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Purpose of Research

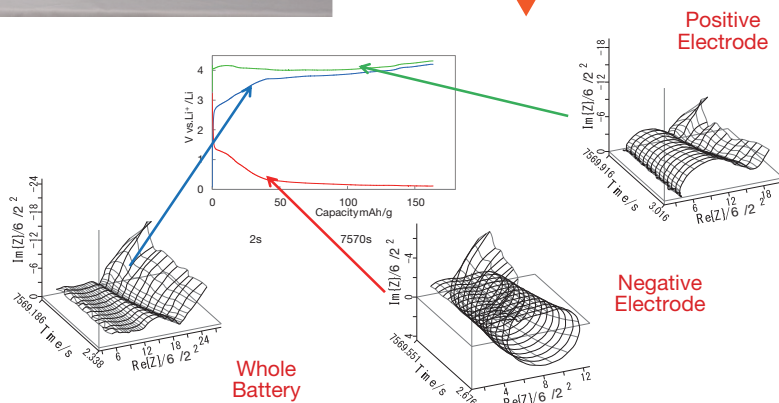
The method for determining replacement timing or reusability of built-in batteries is demanded along with the popularization of a hybrid car. In this study, we propose a multi-in-situ electrochemical impedance monitoring system which is able to diagnose deterioration without breaking a secondary battery.

Summary of Research

We have developed a measurement system which can measure quantitative internal deterioration parameters of a lithium ion battery in a charge/discharge cycle using an electrochemical impedance measurement without disassembling the battery. This system separately measures interfacial resistance of each of positive and negative electrodes within the lithium ion battery when internal deterioration evaluation for the battery is performed by multi-in-situ electrochemical impedance method.



We have developed a novel and revolutionary method for evaluating positive and negative electrodes individually while charging or discharging.



Comparison with Conventional or Competitive Technology

- The battery state can be evaluated in real-time while charging and discharging the battery.
- The positive and negative electrodes, components of the battery, can be evaluated status quo.

Expected Applications

- State evaluation for battery installed in an electric car or an aircraft
- Deterioration diagnosis for a big-scale lithium battery module

Challenges in Implementation

It is necessary to figure out the individual features of positive and negative electrodes in the lithium battery during charging/discharging cycle in situ, and to collect the data on quantitative evaluation, with the developed product.

What We Expect from Companies

We are finding a collaborative project partner for evaluating a correlation between a secondary battery states and a measuring result obtained by the developed product.

Points

- This technology enables to evaluate a natural state of the battery
- The information on positive and negative electrode can be obtained individually without breaking the battery
- Since various equivalent circuit models are provided, battery performance parameters can be evaluated in detail by automatic fitting

Future Developments

- Establish deterioration diagnosis algorithm through evaluation of actual batteries mounted on the hybrid car or the electric car.
- Utilize this theory to development a battery with functions of high-speed charging and discharging.

- Intellectual Property:
Japanese Patent Application No. 2014-173644
“Method and Device for Evaluating Battery Features”

