

Durability Effects of High Frequency Pulse Charging

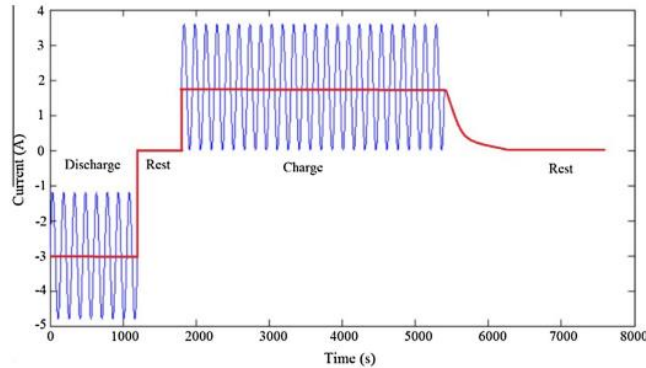


Figure 1. Cell charged with DC signal with a superimposed AC cycle (Uddin et al., 2016) (for illustrative purposes)

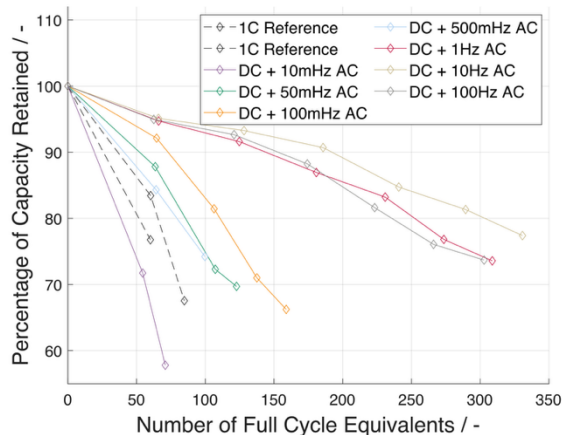


Figure 2., illustrates effect of different frequency on Cell Capacity. Similar investigation to be performed and analysed for lithium-ion cells

The Goal of the Project:

- Understanding the effect on durability and performance of lithium-ion cells due to high frequency cycling
- To investigate internal resistance at various frequencies. Analyzing the voltage response to applied current pulses and then calculate the internal resistance, which is critical for assessing power efficiency and heat generation
- Analyzing the effect on cell capacity fade and lithium-ion plating due to high frequency charging
- Understanding the impact of different charging frequency 1 Hz-1 kHz on cell charging efficiency and cell thermal attributes
- Increase the cooperation between Chalmers and Volvo Cars for battery research
- Publish project report which can explain the advantages and limitations (if any) of high frequency pulse charging

Background:

Traditionally the multi-stage constant current or constant current charging methods are used for charging of lithium-ion cells. The traditional methods have the potential to be improved in terms of charging efficiency, temperature rise during charging, charging capacities, shorten charging time and extension of cell cycle life. The planned test to understand the durability effects of high frequency pulse charging will help to understand the advantages and limitations of high frequency pulse charging and eventually if the results looks favorable and improves charging efficiency, cell life-span and reduce demand of cooling during charging then it will open doors for new and efficient cell charging method.

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