A Kinetic Study of the Phase Conversion of Layered Cobalt Hydroxides

Yi Du, Kang Min Ok and Dermot O’Hare*

Chemistry Research Laboratory, Department of Chemistry, University of Oxford, Mansfield Road, Oxford, UK OX1 3TA

*E-mail: dermot.ohare@chem.ox.ac.uk; Fax: +44 1865 285131; Tel: +44 1865 285130

Sharp-Hancock analysis gives single straight lines for dependences ln(-ln(1-α)) vs. ln(t) over the course of reaction within the range 0.15 < α < 0.85, indicative of conformation to the Avrami-Erofe’ev formalism.

**Figure S1.** Sharp-Hancock plot for the phase conversion from (1) to (4) at 40°C (red circles), 50°C (blue triangles), 60°C (dark cyan triangles), 70°C (pink triangles), and 80°C (dark yellow triangles). The data have been fitted with Avrami-Erofe’ev equation correspondingly.
Figure S2. Extent of reaction (α) plotted against reduced time (t/t₀.₅) for the phase conversion from (1) to (4) at 40°C (red circles), 50°C (blue triangles), 60°C (dark cyan triangles), 70°C (pink triangles), and 80°C (dark yellow triangles). The data have been fitted with Avrami-Erofe’ev equation correspondingly.

Figure S3. Sharp-Hancock plot for the phase conversion from (1) to (4) under different concentration of NaOH at 60°C: 0.125M (dark cyan triangles), 0.25M (pink triangles), 0.5M (blue triangles), 1M (red circles) and 2M (black squares). The data have been fitted with Avrami-Erofe’ev equation.
**Figure S4.** Extent of reaction plotted against reduced time \( ((t-t_{\text{ind}})/t_{0.5}) \) for the phase conversion from (1) to (4) under different concentration of NaOH at 60°C: 0.125M (dark cyan triangles), 0.25M (pink triangles), 0.5M (blue triangles), 1M (red circles) and 2M (black squares). The data have been fitted with Avrami-Erofe’ev equation.

**Figure S5.** (a) *In-situ* SAXS data: 3D stack plot showing the evolution of the intensity observed in SAXS; (b) In situ WAXS data: 3D stack plot showing the intensity evolution of (4)’s 100 (d = 2.75 Å), 101 (d = 2.38 Å).
Figure S6. (a) *In-situ* SAXS data; (b) *In-situ* WAXS data for the phase conversion reaction from (2) to (4).