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Comparison of Entropy Coefficient and Internal Resistance of Two (Used and Fresh) Cylindrical Commercial Lithium-Ion Battery (NCR18650) with Different Capacities

Authors : Sara Kamalisiahroudi, Zhang Jianbo, Bin Wu, Jun Huang, Laisuo Su

Abstract : The temperature rising within a battery cell depends on the level of heat generation, the thermal properties and the heat transfer around the cell. The rising of temperature is a serious problem of Lithium-Ion batteries and the internal resistance of battery is the main reason for this heating up, so the heat generation rate of the batteries is an important investigating factor in battery pack design. The delivered power of a battery is directly related to its capacity, decreases in the battery capacity means the growth of the Solid Electrolyte Interface (SEI) layer which is because of the deposits of lithium from the electrolyte to form SEI layer that increases the internal resistance of the battery. In this study two identical cylindrical Lithium-Ion (NCR18650)batteries from the same company with noticeable different in capacity (a fresh and a used battery) were compared for more focusing on their heat generation parameters (entropy coefficient and internal resistance) according to Brandi model, by utilizing potentiometric method for entropy coefficient and EIS method for internal resistance measurement. The results clarify the effect of capacity difference on cell electrical (R) and thermal (dU/dT) parameters. It can be very noticeable in battery pack design for its Safety.

Keywords : heat generation, Solid Electrolyte Interface (SEI), potentiometric method, entropy coefficient
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