Supplementary Materials

The Effects of a Mixed Precipitant on the Morphology and Electrochemical Performance of $LiNi_{0.5}Mn_{1.5}O_4$ Cathode Materials

Yang Shu, Wenchao Yan, Haisong Wang, Jicheng Jiang, Deye Sun, Xiaodi Ma, Yongcheng Jin

Thermalgravimetric Analysis

As Figure S1 shows, the weight loss of the mixture of $Ni_{0.25}Mn_{0.75}CO_3$ precursors and Li_2CO_3 can be divided into three periods: firstly, weight loss with 4.09% below 350 °C is related to water loss; secondly, the main weight loss with 28.71% between 350 and 500 °C attributes to the decomposition of carbonate and the formation of the spinel LNMO; lastly, slight weight loss with 3.71% over 500 °C is ascribed to the oxygen loss and lithium evaporation, which implies that there will be no violent chemical reactions occurring over 500 °C. Therefore, we preheated the samples at 550 °C and annealed them at 800 °C.

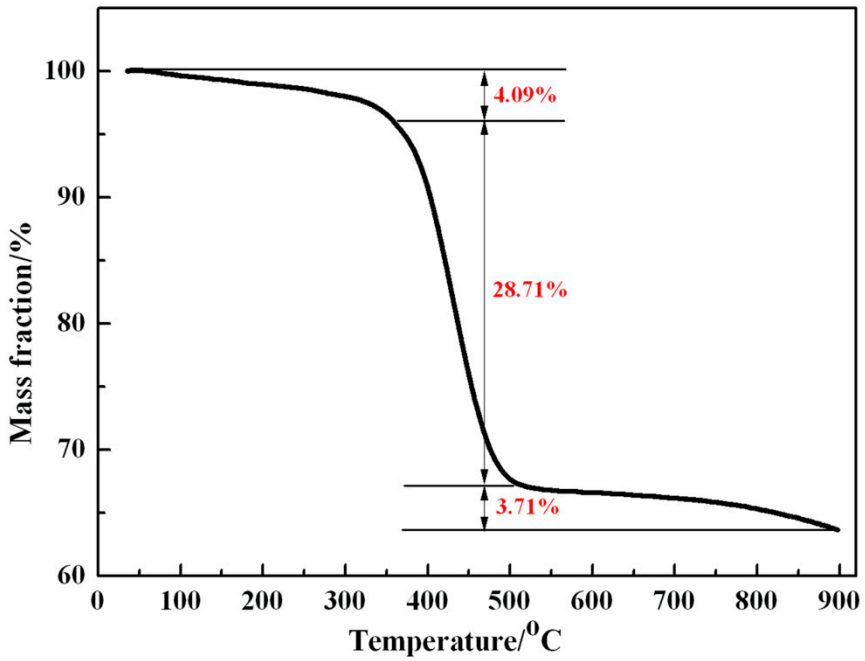

Figure S1. TG curve of heating the mixture of precursor and lithium source for mixed precipitants of $(NH_4)_2CO_3$ and Na_2CO_3 with a molar ratio of 1:2.

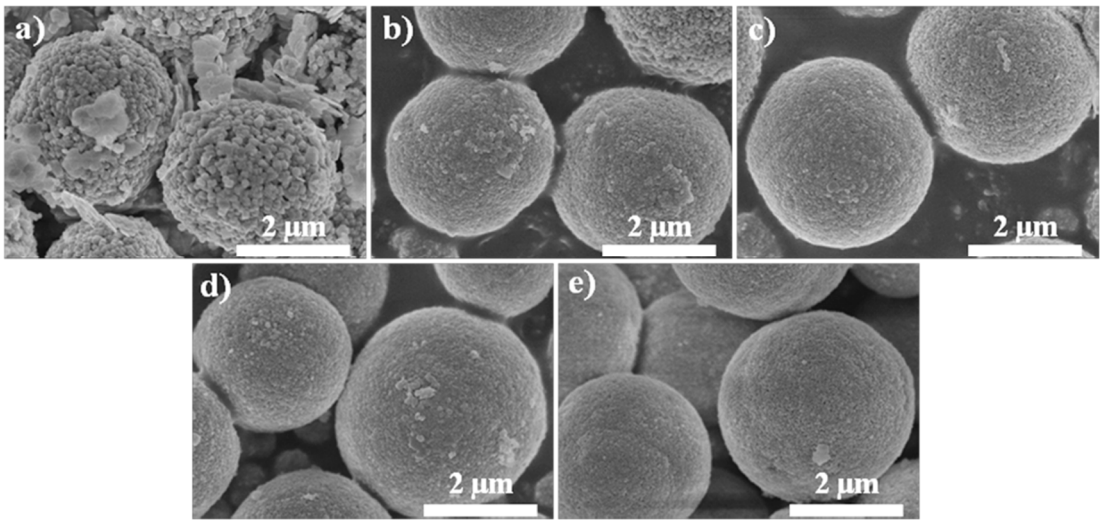

Figure S2. High-resolution SEM images of spherical precursors prepared by mixed precipitants of $(NH_4)_2CO_3$ and Na_2CO_3 with different molar ratios: (**a**) 0:1; (**b**) 1:2; (**c**) 1:1; (**d**) 2:1; (**e**) 1:0.

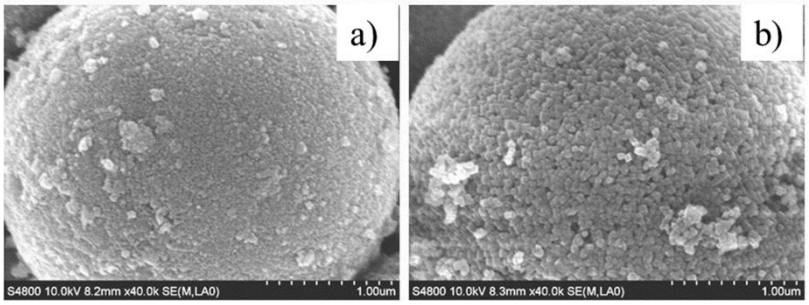

Figure S3. High-resolution SEM images of spherical precursors before (**a**) and after (**b**) hydrothermal treatment prepared by mixed precipitants of $(NH_4)_2CO_3$ and Na_2CO_3 with a molar ratio of 2:1.