

Electronic Supplementary Material (ESI) for RSC Advances.
This journal is © The Royal Society of Chemistry 2015

SUPPORTING INFORMATION

Sol-gel Synthesis and Electrochemical Properties of c-Axis Oriented LiCoO₂ for Lithium-ion Batteries

Sen Gao,^a Wei Wei,^a Maixia Ma,^a Juanjuan Qi,^a Jie Yang,^a Shengqi Chu,^b Jing

*Zhang,^b and Lin Guo^{*a}*

^a School of Chemistry and Environment, Beihang University, Beijing 100191, P. R.

China. E-mail: guolin@buaa.edu.cn

^b Institute of High Energy Physics, the Chinese Academy of Sciences, Beijing,

100049, P. R. China.

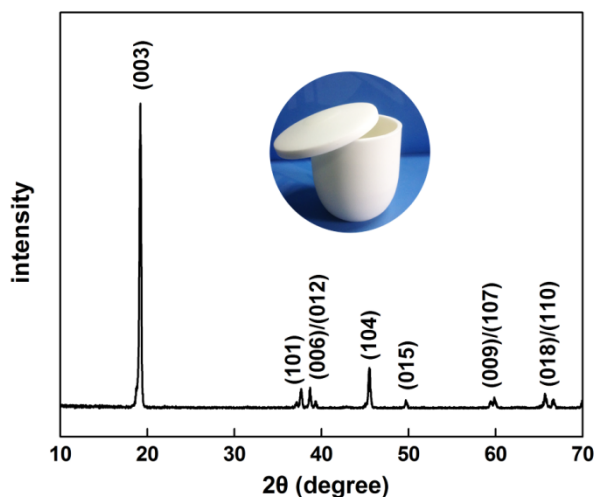


Figure S1. XRD pattern of the LiCoO₂ with medium degree of c-axis orientation

As shown in Fig. S1, when part of the crucible, for example, half the mouth was covered, LiCoO₂ with I_{003}/I_{104} value 7.5 was obtained, and denoted as m-LCO (LiCoO₂ with medium degree of c-axis orientation). It can be found that the I_{003}/I_{104} increases nearly linearly with area covered during calcination, and the degree of c-axis orientation could be adjusted between l-LCO and h-LCO by this simple method.

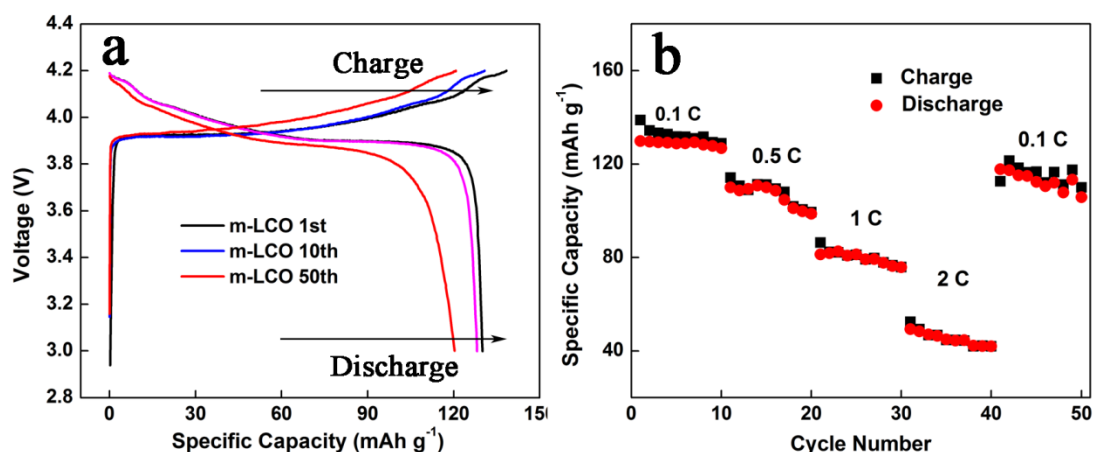


Figure S2. Electrochemical performance of m-LCO: (a) charge/discharge curves at the 1st, 10th and 50th cycles at 0.1 C and (b) rate capacities for m-LCO.

Fig. S2a shows typical charge/discharge curves of m-LCO at the 1st, 10th and 50th cycles, measured at a current rate of 0.1 C in the range of 3.0-4.2 V. The initial

discharge capacity of m-LCO at 0.1 C is 130.2 mA h·g⁻¹. After 50 cycles, the discharge capacity remains 120.3 mA h·g⁻¹, corresponding to a capacity retention of 92.4%. Fig. S2b illustrates the discharge curves at different rates. The m-LCO delivers a rate capacity of 49.2 mA h·g⁻¹ at 2C, which means 37.9% of the capacity at 0.1C is retained.

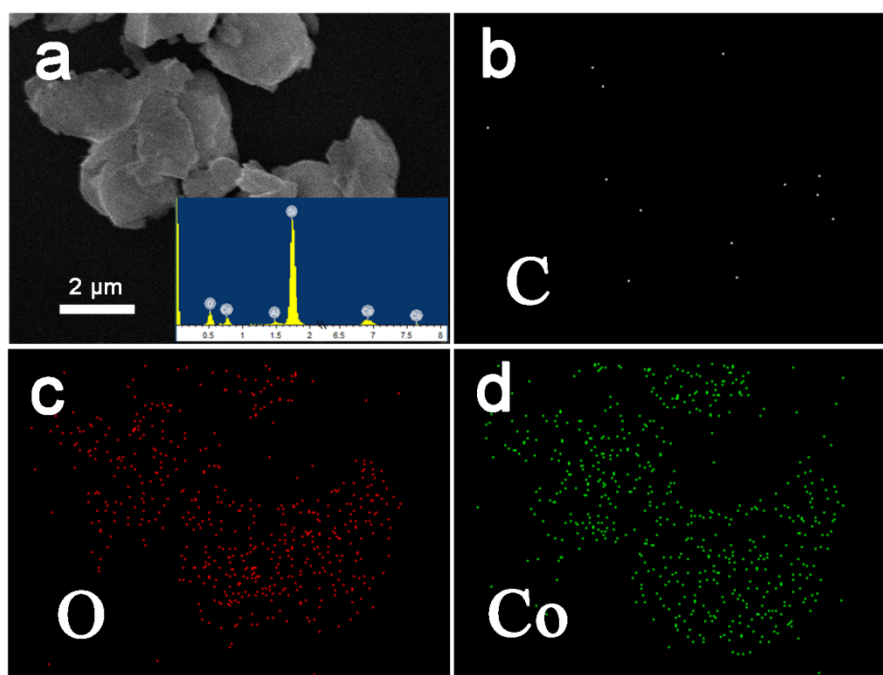


Figure S3. (a) SEM image of l-LCO (the inset is the EDS spectrum for l-LCO); EDS mapping for (b) C, (c) O and (d) Co elements.

EDS spectrum for l-LCO is shown in Fig. S3a and no signal of Carbon is detected. The EDS elemental mappings (Fig. S3b-d) of the l-LCO show a uniform distribution of O and Co, which confirms the existence and uniform distribution of O and Co in l-LCO. But the carbon content in l-LCO is negligible, which is in good agreement with the EDS spectrum.

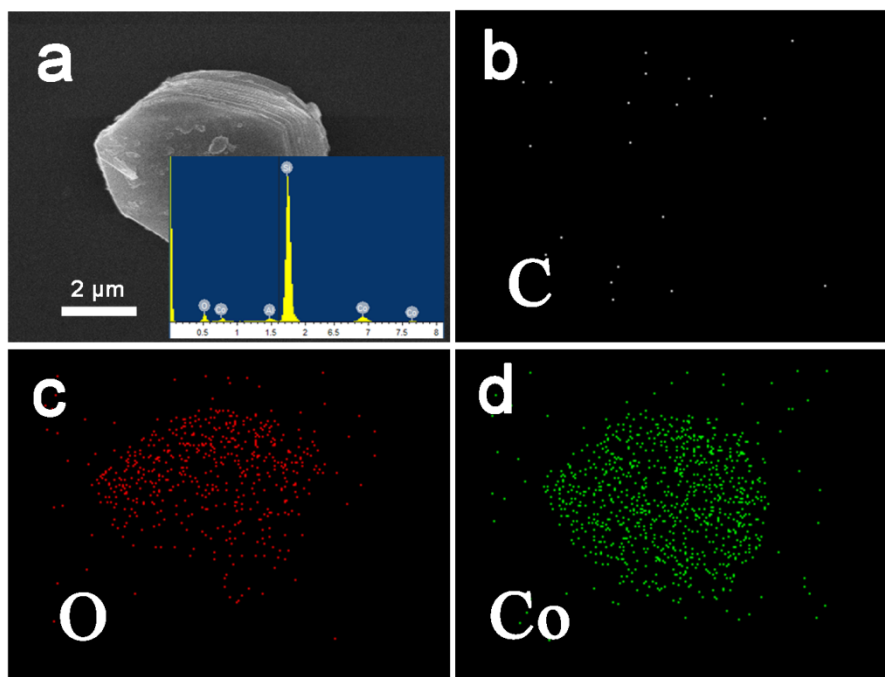


Figure S4. (a) SEM image of h-LCO (the inset is the EDS spectrum for h-LCO); EDS mapping for (b) C, (c) O and (d) Co elements.

EDS spectrum for h-LCO is shown in Fig. S4a and no signal of Carbon is collected. The EDS elemental mappings (Fig. S4b-d) of the l-LCO show a uniform distribution of O and Co. Also, the carbon content in h-LCO is negligible, which is in accordance with the EDS spectrum.