

Thermal Management for Startup of Li-Ion Batteries

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In great part due to their unsurpassed energy density, lithium ion batteries are the chemistry of choice for electric and plug-in hybrid electric vehicles (EV, PHEV) such as the Chevy Volt and the Nissan Leaf. However, significant challenges remain in the practical implementation of Li-ion technology in automotive applications. Some of these challenges include safety issues related to large format cell design, development of thermal management strategies to mitigate cell degradation and thermal runaway that occur under certain conditions, and poor cell performance at low temperature [1,2,3,4].

In this work, using EC Power's software in the loop AutoLion tool, we investigate the effects of various startup procedures on Li-ion battery performance. In particular, we focus on low temperature conditions, which are of particular challenge for Li-ion batteries, due to factors such as poor electrolyte performance, sluggish electrochemical kinetics, and potential for Li plating in the anode. We accomplish this through a series of illustrative case studies aimed at highlighting some of these challenges and suggesting a few methods to overcome these challenges.

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References

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