td>2:1</td>
<td>50 ml H₂O and 30 ml</td>
<td>160 °C</td>
<td>4 h</td>
<td>Ni(OH)₂</td>
</tr>
<tr>
<td>d</td>
<td>5:1</td>
<td>50 ml H₂O and 30 ml</td>
<td>160 °C</td>
<td>4 h</td>
<td>Ni(OH)₂</td>
</tr>
<tr>
<td>e</td>
<td>2:1</td>
<td>80 ml H₂O</td>
<td>160 °C</td>
<td>18 h</td>
<td>Ni(OH)₂</td>
</tr>
<tr>
<td>f</td>
<td>5:1</td>
<td>80 ml H₂O</td>
<td>160 °C</td>
<td>18 h</td>
<td>Ni(HCO₃)₂</td>
</tr>
<tr>
<td>g</td>
<td>2:1</td>
<td>50 ml H₂O and 30 ml</td>
<td>160 °C</td>
<td>18 h</td>
<td>Ni(OH)₂</td>
</tr>
<tr>
<td>h</td>
<td>5:1</td>
<td>50 ml H₂O and 30 ml</td>
<td>160 °C</td>
<td>18 h</td>
<td>Ni(HCO₃)₂</td>
</tr>
</tbody>
</table>
Figure S1. Schematic illustration of the homemade gas mixing line for sensor testing system.

Figure S2. XRD patterns of Ni(OH)$_2$ (sample a-e and g listed in table 1).
Figure S3. XRD patterns of Ni(HCO$_3$)$_2$ (sample f and h listed in table 1).

Figure S4. Refinement of PXRD of Ni$_3$N composite.
Figure S5. SEM images of Ni(OH)$_2$ sample a-e and g (corresponded to images a-h) and Ni(HCO$_3$)$_2$ sample f and h (corresponded to images f and h) listed in table1.
Figure S6. The self-life of Ni$_3$N/NiO-based sensor for 2 ppm NO$_2$ sensing at room temperature for two weeks.

![Graph showing self-life of Ni$_3$N/NiO-based sensor for 2 ppm NO$_2$.]

Figure S7. The room temperature sensing properties for Ni$_3$N, NiO, and Ni$_3$N/NiO mixture-based sensors to 2 ppm NO$_2$.

![Graph showing room temperature sensing properties for Ni$_3$N, NiO, and Ni$_3$N/NiO mixture-based sensors to 2 ppm NO$_2$.]