NOBLEAI

USE CASE

Identifying Optimal EV Battery Electrolytes with Science-Based AI (SBAI)

Accelerate your time to market by reducing the number of experiments needed to optimize your electrolyte formulations.

Target

Electric vehicles are being rapidly deployed to replace traditional fossil-fuel based transportation modes. One of the many challenges encountered with electric vehicle battery development is the optimization of appropriate electrolyte formulations with chemical compatibility toward the desired anode and cathode while simultaneously maintaining high Li-ion transport. Accelerating electrolyte discovery reduces development costs and improves battery performance.

Challenge

Depending upon the battery type (Li-ion, Li-metal, etc.), various electrolyte strategies have been employed. Regardless of the battery approach, chemical reactions will take place between the electrodes and the electrolyte components that lead to battery aging and degradation. There are multiple types of components included in each electrolyte formulation: solvents, lithium salts, and often multiple additives & diluents. The large number of members of each category presents a formidable formulation optimization problem, with each test taking a significant time to determine capacity drop vs. charge/discharge cycling. Predictive tools that reduce the number of required real-world experiments are needed.

Solution

At NobleAI, we utilized real-world Li-ion and lithium metal battery test results coupled with our database of component structural and property information to create science-based AI models. Models that:

- Predict the performance of electrolyte formulations for Li-ion and lithium metal anode battery configurations.
- Exhibit high data efficiency (i.e. fewer tests are needed).
- Allow for generalizability to untrained components beyond traditional ML.

NobleAI Battery Use Cases