

# **X-ray Analysis for Degradation Mechanism of Electrode Materials in Innovative Batteries**

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R&D of high energy batteries for vehicle use are very actively carried out throughout the world. In our institute, various systems including the solid electrolyte batteries are now under development. Among the existing project, RISING2 (Research & Development Initiative for Scientific Innovation of New Generation Batteries) is important and core project in AIST. In RISING2, new and promising innovative battery systems have been developed.

Li-metal polysulfide system is one derivative of Li-sulfur system. Metal polysulfides show higher capacity and elusion of Li polysulfide into the electrolyte solution could be reasonably suppressed [1-4]. These materials can be formed with excess sulfur by decreasing the crystallinity. Study on discharge-charge reaction and degradation mechanism will contribute to improvement of the performance, however, conventional diffraction study doesn't elucidate the exact changes in the electrode materials.

The combination of local structure analysis at synchrotron facilities such as pair distribution function, and theoretical calculation has been applied for this purpose. The results of iron polysulfide system will be presented at the meeting site.

Acknowledgement:

A part of this work was supported by the Industrial Technology Development Organization (NEDO) under RISING2 project.

## **References:**

- [1] H. Sakaebe et al., *The 58th Battery Symposium in Japan*, Abstract 2B16 (2017).
- [2] A. Sakuda et al., *J. Am. Chem. Soc.*, **139**, 8796 (2017).
- [3] K. Koganei et al., *Solid State Ionics*, **323**, 32 (2018).
- [4] T. Takeuchi et al., *Solid State Ionics*, **320**, 387 (2018).