

Study of Temperature Difference and Current Distribution in Parallel-Connected Cells at Low Temperature

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Abstract : Two types of commercial cylindrical lithium ion batteries (Panasonic 3.4 Ah NCR-18650B and Samsung 2.9 Ah INR-18650), were investigated experimentally. The capacities of these samples were individually measured using constant current-constant voltage (CC-CV) method at different ambient temperatures (-10 °C, 0 °C, 25 °C). Their internal resistance was determined by electrochemical impedance spectroscopy (EIS) and pulse discharge methods. The cells with different configurations of parallel connection NCR-NCR, INR-INR and NCR-INR were charged/discharged at the aforementioned ambient temperatures. The results showed that the difference of internal resistance between cells much more evident at low temperatures. Furthermore, the parallel connection of NCR-NCR exhibits the most uniform temperature distribution in cells at -10 °C, this feature is quite favorable for the safety of the battery pack.

Keywords : batteries in parallel connection, internal resistance, low temperature, temperature difference, current distribution

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