BioLogic

Advanced
Fuel Cell & Electrolyzer

Electrochemical solutions for research and industry

Your fuel cell & electrolyzer development challenges. Our proven solutions.

The drive for more sustainable energy sources means fuel cells and electrolyzers are reemerging as an appealing source for backup energy generation and transportation.

Fuel cell and electrolyzer development spans from catalyst discovery through to single cell investigations, and up to full stack validation. Whether you are investigating novel electrocatalysts, optimizing membrane–electrode assemblies, or validating full systems under realistic operating conditions, BioLogic solutions support every stage of development with dedicated instrumentation and software, advanced electrochemical techniques, and integrated test platforms.

Catalysts & Components

Innovation begins at the catalyst and component level. Reliable benchmarking and high throughput screening of electrocatalysts, membranes, gas diffusion layers, and interfaces requires precise electrochemical control and standardized testing conditions. BioLogic solutions enable reproducible evaluation of activity, stability, and degradation mechanisms under well-defined environments.

Research advantages

- Advanced electrochemical techniques for catalyst activity and durability benchmarking
- High throughput screening of electrocatalysts
- High sensitivity measurements for kinetic and interfacial studies
- Local & component-level investigation capabilities

Cell Studies (MEA & Single-Cells)

At the cell level, researchers bridge fundamental understanding and realistic operation. Detailed insight into reaction kinetics, mass transport, and degradation processes is essential for optimizing MEA design and operating strategies. Our solutions provide the flexibility and accuracy required to study fuel cells and electrolyzers under dynamic, application-relevant conditions.

Research advantages

- Versatile control and analysis techniques for novel chemistries and cell designs
- Advanced modeling and EIS tools to understand kinetics, degradation, and mechanisms
- Flexible configurations for custom cell formats, temperature control, and reference electrode setups

Stacks

As development progresses toward stacks, testing must reflect real operating environments. Scaling from single cells to multi-cell stacks requires synchronized measurements, robust safety management, and long-term stability. BioLogic solutions support consistent, traceable testing to validate performance, efficiency, and durability at the system level.

Research advantages

- Synchronized multi-channel testing for stack-level investigations
- Accurate monitoring of voltage distribution and degradation across cells
- Long-term durability testing under realistic load profiles
- Safe, reliable operation for extended validation campaigns

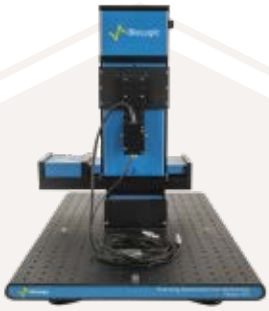
BluPEM Workstations

BluPEM workstations combine high-performance electrochemical instrumentation with dedicated fuel cell and electrolyzer hardware. Designed for research and development our BluPEM platforms deliver precise control, advanced diagnostics, and flexible configurations from materials testing to short stack validation for both PEM and AEM cell technologies.

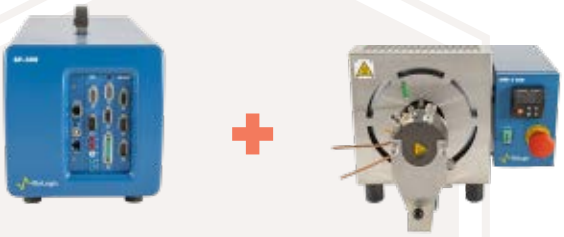
Key advantages

- Highly accurate control of gas, humidity, temperature and water/KOH management
- Rapid cooling to reduce measurement time
- Integrated potentiostat/galvanostat with wide current and voltage ranges
- Embedded EIS for real-time diagnostic insight
- Flexible architectures for single cells, MEAs, and short stack testing
- Reliable long-term operation for durability and lifetime studies

Fuel Cell & Electrolyzer Developement:
Innovation at every stage



M470
Scanning Electrochemical Workstation
- Customize up to 7 modules
- Differentiate local phenomena
- High throughput screening



HTF-1100
High Temperature Furnace
- Small footprint
- Temperature scan up to 20°C/min
- Measurements up to 1100°C for SOFC
- Control with EC-Lab®

Catalyst **Membranes** **Single Cells**

BluRev
Electrode Rotator
- ±1 RPM accuracy over rotational range
- Wide range of RDE & RRDE tips

SP-300
Premium Potentiostat
- ±1 A (up to 120 A)
- ±10 V (up to [0; 48] V)
- EIS up to 11 MHz

VMP-300

Premium Potentiostat

- ±1 A (up to 150 A)
- ±10 V (up to [0; 48] V)
- EIS up to 11 MHz
- Parallelization for scale-up or multi-cell measurements

VMP-3e

Essential Potentiostat

- FlexP booster up to 60 V
- Single cell & full stack EIS
- Test station synchronization

Small Stacks

HCP-803

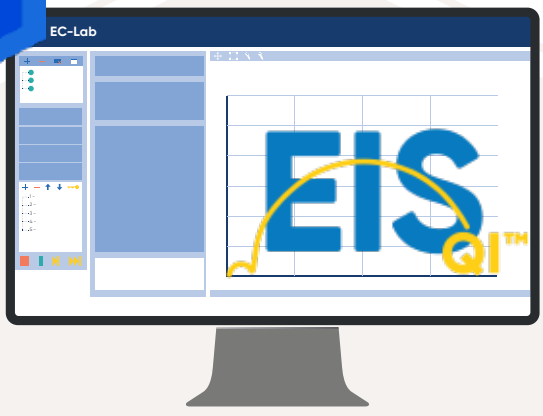
Essential High Current Potentiostat

- Up to ±3 V
- Up to 80 A
- EIS up to 10 kHz

EC-Lab®

Control & Analysis Software

- Advanced energy techniques
- ZFit for data modelling
- Safety limits
- EIS QI™



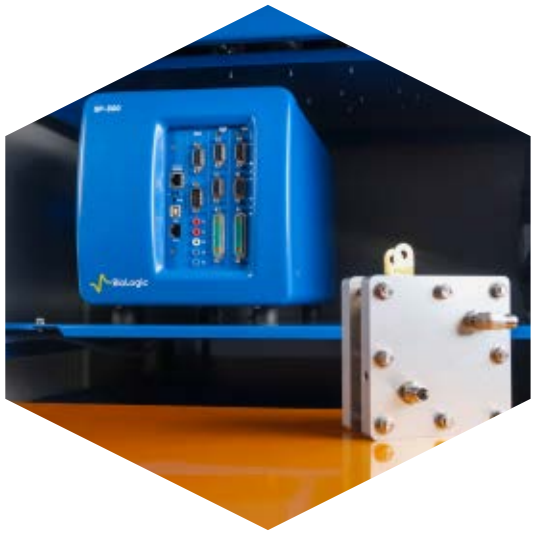
Proven Accuracy, Trusted Results

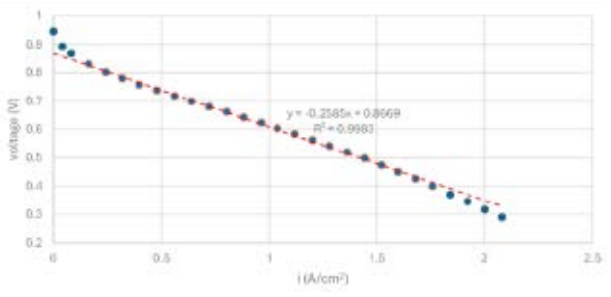
Insights in Action

For fuel cell and electrolyzer developers, high-quality electrochemical data is essential for understanding the global performance, efficiency, and durability of the complete cell. BioLogic solutions enable advanced diagnostic techniques that go beyond basic polarization measurements, helping researchers identify limiting processes, degradation mechanisms, and optimization pathways across all stages of development.

Advanced DC characterization

In fuel cell and electrolyzer development, accurately detecting performance losses and degradation mechanisms is critical for improving efficiency and durability. BioLogic's potentiostats provide high-precision control and measurement, enabling researchers to perform key techniques such as polarization curves, OCV, CV, and LSV with confidence. With fully customizable methods, real-time feedback, and intuitive visualization, these tools turn fundamental measurements into actionable data



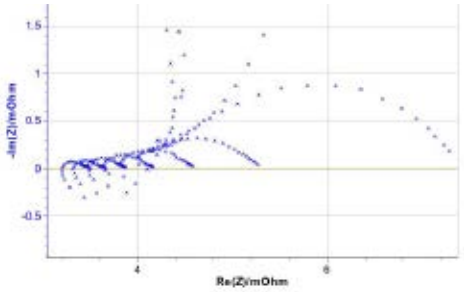


Polarization Curve

High current density AC & DC measurements

When characterizing high-current energy devices, establishing I–V behavior is essential in order to validate both the setup and the data quality before pushing performance limits.

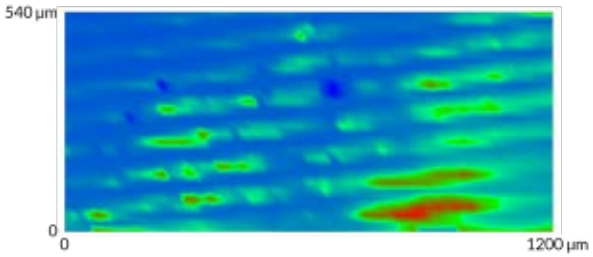
With BioLogic's FlexP booster, researchers can reach current densities up to 8 A/cm² on 25 cm² cells (200 A absolute current), enabling detailed investigation of mass transport limitations and high-load operating conditions. Its bidirectional current capability allows the same platform to be used for fuel cells or electrolyzers, providing a flexible, high-power solution for advanced electrochemical testing.



Staircase Potentio EIS for PEM Water Electrolyzer

SECM to investigate membrane lifetime

Scanning Electrochemical Microscopy (SECM), can help to understand the mechanisms leading to Polymer Electrolyte Membrane (PEM) degradation, and improve their lifetime. Using SECM the probe can be biased to interact selectively with protons to determine proton conductivity through the membrane, providing information on functional impairment to the membrane. To instead investigate for defects the probe can be biased to interact with a redox mediator to which the membrane is usually impermeable. This provides valuable insight on the factors leading to PEM failure.

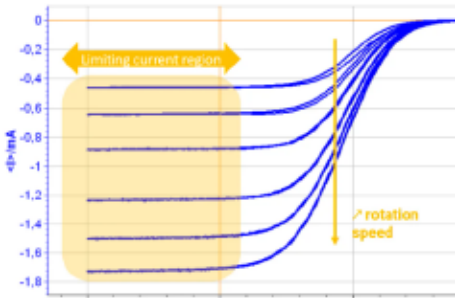


*SECM plot showing proton permeation through a catalyst coated membrane.** Data courtesy of Prof. Maik Eichelbaum, Technische Hochschule Nürnberg

*S. Thiel, M. Eichelbaum, ACS Meas. Sci. Au 5 (2025) 740–750

Rotating disk & ring disk for catalysts charaterization

Hydrodynamic techniques like rotating disk electrode (RDE) and rotating ring-disk electrode (RRDE) provide the key to finding effective catalysts for fuel cells, electrolysers, and CO_2 conversion. BioLogic's BluRev allows for precise control of mass transport conditions, making it easier to extract kinetic parameters and distinguish between desired pathways and side reactions. RDE measurements give steady-state reaction rates and mass transport limits, while RRDE detects products formed at the disk to quantify reaction intermediates.



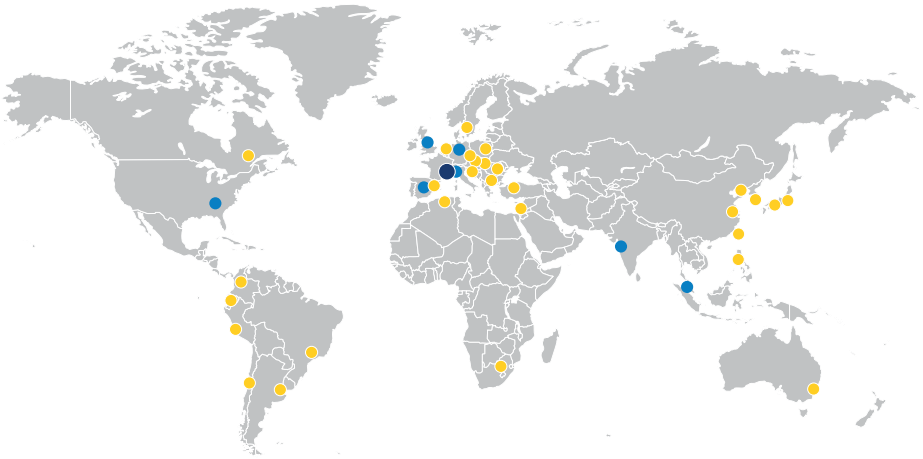
Levich plot experiment

FlexP0012 High Current Booster

Specifically **designed for electrolyzer/fuel cell characterizations**, the FlexP0012 boasts a continuous maximum current of -200/+195 A for a single unit extendable up to -800/780 A in parallel. Its EIS capability up to 10 kHz enables detailed impedance analysis across the full frequency range relevant to fuel cell and electrolyzer diagnostics.

Flexibility is built into its core: the plug-and-play booster module architecture allows on-site configuration upgrades as your testing needs evolve.

We serve our customers worldwide through our subsidiaries offices and our extensive distribution network.



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Always by your side. Wherever you are.

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