Battery Aging and Impedance Analysis

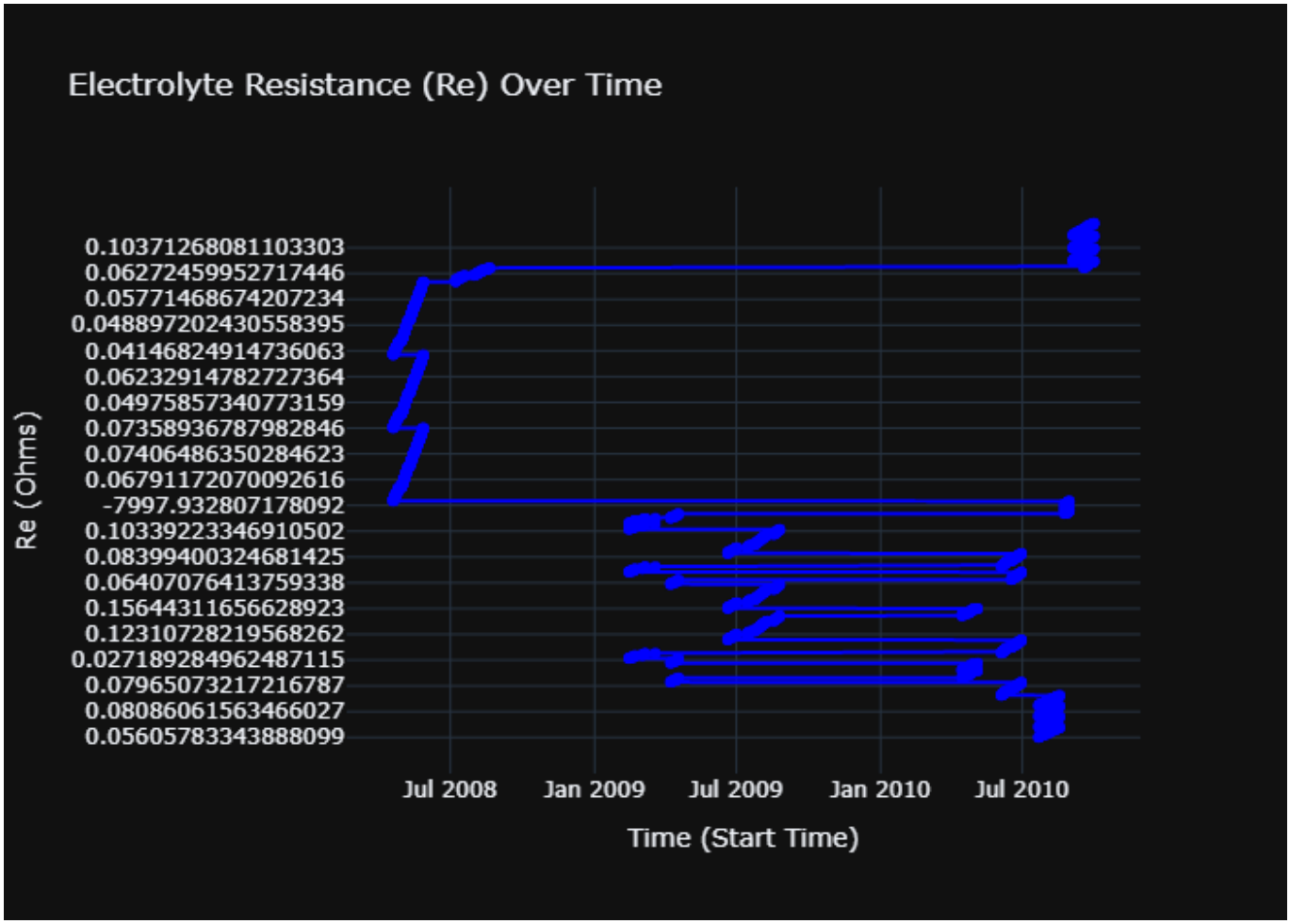
This report presents an analysis of the aging process of Li-ion batteries, based on the NASA Battery Dataset. The analysis includes battery impedance (Re and Rct) measurements, which were taken over
several charge/discharge cycles. The experiments were stopped when the batteries reached their end-of-life
(EOL) criteria. This report aims to explore how these battery parameters evolve over time during the aging
process of the batteries.

Methodology:

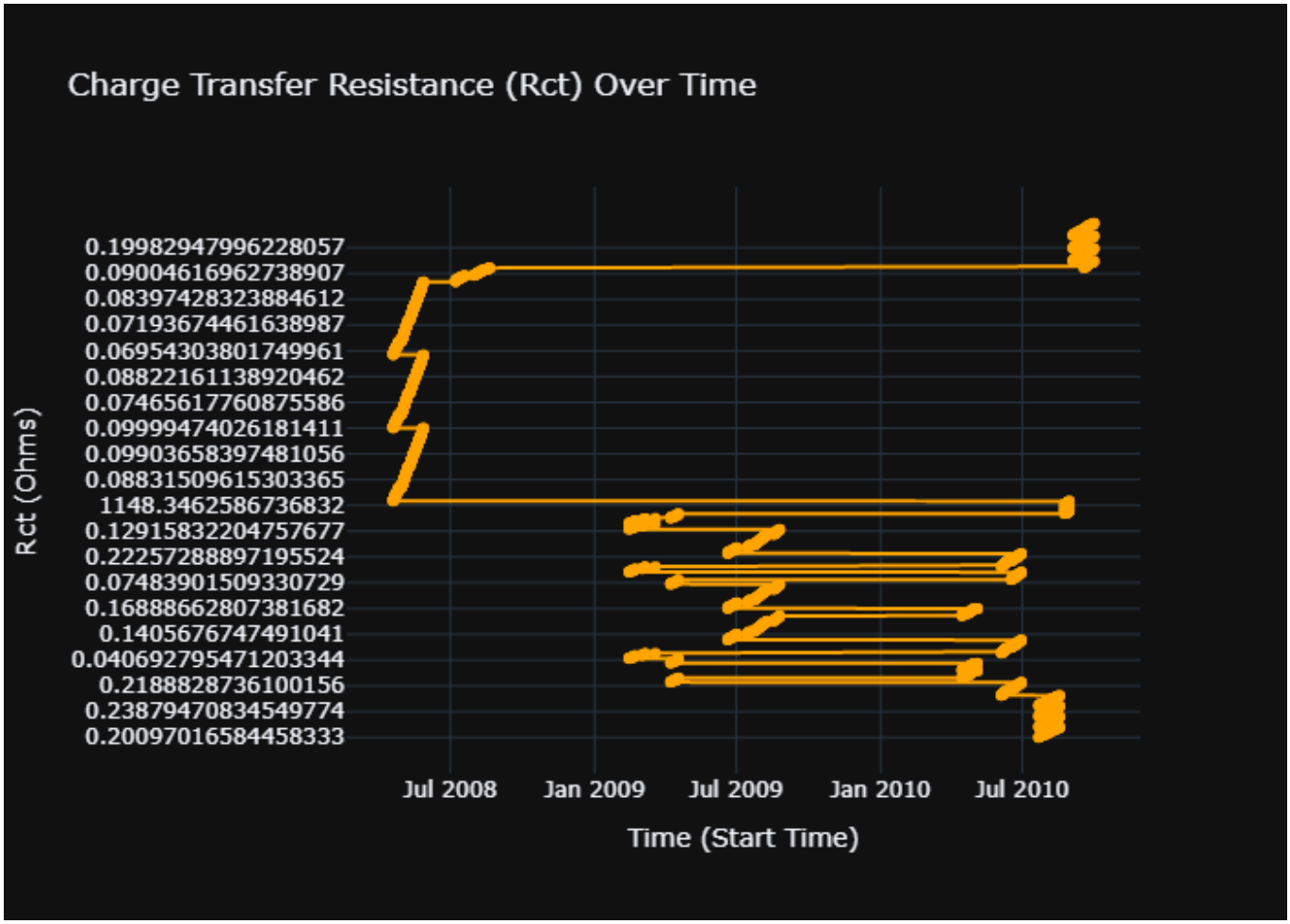
The dataset was filtered for impedance data and the start time, Re, Rct, and battery ID were extracted for analysis.

The impedance measurements (Re and Rct) were plotted over time to observe how these parameters change as the
battery ages. The plots represent the electrolyte resistance (Re) and charge transfer resistance (Rct), which are
crucial for understanding the internal condition of the battery during operation.

Plot 1: Re (Electrolyte Resistance) over Time



Plot 2: Rct (Charge Transfer Resistance) over Time



Analysis of Results:

- Re (Electrolyte Resistance) over Time: The plot demonstrates how the resistance of the electrolyte increases over

time, which could indicate the internal degradation of the battery material as it ages.

- Rct (Charge Transfer Resistance) over Time: The plot illustrates how the charge transfer resistance changes, which

provides insight into how effectively the battery can transfer charge, an important indicator of battery performance.

Conclusion:

The analysis of Re and Rct indicates that as the battery ages, both the electrolyte resistance and charge transfer

resistance increase, which signifies degradation of the battery. These trends are consistent with the expected behavior

of Li-ion batteries as they undergo charge/discharge cycles. Future studies could investigate additional parameters

affecting battery life and performance, and explore methods for improving battery longevity.