Supplementary Information for

Comparison of electrochemical performance of LiNi$_{1-x}$Co$_x$O$_2$ cathode materials synthesized from coated (1-x)Ni(OH)$_2$@xCo(OH)$_2$ and doped Ni$_{1-x}$Co$_x$(OH)$_2$ precursors

Lei Tang$^a$, Gang Li$^b$, Peng Xiao$^a$, Xu Chen$^a$, Wensheng Yang$^{**}$

$^a$ State Key Laboratory of Chemical Resource Engineering, Beijing University of Chemical Technology, Beijing 100029, China; Email: yangws@mail.buct.edu.cn

$^b$ Research Institute of Petroleum Processing, Sinopec, Beijing 100083, China
Rate performance test

The Li/LiNi$_{1-x}$Co$_x$O$_2$ (x = 0.04, 0.08, 0.12, 0.16) cells were charged and discharged by applying a constant current density of 20 mA g$^{-1}$ (0.1C) for the initial 5 cycles and then cycled at 0.2C, 0.5C, 1C, 2C, 5C, 0.1C for the subsequent 30 cycles in the voltage range of 2.75-4.3 V at room temperature on a LAND CT-2001A test system (Wuhan).

Fig. S1 shows rate performance of the LiNi$_{1-x}$Co$_x$O$_2$ materials synthesized from coated and doped precursors. For the initial 5 cycles at the current density of 0.1C, the LiNi$_{1-x}$Co$_x$O$_2$ materials synthesized from coated and doped precursors both have the highest discharge specific capacity at Co content x = 0.08. However, the material with the highest discharge specific capacity becomes LiNi$_{0.88}$Co$_{0.12}$O$_2$ as the current density increases to 0.2C and is maintained until the 35th cycle at different current densities. We calculated the capacity retention rates of the LiNi$_{0.88}$Co$_{0.12}$O$_2$ materials synthesized from coated and doped precursors at current density from 0.1C to 5C, which are 78% and 73%, respectively. This is consistent with our conclusion that the electrochemical property of the LiNi$_{0.88}$Co$_{0.12}$O$_2$ material from the coated precursor is the best. It can be attributed to the “barrier effect” of the coated Co(OH)$_2$ layer.
Fig. S1 Rate performances of the LiNi$_{1-x}$Co$_x$O$_2$ ($x = 0.04, 0.08, 0.12, 0.16$) materials synthesized from (A) coated and (B) doped precursors.