

# MICROSTRUCTURAL CHANGE OF $\text{Li}(\text{NiCo})\text{O}_2$ BASED MATERIALS OF LI ION BATTERIES.

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The performance of  $\text{Li}(\text{Ni,Co})\text{O}_2$  materials as positive material has been studied by many authors. For example, we have reported the fading mechanism of lithium ion batteries with  $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ [1-3], and pointed out that the reaction and diffusion resistances of positive electrode drastically increased during durability test at high temperatures. It was revealed that the microstructural change of positive material played a important role for resistance increase. In this presentation, the microstructural change of  $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$  material investigated by various methods, such as electrochemical techniques, STEM, EELS, and XAFS. The cylindrical cells (18650-type) of  $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$  and artificial graphite with carbonate electrolyte were used for durability tests at high temperatures. The electrodes taken out of the cells before and after durability tests were evaluated by using various methods. The  $\text{LiNi}_{0.8}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$  materials before and after 1 cycle were also evaluated by STEM-EELS to compare with the materials after long durability test. The importance of non-uniform reaction, especially at low temperature will be discussed.

[1] Y. Itou et al, J. Power sources, 146 (2005) 39.

[2] T. Nonaka et al, J. Electrochem. Soc., 154 (2007) A353.

[3] T. Sasaki et al, J. Electrochem. Soc., 154 (2007) A289.