A powerful software platform for battery development

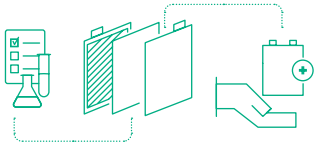
PROTEO Design

PROTEO Prediction

PROTEO Data Analytics

Offering value through three combined tool

From complexity

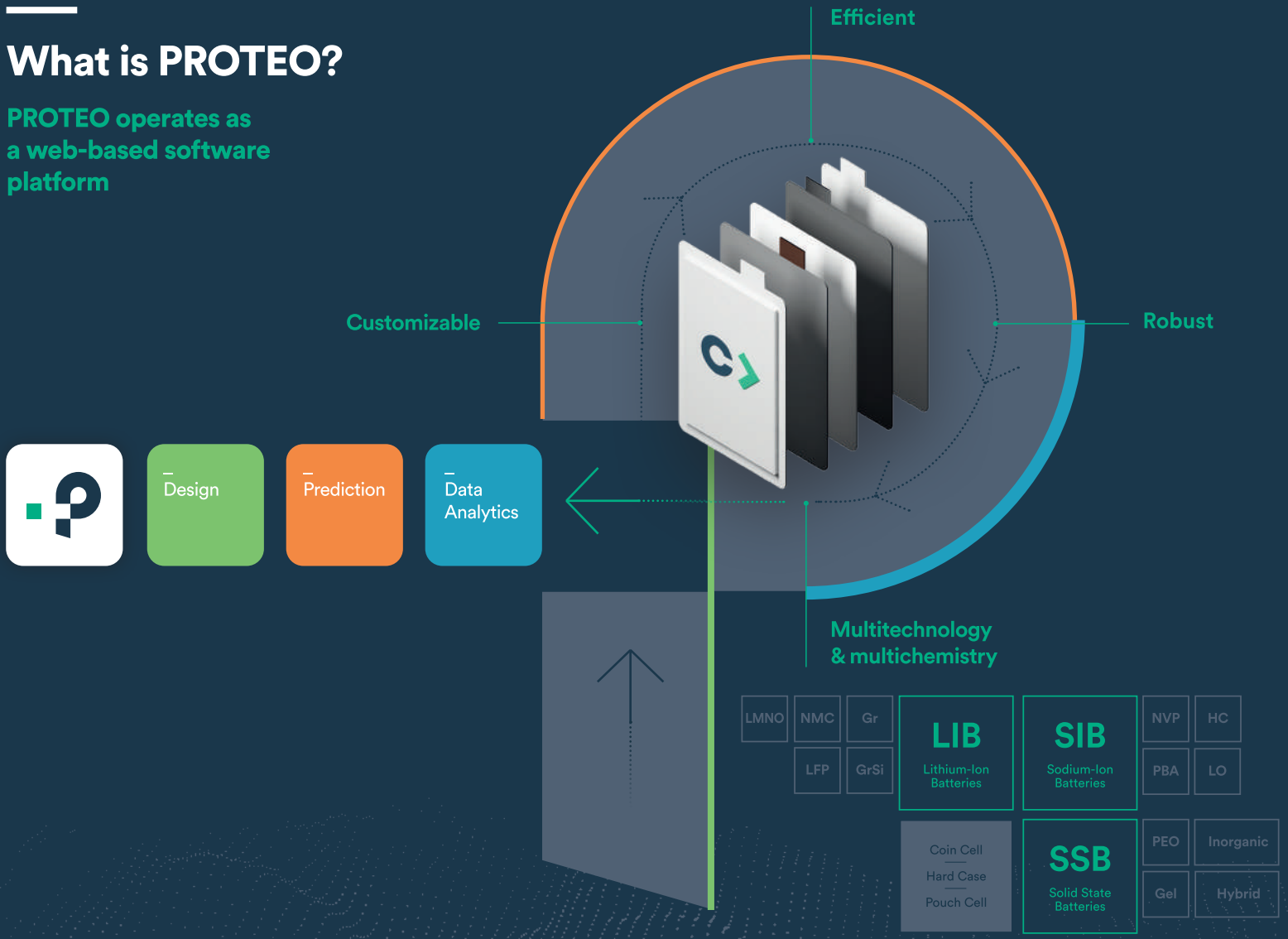


to simplicity

proteo by CIDETEC

What is PROTEO?

PROTEO operates as a web-based software platform



Design

Design | Prediction | Data Analytics

PROTEO Design offers a revolutionary approach to battery cell creation and optimization, entirely in a virtual environment. Delve deep into the underlying phenomena of advanced cell design and become adept at identifying and mitigating failure modes.

PROTEO Design is built on multiphysics models, encompassing electrochemical, thermal, & mechanical aspects

ELECTROCHEMICAL
Charge, mass and kinetic phenomena description

THERMAL
Heterogeneous cell thermal behaviour

SWELLING
Cell/Electrode Swelling

DEGRADATION
Understanding degradation mechanisms

Can be applied to any battery cell material and component

MATERIAL
Electrode, Electrolyte and cell domains

Addresses multi-objective optimization of the system, such as achieving the highest energy density alongside optimal cyclability

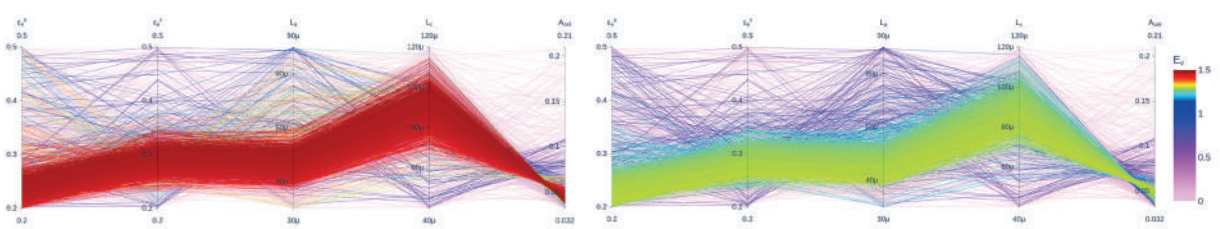
MULTIOBJECTIVE OPTIMIZATION
Formation protocol, Performance, Ageing

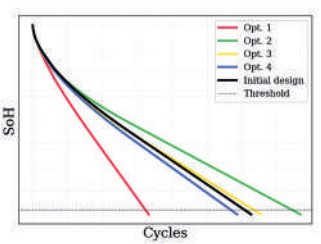
COMPLEMENTARY SERVICES

PARAMETRIZATION
Leveraging Physics-based Models for Parameterization. Offering robust, precise, and swift parameterization solutions

VALIDATION
Cell prototyping (LIB, SIB, SSB)

Design Optimization





Prediction

Design | Prediction | Data Analytics

PROTEO Prediction is a fast and powerful AI-based tool that predicts the lifetime of a battery cell, considering electrode characteristics, cell design, and usage profile.

PROTEO Prediction uses regression and time series models

MODELS

Data-driven, hybrid models

Trained using historical data. It considers both the cell chemistry and fundamental physical characteristics of the electrodes

MATERIALS

Electrodes and Cells, multitechnology and chemistry

It predicts battery lifetime, degradation modes, and State of Health (SoH) evolution, substantially reducing the need for lengthy battery cyclability testing

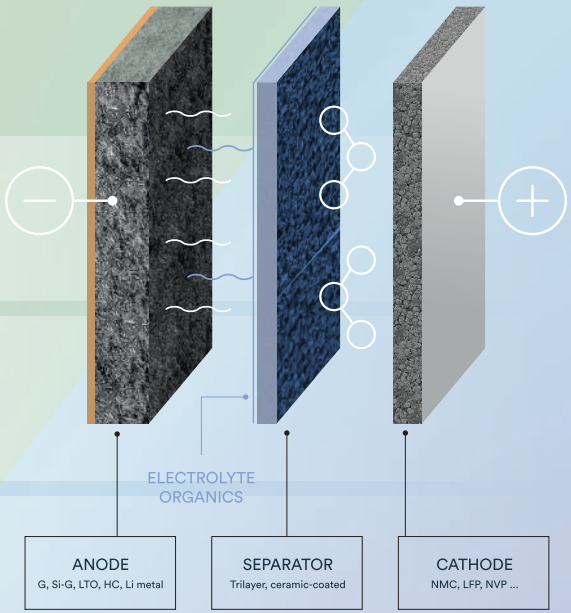
PREDICTION

Early prediction, SOH and Degradation modes prediction

COMPLEMENTARY SERVICES

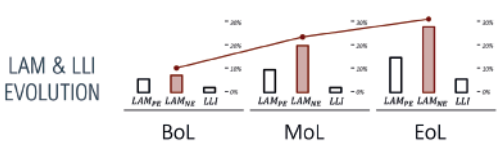
DoE

Creation of a smart DoE to minimize experiments from your system is also offered as an additional service

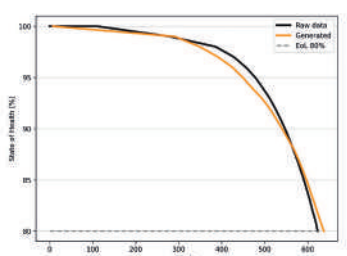


Lifetime prediction

Degradation modes estimatio



SoH prediction. Multichemistry & multitechnology

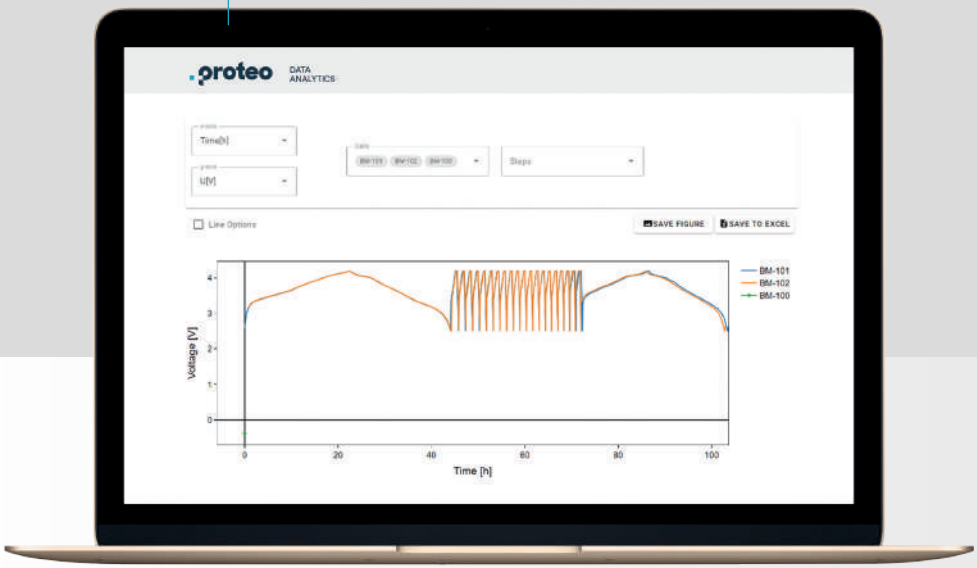


Data Analytics

Design | Prediction | **Data Analytics**

PROTEO Data Analytics is a tool that streamlines the analysis of experimental data and visualization from various sources, saving both time and resources.

AI PROTEO Data Analytics utilizes AI to identify patterns and detect anomalies.



Features

AUTOMATIC
Speeds up the data processing.

CUSTOMIZABLE
Different data sources: battery equipments, field data.

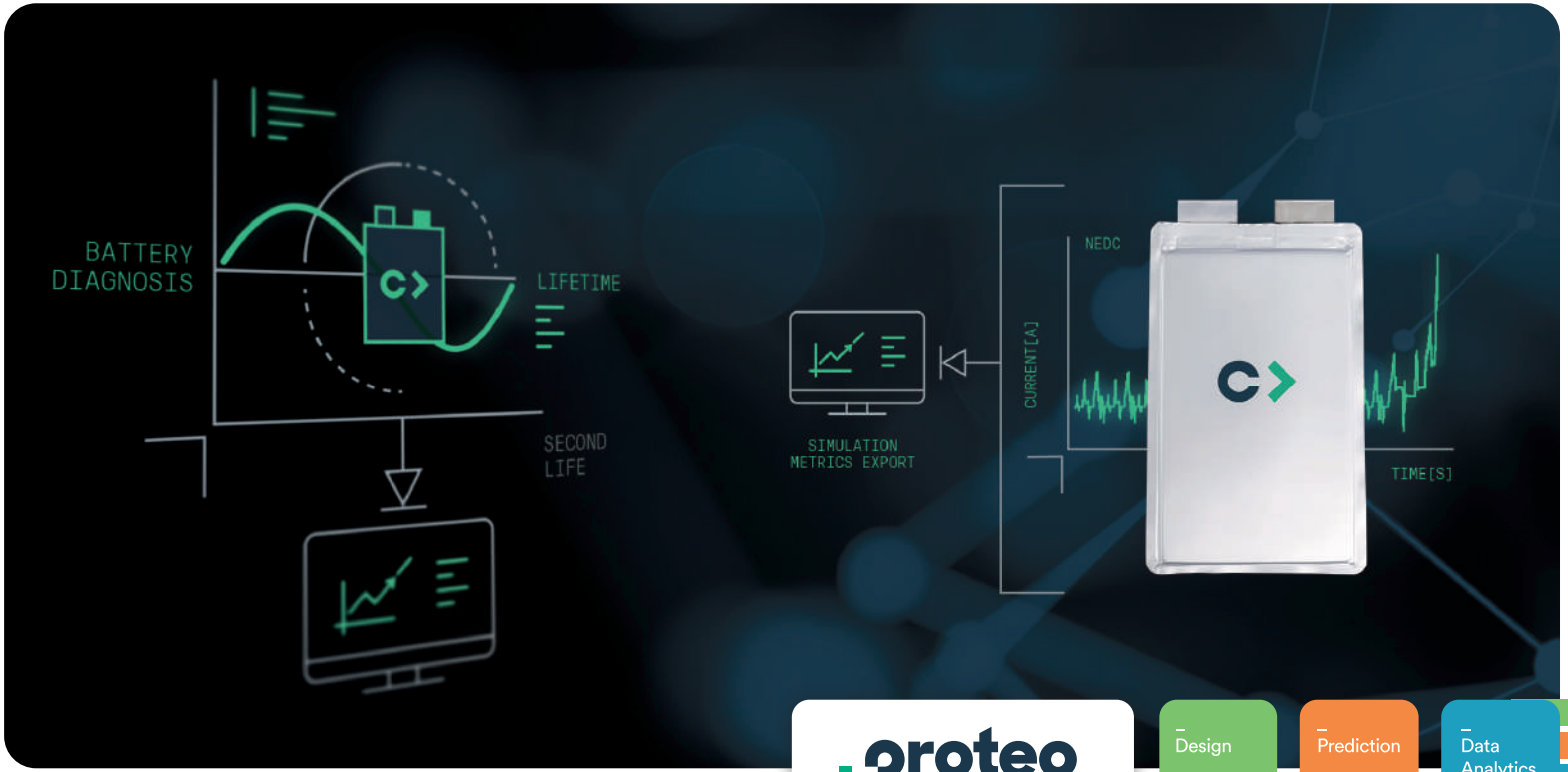
It allows

A Data finding & exploring
- Search from test equipment files or field data
- Search based on results and metadata

B Data processing
- Automatic test plan recognition and interpretation
- Postprocessing tools, e.g.:
  - Automatic GITT results analyzer
  - Automatic EIS results analyzer
  - Degradation Models Estimator Tool

C Data visualization
- Interactive and customizable graphics

D Exporting of results
- Excel, CSV, PNG, ...



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Design

Prediction

Data Analytics

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