

Research and Development of advanced Li-ion batteries for Electric Vehicles accelerated by utilization of large experimental facilities

Hideto Imai : NISSAN ARC LTD.

“EV shift” (Electric vehicle shift) has become clear in world-wide in late 2017, and automotive industry is now facing major turning point once in hundreds of years. To develop competitive EVs and motorization technologies, research and development, and application of advanced Li-ion batteries with higher-performance is strongly required.

In analysis of functions, performance and life-time of Li-ion batteries, “heart of EVs”, we cannot deal the internal electrochemical reactions as a “black-box”. Instead, we need quantitatively detailed information on electrode reactions to grasp true state of batteries and design better batteries. In addition to simple structure and physical properties of materials, we need information on real states of the materials in real operating condition, to improve design of batteries. To this reason, there have been strong demands for application of powerful evaluation methods those are available at large experimental facilities, such as synchrotron radiation x-rays at SPring-8, neutrons at J-PARC, and large-or multi-scale computer simulations at K-computer.

To date, we, NISSAN ARC have been developed various new experimental and analytical methods suitable for advanced battery developments: such as quantitative evaluation methods of electrochemical reactions at positive electrode [1], precise determination of amorphous structure of high-capacity negative electrodes [2], and non-destructive quantitative analysis of solid-electrolyte interphases [3]. We report practical examples of such application for real industry, from R&D, production to quality control phases.

Bibliography

- [1] K. Kubobuchi, *et. al*, **J. Appl. Phys**, 120, 142125 (2016)
- [2] A. Hirata, *et. al*, **Nat. Commun**, 7, 11591, (2016)
- [3] M. Matsumoto, *et. al*, **ECS Trans**. 69, 13 (2015)

External links

http://www.spring8.or.jp/ja/news_publications/press_release/2016/160513/
http://www.spring8.or.jp/ja/news_publications/publications/news/no_76/#topic