

Batemo Develops Fast-Charging Li-ion Batteries Using Modeling and Simulation

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Fast charging of Li-ion batteries is a prerequisite for successful electromobility. If anode potential falls below zero during lithium plating charging, the result is a loss of capacity and therefore driving range. Formation of metallic lithium is a severe safety risk and must be avoided. Preventing battery aging traditionally meant time-consuming experimental effort, and modeling approaches were either unreliable or just too slow.

Batemo has developed a globally validated Simulink® model and data collection approach for reproducing anode and cathode behavior in Li-ion batteries under conditions of the charging and discharging currents, excitations, temperatures, and states-of-charge specified by the manufacturer. This model precisely predicts under which conditions batteries can be charged how fast and enables reliable planning of batteries and charging infrastructures with respect to functional safety, heating, cooling, aging, and pack and charger design requirements.

Advantages of using MATLAB and Simulink:

- Data collection, processing, and Simulink model generation mostly automated
- Parametrization possible for any cell type
- Clearly demonstrable global validity
- Precise, fast, easy-to-use approach that is compliant with safety requirements

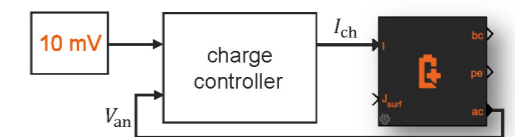
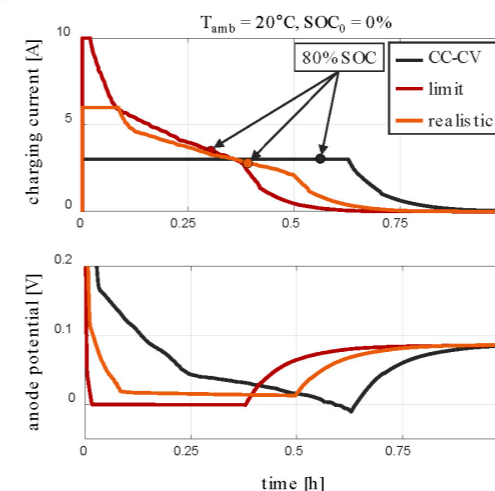


In the laboratory, this takes ages.

Instead, **we digitize a Simulink model once**, write the scripts, and **run it overnight.**



The Strategy



Fastest CC-CV:	34 Min.	-47%
Physical Limit:	18 Min.	
Realistic:	23 Min.	-32%
	without additional aging	