Supporting Information

Morphology-controlled synthesis of 3D mesoporous rosette-like CeCoOx catalyst by pyrolysis of Ce[Co(CN)₆] and applied for the catalytic combustion of toluene

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Fig.S1 SEM image of Ce[Co(CN)₆]-200 precursors with different hydrothermal time: (a) 6h, (b) 12h, (c) 18h (d) 24h.
Fig.S2 The formation mechanism of CeCoOx-200.

\[ K_3Co(CN)_6 + \text{Distilled water} \]
\[ \downarrow \text{Dropwise adding} \]
\[ \text{Ce(CH}_3\text{COO)}_3 + \text{PVP} + \text{Anhydrous ethanol} + \text{Distilled water} \]

- Hydrothermal reaction
- Calcined at 500 °C
- 6 h
- 12 h
- 24 h
- 18 h
Fig.S3 STEM and Energy dispersive X-ray spectrometry elemental maps of

CeCoOx-25 (a, d, g), CeCoOx-100 (b, e, h) and CeCoOx-200 (c, f, i)
Fig.S4 The Size distribution of CeCoOx-100 and CeCoOx-200.

- **CeCoOx-25**
  - Average particle size = 4.49 nm

- **CeCoOx-100**
  - Average particle size = 9.15 nm

- **CeCoOx-200**
  - Average particle size = 8.15 nm
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<th>Phonon Mode</th>
<th>$F_{2g}(a)$</th>
<th>$2TA$</th>
<th>$F_{2g}(b)$</th>
<th>$E_g$</th>
<th>$F_{2g}(c)$</th>
<th>$O_v$</th>
<th>$F_{2g}(d)$</th>
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<td>479</td>
<td>520</td>
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Fig. S5 The XPS survey and N1s of CeCoOx catalysts.
Fig. S6 CO-TPR of CeCoOx catalysts.
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<th>Peak β Position</th>
<th>Area / °C</th>
<th>Peak γ Position</th>
<th>Area / °C</th>
<th>Peak δ Position</th>
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