Synthesis of $LiMn_2O_4$ Cathode Material for Lithium ion Batteries by Solid State Process

Youngsang Kim, Jungwoo Park, Jaemyeong Lee, Insung Lee

Secondary Battery Research Team, Research Institute of Industrial Science & Technology (RIST), Pohang, South Korea, Correspond to 0402kim@rist.re.kr

Secondary batteries based on Lithium ions are popular for the EV and other applications because of their high energy density. Among many cathode materials, $LiMn_2O_4$ spinels are one of the promising cathode materials for Li-ion batteries as power sources of the EV/HEV, due to their low price and safety [1-3]. Until now, main studies on the $LiMn_2O_4$ spinels have been focused on solving capacity fading due to the Mn dissolution. Recently, a new study on $LiMn_2O_4$ has been focused on reducing a manufacturing cost which is determined by a synthesis method. A well-known method is a wet process which includes a mechanical milling with a solvent and a spray-dry process. The main challenge is that applying these processes requires considerable capital and energy costs.

In this study, we introduced the solid state mixing which achieves a one-pot synthesis of powders without any solvent in the dry phase. A detail mechanism of the solid state synthesis of the Lithium Manganese Oxide is shown in Fig. 1. Electrochemical properties are evaluated by the galvanostat mode with the half coin cell CR2032. The synthesized samples show an initial discharge capacity of 108.1mAhg-1 at 0.1C and capacity retention of 97.6% at 40 cycles.

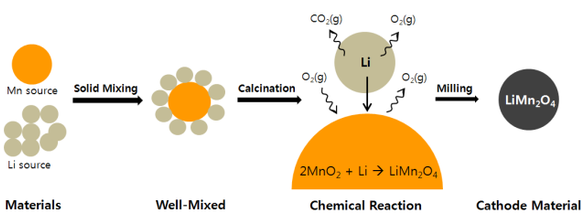

Fig. 1 Solid state synthesis of Lithium Manganese Oxide

References

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