

## BATTERIES

The future widespread adoption of electric vehicles will result in reduced harmful emissions and cleaner air, among other social and economic benefits. The battery industry is in need of software solutions for battery manufacturers to reduce fabrication and development costs while improving key battery metrics. Charging capability, energy density and cost will need to improve dramatically, but AI has the potential to drive battery development and understand the relationship between data and battery parameters.

### OUR TECHNOLOGY

Intellegens has developed a machine learning tool, Alchemite™, that trains models on all available data, no matter how sparse or noisy. We bring all the available data together and use underlying correlations to accurately predict missing values and generate the most complete models possible. Applying this novel method to the available historical and simulated data, enables organisations to identify opportunities for reducing costs and downtime, time savings and overall performance improvements, through predictive maintenance and process optimization.



### AREAS OF RESEARCH

#### Battery chemistry

Alchemite™ designs the best possible chemical characteristics of molecules that can prove to be the basis of a next-generation battery material. Reduce reliance on toxic materials and optimize the flow of current between the cathode and the anode.

#### Battery pack design and geometry

Alchemite™ understands how changes in pack design and geometry impact overall battery performance and optimize the design to meet target requirements such as thermal management, power density, and charging rates.

#### Battery management systems

Alchemite™ predicts how many cycles a battery can have and how many years it will last before it starts degrading. Better lifecycle predictions can help identify why some batteries fail earlier than others, thereby allowing safety to be monitored.

### WHAT ALCHEMITE™ CAN OFFER

- 1 Optimize material performance for multiple target properties
- 2 Reduction of prototype costs  
Alchemite™ cuts down the number of prototypes needed from 20 to fewer than five (on average).
- 3 Reduction in the number of experiments by 90%  
Virtual experiments extract valuable information about correlations between parameters, reducing R&D costs.
- 4 Minimization of expensive properties & reduction of environmental impact
- 5 Standardization of the design process across the company

### PUBLICATIONS AND RESOURCES

ANSYS Granta, Intellegens and the University of Birmingham secure funding to improve battery metrics with artificial intelligence ([press release](#))

UK-based consortia (including Intellegens) secures £55 million for energy storage research ([article](#))

Data-driven machine learning is the best approach for advanced battery modelling ([press release](#)).

Predicting the state of charge and health of batteries using data-driven machine learning ([Nature publication](#)).

Machine Learning for Battery Optimisation ([white paper](#))

#### About Intellegens

Intellegens, has developed a unique machine learning toolset for sparse and noisy data. We apply deep learning to rare and valuable experimental data to help guide next generation materials, chemicals and drugs. The generated models also enable knowledge to be shared across an organization, ability to run virtual experiments and guide future experiments.



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