Analysis of Carbon Negative Electrodes for Next-Generation Batteries using Solid-State Nuclear Magnetic Resonance

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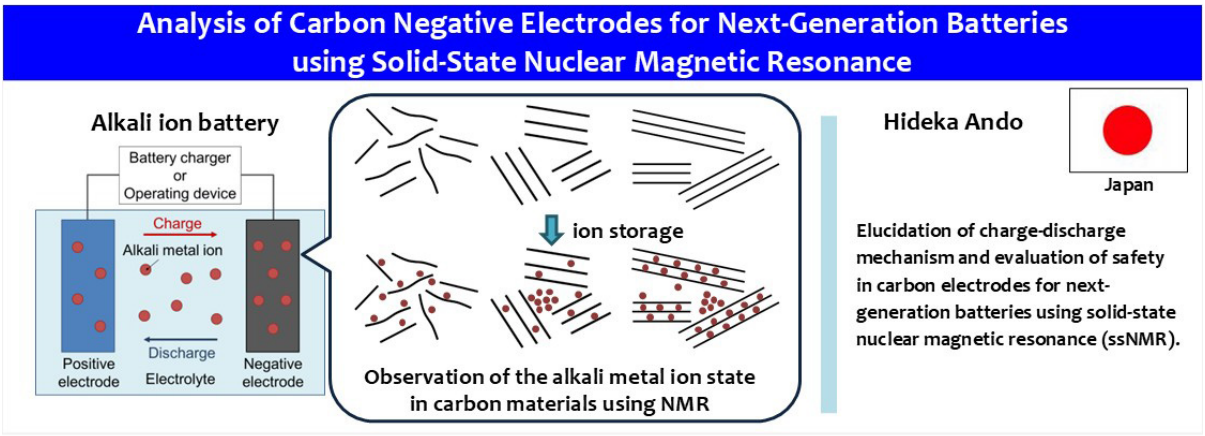

■Research

My research focuses on elucidating the charge-discharge mechanisms in carbon anode materials for next-generation batteries. Currently, Li-ion batteries (LIBs) are widely used as energy storage systems in electronic devices and electric vehicles. However, the raw materials used for LIBs are scarce, raising concerns about the stability of their supply. Next-generation batteries, such as Na-ion batteries (NIBs) and K-ion batteries (KIBs), are rechargeable batteries that have the potential to be an alternative to LIBs due to their abundance of resources. In these next-generation batteries, carbon materials such as graphite and amorphous carbons are most promising anode materials because of their high energy density and excellent cycle performance. However, the charge-discharge mechanisms in carbon anodes are highly complex and still not fully understood. Solid-state nuclear magnetic resonance (ss NMR) is a powerful tool for elucidating the mechanisms because it can observe the states of target nuclei. Therefore, I am trying to elucidation of battery mechanisms from a new perspective using ss NMR. By deepening our understanding of these mechanisms, I hope my research will contribute to the development of higher-performance electrode materials, advancing the practical application of next-generation batteries.

■Comments

I came to NIMS after graduating from the Graduate School of Material Science and Technology at Okayama University. During my doctoral program, I participated in an internship at NIMS, where I had the opportunity to conduct research with excellent facilities, as well as technical support. Based on this experience, I decide to apply to NIMS, attracted by its excellent research environment of the best institute for materials research in Japan. Coming to ICYS, I am very pleased with the excellent facilities, technical and clerical support, as well as the international working environment. As a young researcher, I am looking forward to using this opportunity to grow and contribute to society through materials science.

■Link

https://www.nims.go.jp/icys/research/#ANDO