Harvesting Energy from Lithium Batteries

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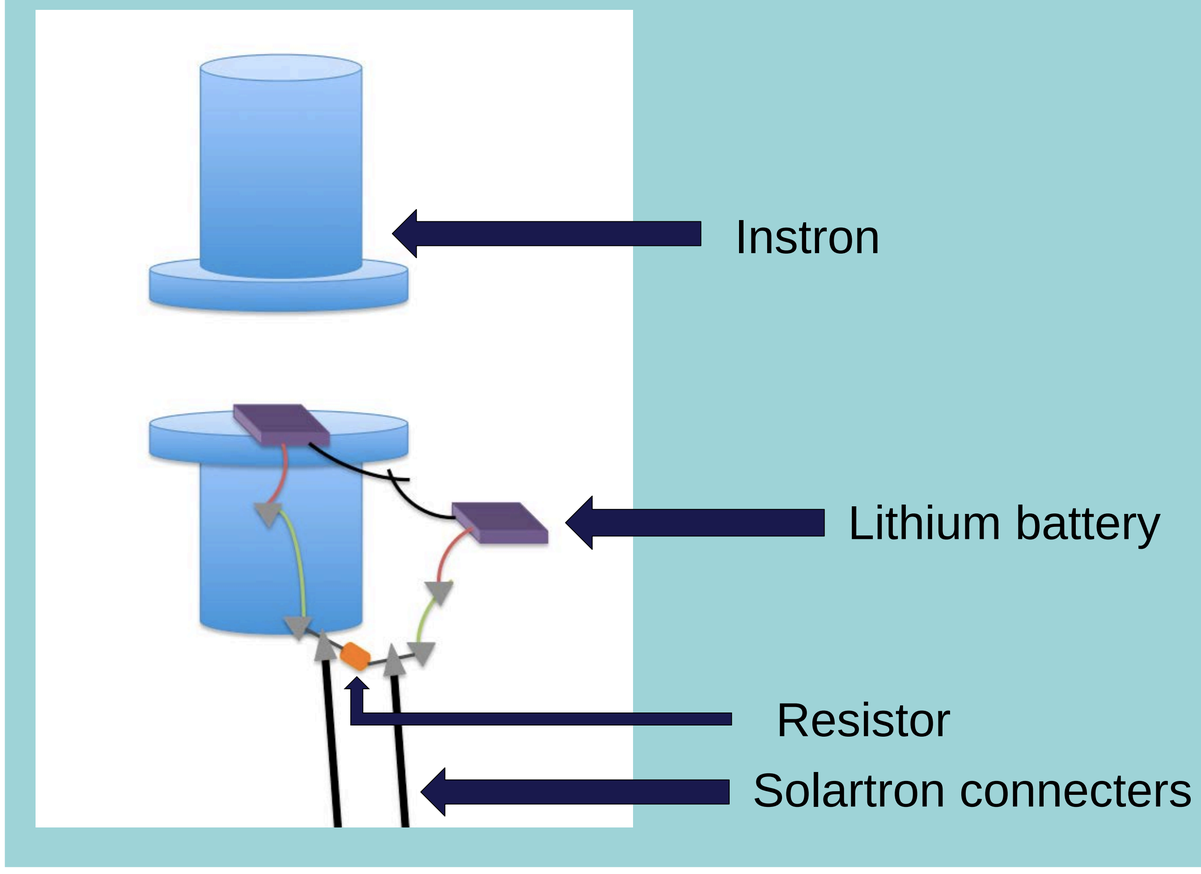
Background

A major focus on lithium batteries today is to better understand them and improve energy harvesting from batteries. The state of health (SOH) of a battery is the available capacity of a fully charged battery as a percentage of its original capacity. The state of charge (SOC) of a battery is the percentage of remaining available capacity. Mechanical stresses and strains in a battery can indicate the state of health and state of charge. When a battery is charged it expands, and when it is discharged it contracts. Working with lithium pouch batteries, we observe that when a battery is compressed, its voltage increases.

Setup

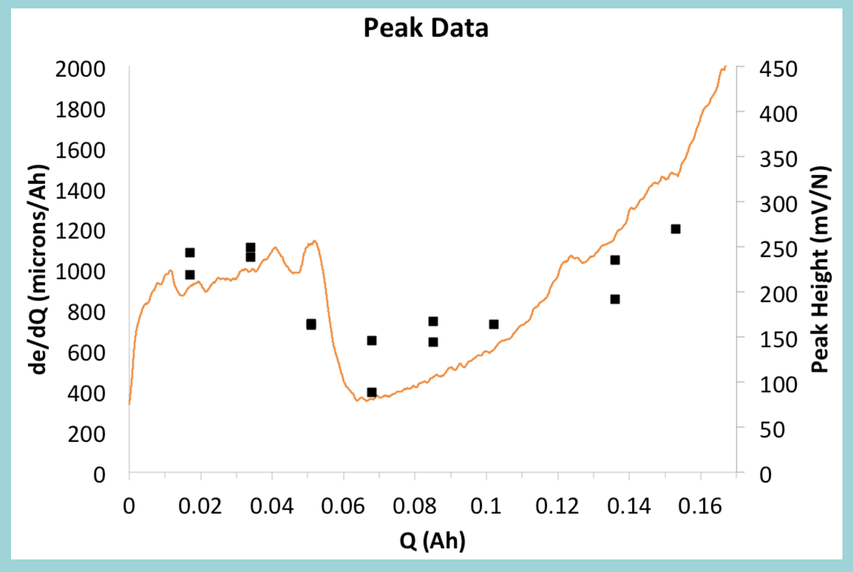


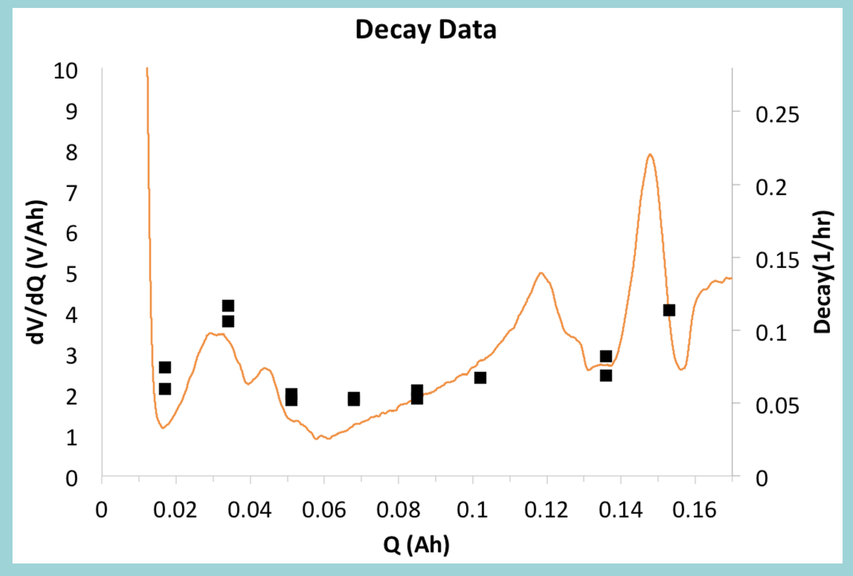
Methodology

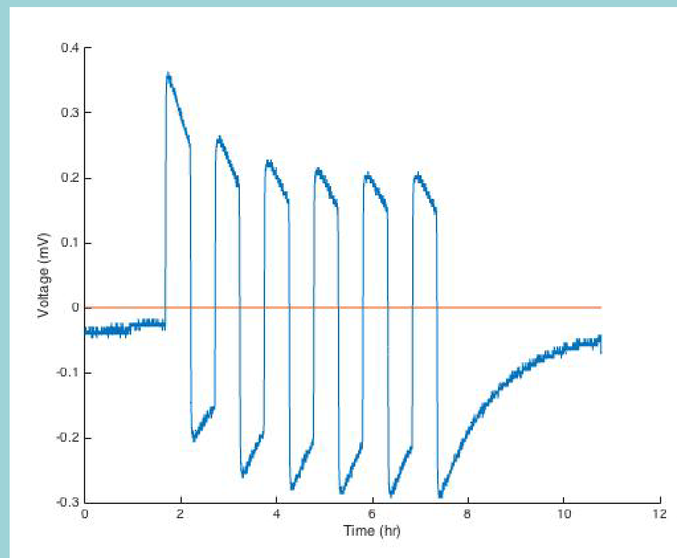
- Charged and discharged batteries at various percentages ranging from 10% to 90%.
- Used an Instron to squeezed a lithium ion battery for 6, one-hour cycles.
- Collected data from the Instron and Solartron potentiostat.
- Analyzed data using a Matlab program.

Data

- Peak Data- the maximum voltage of the batteries plotted with the derivative curve.
- Decay Data- the voltage decay of the batteries over time plotted with the derivative curve.
- Using the data from the Solartron potentiostat, we are able to create the graph at the bottom left. Using the graph, Matlab computed the peak and decay from each cycle.
- The average efficiency of the batteries was calculated to be 0.004972771%







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