List of Supplementary data

**Supplemental figure S1.** Isotherm and pore size distribution (inset) of Ni-Ce-ZrO₂ catalysts

**Supplemental table S2.** XPS core level electron binding energy of Ni-Ce-ZrO₈ catalysts for different Ni content

**Supplemental figure S3.** The stability of Ni6.0 catalyst at 300 °C for 48 h

**Supplemental figure S4.** TEM images of (a) fresh and (b) spent Ni6.0 catalysts. Reaction conditions: GHSV = 10,000 h⁻¹, H₂/CO₂ = 4, reaction temperature = 300 °C and reaction time 30 min.
Supplemental figure S1. Isotherm and pore size distribution (inset) of Ni-Ce-ZrO₂ catalysts
Supplemental figure S1 (cont.). Isotherm and pore size distribution (inset) of Ni-Ce-ZrO₂ catalysts
Supplemental figure S1 (cont.). Isotherm and pore size distribution (inset) of Ni-Ce-ZrO$_2$ catalysts
Supplemental figure S1 (cont.). Isotherm and pore size distribution (inset) of Ni-Ce-ZrO₂ catalysts
Supplemental figure S1 (cont.). Isotherm and pore size distribution (inset) of Ni-Ce-ZrO₂ catalysts
**Supplemental table S2.** XPS core level electron binding energy of Ni-Ce-ZrO₂ catalysts for different Ni content

<table>
<thead>
<tr>
<th>Catalysts</th>
<th>Zr3d₅/₂ (eV)</th>
<th>Zr3d₃/₂ (eV)</th>
<th>O1s (eV)</th>
<th>Ni2p₁/₂ (eV)</th>
<th>Ce3d₅/₂ (eV)</th>
<th>Ce3d₃/₂ (eV)</th>
<th>NiO/Ni(OH)₂ ratio</th>
<th>Ce⁴⁺/Ce³⁺ ratio</th>
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<td>880, 898</td>
<td>901, 917</td>
<td>1.41</td>
<td>2.40</td>
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Supplemental figure S3. The stability of Ni6.0 catalyst at 300 °C for 48 h
Supplemental figure S4. TEM images of (a) fresh and (b) spent Ni6.0 catalysts. Reaction conditions: GHSV = 10,000 h\(^{-1}\), H\(_2\)/CO\(_2\) = 4, reaction temperature = 300 °C and reaction time 30 min.