Supporting Information

Formation dynamics of mesocrystals composed of organically modified CeO₂ nanoparticles: Analogy to particle formation model


a Graduate School of Engineering, Tohoku University, 6-6 Aramaki Aza-Aoba, Aoba-ku, Sendai 980 – 8579, Japan

b Department of Materials Process Engineering, Graduate School of Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya, 464-8603

c JEOL Ltd., 3-1-2 Musashino, Akishima, Tokyo 196-8558, Japan

d WPI – Advanced Institute for Materials Research (WPI-AIMR), Tohoku University, 2-1-1 Katahira, Aoba-ku, Sendai 980-8577, Japan

e New Industry Creation Hatchery Center, Tohoku University, 6-6-10, Aoba, Aramaki, Aoba-ku, Sendai 980-8577, Japan

f Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, 2-1-1 Katahira, Aoba-ku, Sendai 980-8577, Japan
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X-ray diffraction patterns of cerium oxide are shown here. The crystallite size was calculated from XRD data by Halder-Wagner method. Halder-Wagner equation can be written as follows:

\[
\left( \frac{\beta}{\tan \theta} \right)^2 = \frac{K \lambda}{D} \times \frac{\beta}{\tan \theta \sin \theta} + 16 \varepsilon^2
\]

Here, \( \beta \) is integral breadth (in radians), \( \theta \) is Bragg angle, \( K \) is a constant (= 4/3 for the mean volume-weighted size of spherical crystallites), \( \lambda (= 0.15418 \text{ nm}) \) is the wavelength of the Cu K\( \alpha \) X-ray, \( D \) is the crystallite size, and \( \varepsilon \) is micro strain of the crystal.

Figure S1. XRD pattern of cerium oxide synthesized in the presence of L-glutamic acid at 548 K, 25 MPa, [Ce][Glu] 1:3
Figure S2. Halder-Wagner plots obtained from XRD patterns of cerium oxide synthesized in the presence of L-glutamic acid at 548 K, 25 MPa, [Ce][Glu] 1:3 (A) 0.7 s, (B) 2.0 s, (C) 3.7 s (D) 8.0 s

Figure S3. XRD pattern of cerium oxide synthesized in the presence of glutamic acid with different concentration or adding of ethanol with a molar fraction of $x_{\text{EtOH}} = 8\%$ at 548 K, 25 MPa, [Ce][Glu] 1:3, 0.7s
Figure S4. Halder-Wagner plots obtained from XRD patterns of cerium oxide synthesized in the presence of glutamic acid with different concentration (A) 0.01 M, (B) 0.005 M, or (C) adding of ethanol with a molar fraction of $x_{\text{EtOH}} = 8\%$ at 548 K, 25 MPa, [Ce][Glu] 1:3, 0.7s

Table S1 Summary of the results of Halder-Wagner analysis for XRD data

<table>
<thead>
<tr>
<th>HW plot</th>
<th>Fig. S2 (A)</th>
<th>Fig. S2 (B)</th>
<th>Fig. S2 (C)</th>
<th>Fig. S2 (D)</th>
<th>Fig. S4 (A)</th>
<th>Fig. S4 (B)</th>
<th>Fig. S4 (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>0.7 s</td>
<td>2.0 s</td>
<td>3.7 s</td>
<td>8.0 s</td>
<td>0.01 M</td>
<td>0.005 M</td>
<td>Ethanol</td>
</tr>
<tr>
<td>$D$ [nm]</td>
<td>18.0</td>
<td>21.1</td>
<td>22.0</td>
<td>20.2</td>
<td>17.8</td>
<td>16.4</td>
<td>14.4</td>
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<tr>
<td>$\varepsilon$ [-]</td>
<td>0.0032</td>
<td>0.0045</td>
<td>0.0027</td>
<td>0.0015</td>
<td>0.0032</td>
<td>0.0021</td>
<td>0.0043</td>
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