Application Note BATT1022

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BATT1022 - Particle Distribution Analysis and Crack Analysis in Lithium-Ion Batteries

Introduction

In the design and development of batteries, it is essential to assess the internal structures of various components and materials using prototype samples. However, when performing assessments of the internal structure of prototypes using SEM, etc., physical destruction of the sample and the preparation of an observation surface were necessary.

X-ray CT enables the observation of the state of the inside of sample in a non-destructive manner. The state of parts and materials observed using analysis software can be quantitatively assessed. With this assessment, a used coin- type lithium-ion battery was scanned using X-ray CT, and the crack volume generated inside the sample, the diameter of dispersed particles within and their distribution were assessed.

Non-destructive analysis

- **Analysis:** Whole battery
- **Analysis method:** VGSTUDIO MAX
- **Use:** Improving battery performance
- **Analyzed materials:** Lithium-ion batteries CR2032

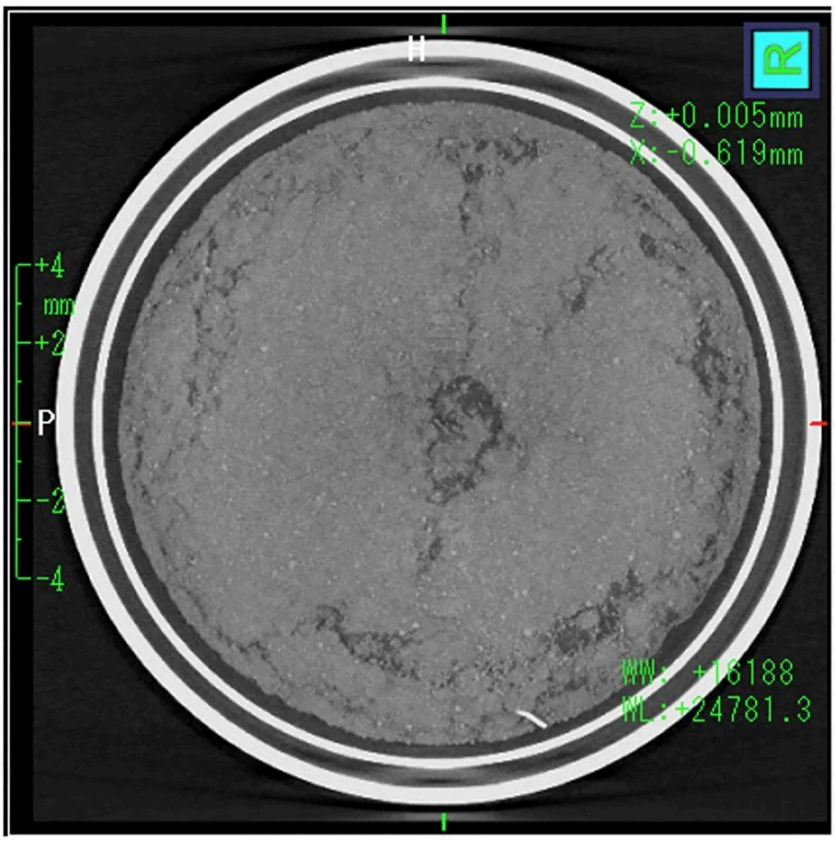

Figure 1: Tomographic image

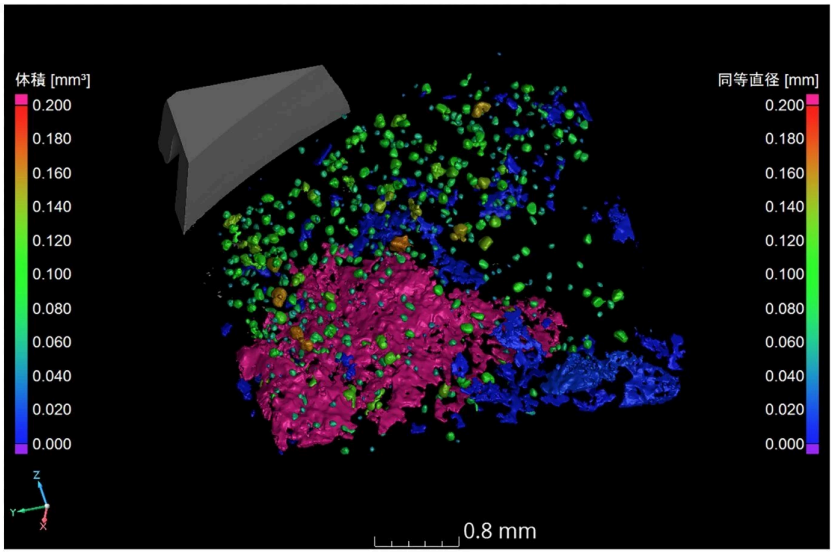

Figure 2: Analyzing part of crack analysis and particle diameter distribution analysis (Figure 1)

Conclusion

Based on Figure 1, in the sample following energization, the generation of cracks can be verified in the entire sample. Based on Figure 2, it can be ascertained that the dispersed particle diameter is roughly 0.1 mm, and that the particles are dispersed in the outer part of the sample. By observing the internal structure nondestructively, one can hypothesize where the cracks started and how their sizes relate to the distribution of the particles.

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CT Lab HX

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