# Heat Generation Breakdown of Lithium-ion Batteries

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## Abstract

The thermal behavior of lithium ion batteries could be investigated by efficient simulation method [1,2]. Here, we developed an electrochemical-lumped thermal analytical model to analyze the thermal response and heat breakdown of a pouch LiNi1/3Co1/3Mn1/3O2 battery (3Ah) under fast-discharging conditions at 7C(environment temperature:20℃). The key parameters of the proposed model (such as diffusion coefficient and reaction rate constant) possess the temperature dependent Arrhenius behavior while temperature is relevant to heat generation, heat conduction, and convective heat dissipation. Based on the method of integral transformation, the state estimation algorithm is able to rapidly recover the model states of current, voltage and temperature. The theoretical solution is tested to be highly accurate through comparison of numerical solution results and experimental data. As a consequence, our simulation model can scientifically and precisely calculate the heat generation and temperature distribution of lithium ion batteries.

## Reference

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