

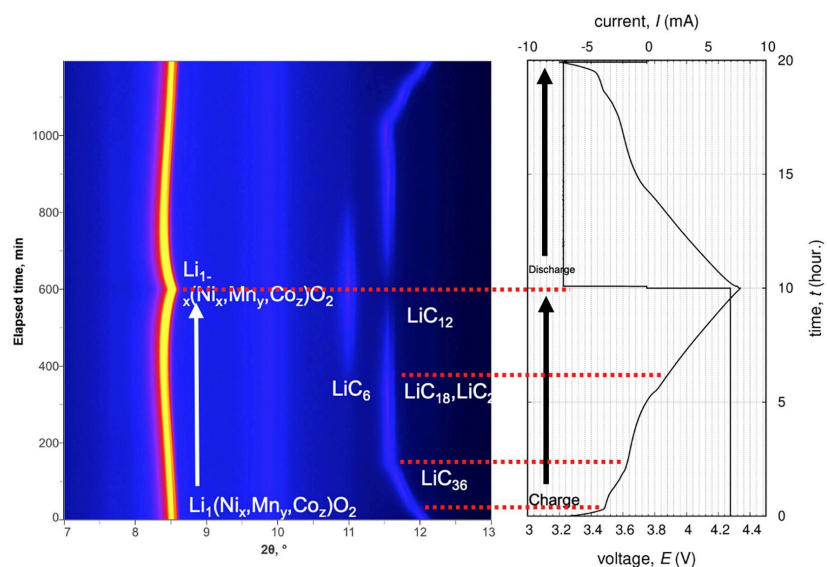
# BATT1016 - XRD Measurement During Charge/Discharge Using Laminated Cell Batteries

## Introduction

With operando measurement, in which XRD measurement is conducted while charging/discharging, crystal phase transition behavior during charge/discharge can be ascertained. This can be used to clarify charging/discharging mechanisms and estimate battery capacity deterioration. Additionally, since measurement of laminated cell batteries is generally conducted using the transmission method, information about both positive and negative electrodes can be observed.

### Phase transition analysis

- **Analysis:** Whole battery
- **Analysis method:** Rietveld analysis, operando measurement
- **Use:** Improving battery performance
- **Analyzed materials:** Laminated cell batteries (Cathode NCM, anode C, separator, electrolyte solution)



**Figure 1:** Observations of change in lattice constant (elapsed time vs  $2\theta$  (left) and charge/discharge profile (right), NCM) and observations of changes in crystalline structure (C)

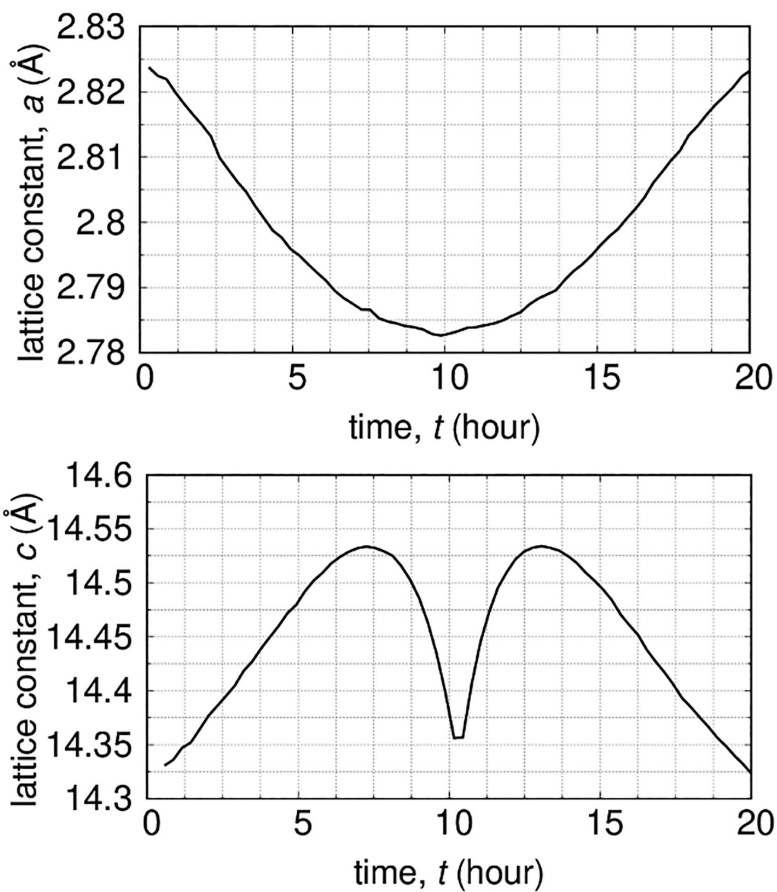


Figure 2: Change in a-axis and c-axis for NCM

## Conclusion

Changes in the lattice constant upon charging/discharging were successfully observed with operando measurement using laminated cell batteries.

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