

## Structural Change of Li/LiFeO<sub>2</sub> Cell on Cycling

### 충·방전중 Li/LiFeO<sub>2</sub> 셀의 구조 변화

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Based a number of studies for developing good cathode materials for lithium secondary batteries, many candidates have been intensively evaluated and considered from various view of points, such as the cost, safety, and environmental aspects. Although lithium iron oxide is the one of the strongest candidates to satisfy these considerations, it still shows some serious problems for use as a practical cathode material such as a complex synthetic process and a lower operating voltage region.

Recently, we have reported the synthesis of nano-crystalline orthorhombic LiFeO<sub>2</sub> with advanced battery performance. It was successfully synthesized at 150°C using a solid-state method. The LiFeO<sub>2</sub> cell showed a high initial capacity of over 150 mAh/g as well as good cycle retention of over 73% after 50 cycles. Moreover, there are three new observations as follow: First, the unique role of pelletizing, which accelerated the slow reaction of lithium and the  $\gamma$ -FeOOH particles at a low synthesis temperature. Second, a Li/LiFeO<sub>2</sub> cell showed a unique capacity drop on the 13th cycle at the high current density of 0.4 mA/cm<sup>2</sup>. Lastly, this cell underwent a structural change from the orthorhombic to spinel phase during cycling, which was one main reason for the capacity loss during long-term cycling.

However, as mentioned in our previous report, there still remained some questions, such as the existence/role of the structural changes during the first cycle and the more critical investigation about the structural change after long-term cycling. We report here the unique structural change of the orthorhombic LiFeO<sub>2</sub> during the first cycle and suggest the capacity loss mechanism of the Li/LiFeO<sub>2</sub> cell during cycling using *in-situ* XRD and TEM analyses.