

Supporting Information

Characterization of LiCoO₂ nanoparticle suspensions by single collision events

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EXPERIMENTAL PART

LiCoO₂ (LCO) Nanoparticle Synthesis. LCO nanoparticles were synthesized from 3.7 g of cobalt nitrate (II) hexahydrate Co(NO₃)₂.6H₂O (Sigma Aldrich), which were dissolved in 100 ml of deionized water. This solution was slowly added to 100 ml of 5 M NaOH solution, stirred for 20 min, and then added to 1500 ml of deionized water and stirred for 12 h under air. The brown precipitate obtained is separated from the solution by centrifugation and washed six times with 35 ml of deionized water and then dried under vacuum at 45 °C for 12 h. This step provided CoOOH powder with a yield of 80 %.

The hydrothermal synthesis of LCO was carried out from 100 mg of CoOOH powder added to 12 ml of LiOH solution at different concentrations in an autoclave and heated for 12 h at different temperatures ranging from 120 °C to 195 °C. LCO was separated from the solution by centrifugation and washed several times with deionized water until reaching a neutral pH. LCO was then dried for 12 h at 45 °C under vacuum yielding 70 mg of NPs. Depending on the synthesis condition (Table SI-1), different NP sizes were obtained.

Table SI.1 : Hydrothermal conditions for the synthesis on LCO NPs

T (°C)	[LiOH] (mol.L ⁻¹)
120	5.0
120	1.0
150	1.0
150	0.1
170	1.0
170	0.5
170	0.25
170	0.1
195	1.0
195	0.5
195	0.1

NP characterization

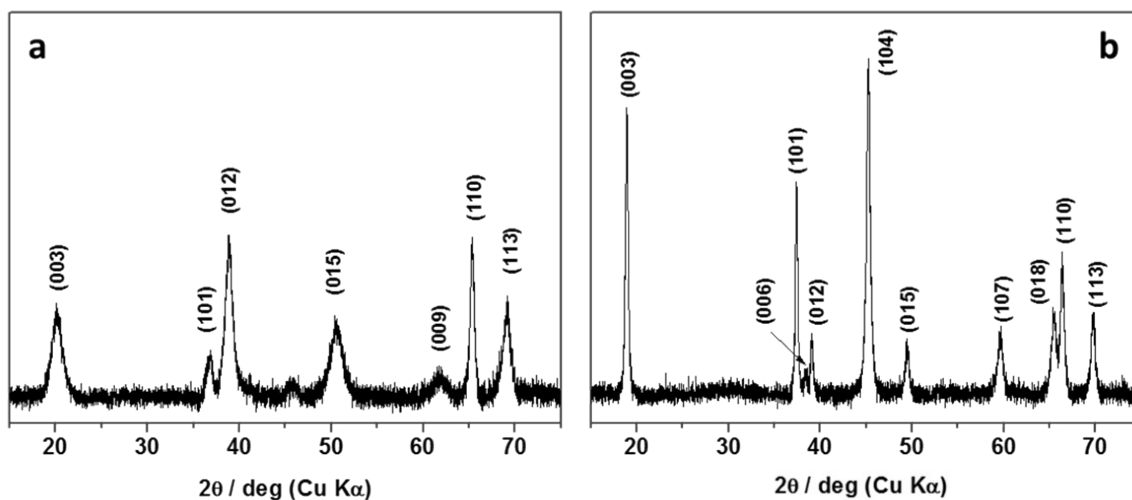


Figure SI.1. (a) XRD pattern of CoOOH obtained after the first step of the synthesis; (b) XRD pattern of LCO obtained by hydrothermal synthesis at 170°C for 12 h in 0.5 M LiOH

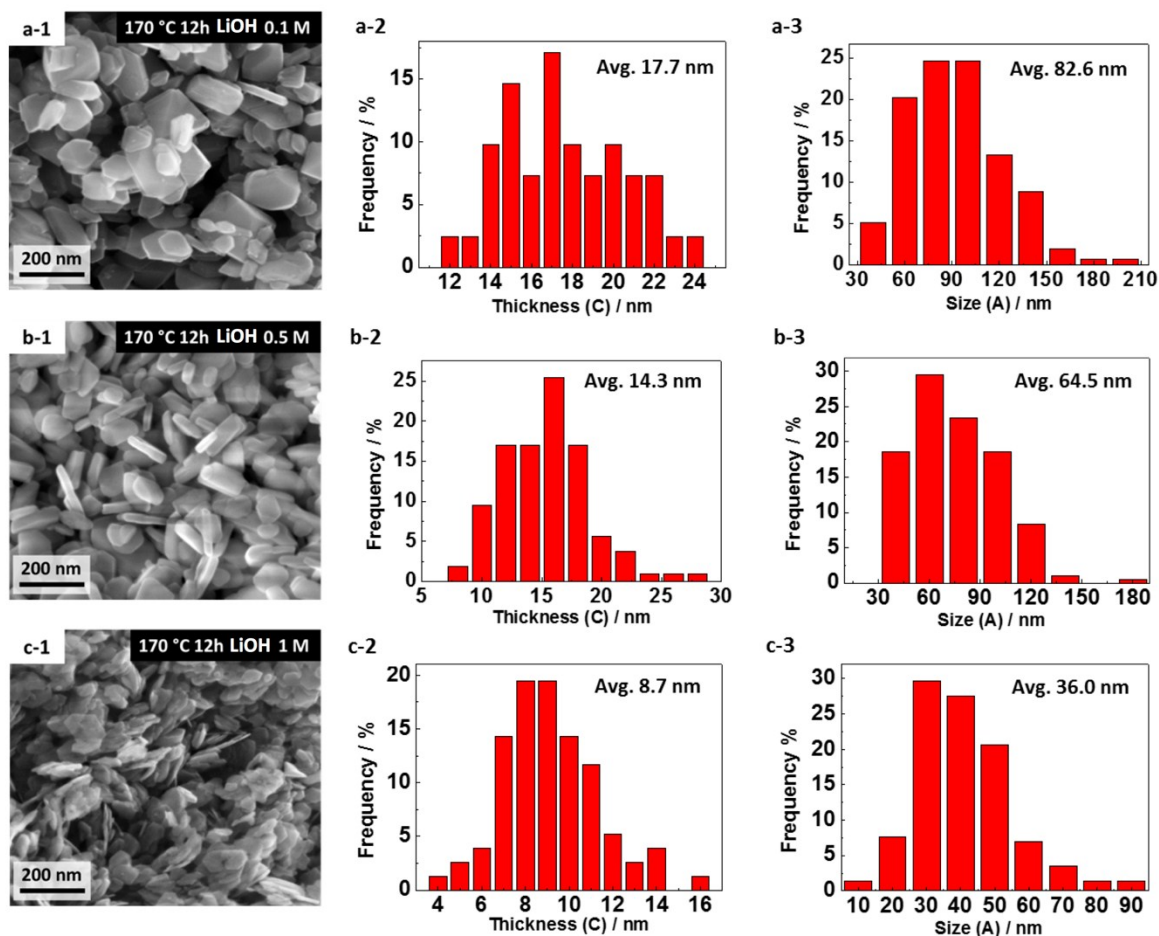


Figure SI.2. SEM images of LCO NPs and size distribution (average thickness and average diameter) for different synthesis conditions: first row 170°C – 12 h – 0.1 M LiOH; second row 170°C – 12 h – 0.5 M LiOH; third row 170°C – 12 h – 1 M LiOH.

ELECTROCHEMISTRY ON A COMPOSITE ELECTRODE

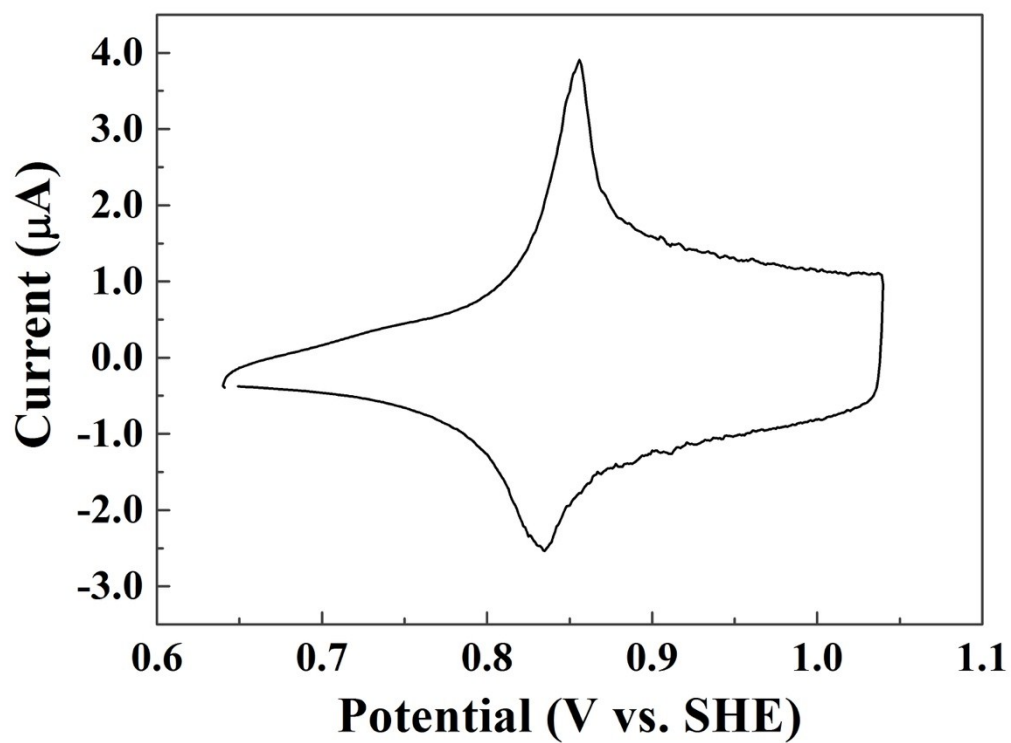


Figure SI.3. Cyclic voltammogram at 1 mVs^{-1} of a composite electrode (carbon black + Nafion + LCO NPs – $2 \mu\text{g}$) in 0.01 M LiNiO_3 .