## **Supporting information**



Figure S1 SEM images of (a) P-NCM811, (b) NCM811-CN0.5, (c) NCM811-CN0.75 and (d) NCM811-CN1



Figure S2 The charge/discharge curves of (a) P-NCM811 and (b) NCM811-CN0.75 at 0.1C-10C



**Figure S3** Capacitance contribution rate at 1 mV/s of (a) P-NCM811, (b) NCM811-CN0.5, (c) NCM811- CN0.75, (d) NCM811-CN1 and (e–h) their capacitance contribution ratios at various scan rates

Sample	P-NCM811	NCM811-CN0.5	NCM811-CN0.75	NCM811-CN1
a/Å	2.8701	2.8754	2.877	2.8781
$c/{ m \AA}$	14.184	14.2167	14.2678	14.3018
c/a	4.942	4.9443	4.9593	4.9691
$V/Å^3$	101.188	102.221	102.847	103.097
Li <sup>+</sup> /Ni <sup>2+</sup> (3a)	0.02892	0.02878	0.0282	0.02968
<i>R</i> [ <i>I</i> (003)/ <i>I</i> (104)]	1.6	1.68	1.74	1.49
<i>R</i> <sub>wp</sub> /%	2.4	2.12	2.57	2.92
$R_{ m p}$ /%	1.92	1.5	2.01	2.2
CHI <sup>2</sup>	0.54	0.82	0.88	1.81

Table S1 Comparison of lattice parameters of the as-obtained samples from the Rietveld refinements on the XRD patterns