

Synthesis and Characterization of $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ Thin Film by Electrostatic Spray Deposition (ESD) Technique

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Since the commercialization of lithium secondary batteries by Sony in 1990, LiCoO_2 is used as a cathode material despite its disadvantages of high cost and toxicity. Due to its disadvantages, many researchers have been seeking for alternative materials, and among those LiNiO_2 and LiMn_2O_4 have been studied most extensively. Recently, Dahn and Ohzuku proposed new layer structured material, $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$, which showed higher capacity, better cycling stability and thermal stability compared to LiCoO_2 .^{1,2} $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ has been aroused as a promising alternative cathode material for lithium secondary batteries.

Dahn synthesized $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ by mixed hydroxide method, $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ has a relative high capacity (about 160mAh/g) at room temperature. On the other hand, Ohzuku et al. synthesize $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ by solid state method. They calcined it at 1000 °C for 15 hours. Recently other researchers reported a powder type $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ made by sol-gel method. However, the preparation of thin film type $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ has not been reported yet.

In the present study, we synthesized thin film type $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ by electrostatic spray deposition (ESD) technique. And, its electrochemical and structural characteristics are evaluated by cyclic voltammetry, thin film X-ray diffraction, and X-ray absorption spectroscopy. Using ESD technique, we could prepare additive-free thin film electrode, and collected electrochemical and structural data can be attributed solely to cathode material itself.

Fig. 1 and 2 shows X-ray diffraction patterns and cyclic voltammograms of thin film $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ electrode prepared by ESD technique. More details will be discussed at the meeting.

REFERENCES

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2. T. Ohzuku and Y. Makimura, *Chem. Lett.*, 642(2001)

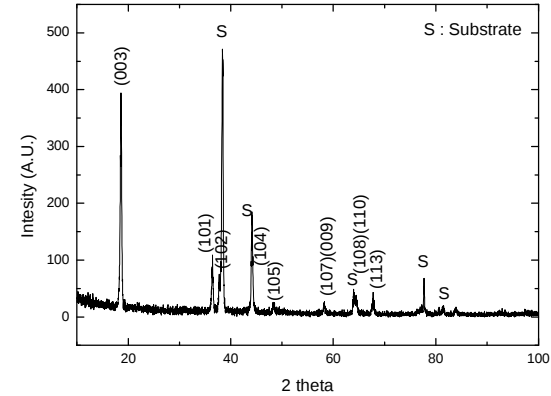


Fig. 1. X-ray diffraction patterns of thin film $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ prepared by electrostatic spray deposition (ESD) technique.

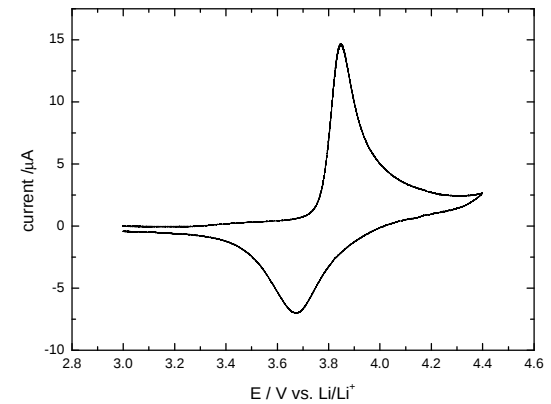


Fig. 2. Cyclic voltammogram of thin film $\text{LiNi}_{0.5}\text{Mn}_{0.5}\text{O}_2$ prepared by electrostatic spray deposition (ESD) technique.