



2026
FLOW BATTERIES



THE M-CELL

REDOX FLOW BATTERY TEST CELL



The **Swiss Army knife** of electrochemical flow cells



The Mini-Cell

The M-Cell is a unique 1 cm² multipurpose electrochemical research cell designed for maximum flexibility across a wide range of applications. From flow batteries and water electrolysis to CO₂ reduction and classical cyclic voltammetry, the M-Cell can be configured to suit a broad variety of electrochemical research setups.

What makes it a great choice for R&D?

- **The “Swiss Army knife” of electrochemistry.** A single compact platform for closed flow cell, open cell, half-cell, and three-compartment configurations
- **1 cm² active area.** Suited for testing expensive catalysts, novel membranes, or limited-quantity materials
- **Advanced reference electrode system.** Multiple Luggin capillary configurations with measurement point precision better than approximately 0.2 mm
- **Multiple distinct configurations.** Covering flow batteries, AWE, AEM, PEM electrolysis, CO₂ reduction, electrodialysis, corrosion studies, and cyclic voltammetry
- **Robust and chemically resistant.** All non-active components in PEEK, PTFE, EPDM, and VITON for operation in aggressive electrolytes at temperatures up to at least 95 °C
- **Exchangeable current collectors.** Standard options in graphite, nickel, titanium, and 316L stainless steel; other materials available on request
- **4-wire electrical connection.** Separate current and voltage wires for accurate electrochemical measurements

Explore the purpose-built electrochemical flow cell for redox flow battery innovation.

Components & Configuration

Current collectors

Graphite, nickel, stainless steel, or titanium

1 cm x 1 cm active area.

Other dimensions on request.

Wire materials in titanium, nickel, or stainless steel



Flow Body

Corrosion-resistant PEEK

Temperature sensor ports $\varnothing 3.4\text{mm}$

$\sim 36 \times \sim 35 \times \sim 35\text{ mm}$ dimensions



M4 bolts

Made of PEEK

Together with the assembly bars they ensure exact cell alignment with every reassembly

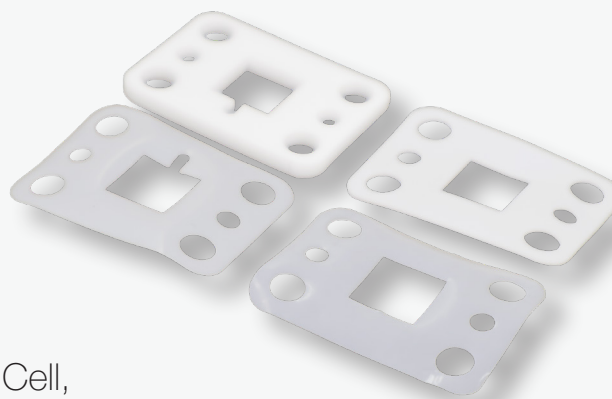
Gasket packs

Material: VITON, EPDM, PTFE

1 cm² active area

Thickness: 0.05 mm, 0.1 mm, 0.25 mm,
0.5 mm, 1 mm

Standard, Porous Separator, Open Cell, Half Cell,
3-Compartment pack options



About the cell

The ultimate multipurpose research cell

The M-Cell is a versatile and precise 1 cm² research cell developed to address a core need in modern electrochemical laboratories: a single, reliable platform that can be adapted to a range of research projects by only changing the gasket configuration and current collectors. Whether the application is fundamental electrochemical investigation or applied engineering, the M-Cell can be configured accordingly.

Covers a wide range of application areas

- **Catalyst and material screening.** The small 1 cm² active area is well-suited for testing precious metal catalysts (e.g. Pt, Ir, Ru), novel gas diffusion electrodes (GDEs), and newly synthesised membrane materials where sample quantity is limited or material cost is high.
- **Flow battery research.** Operate in a standard closed-cell configuration (Configurations A to C) to test electrode felts, membranes, and electrolyte formulations for redox flow batteries.
- **Water electrolysis.** Configure as a closed cell with membrane (for PEM, AEM, or alkaline electrolysis) or as an open cell without membrane (for membraneless electrolysis studies). Reference electrodes can be added to deconvolute anode and cathode overpotentials.
- **CO₂ reduction (CO₂ RR).** Use the closed cell, open cell, or three-compartment configuration (Configuration I) to investigate electrochemical CO₂ conversion with control over the cathode environment.
- **Electrodialysis.** The three-compartment configuration (Configuration I) enables studies with two membranes and a central compartment, suited for ion separation research.
- **Fundamental electrochemistry and cyclic voltammetry.** The Full Cell hardware can also be used in half-cell configurations (G-1, G-2) for classic three-electrode experiments, providing a robust and reproducible *alternative to traditional* beaker cells.
- **Corrosion studies.** The half-cell setup with a precise reference electrode provides a platform for corrosion testing in flowing electrolytes.



THE M-CELL



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Configuration	Operation mode	Reference electrodes	Key applications
A	Closed cell	None	Flow batteries, electrolysis, CO ₂ reduction
B	Closed cell	Individual anode and cathode	Electrolysis, CO ₂ reduction, flow batteries
C	Closed cell	On membrane	Electrolysis, CO ₂ reduction
D	Open cell	None	Membraneless electrolysis, CO ₂ reduction
E	Open cell	Individual anode and cathode	Electrolysis, CO ₂ reduction
F	Open cell	Common (via T-connector)	Electrolysis, CO ₂ reduction
G-1	Half-cell (wire counter)	Yes	Cyclic voltammetry, catalyst screening, kinetic studies
G-2	Half-cell (flow body counter)	Yes	Cyclic voltammetry, catalyst screening, kinetic studies
H	Flexible Luggin	Flexible positioning	Any application requiring custom reference placement
I	Three-compartment	Yes (through membrane)	CO ₂ reduction, electrodialysis

M-Cell: Full- and Half-Cell Configurations

The M-Cell can be assembled into a number of distinct configurations, each tailored for specific applications. The three fundamental operation modes are **Closed Cell**, **Open Cell**, and **Half-Cell**.



Full Cell

Flow Cell · 10 configurations

The M-Cell is a unique 1 cm² multipurpose electrochemical research cell designed for maximum flexibility across a wide range of applications. From flow batteries and water electrolysis to CO₂ reduction and classical cyclic voltammetry, the M-Cell can be configured to suit a broad variety of electrochemical research setups.

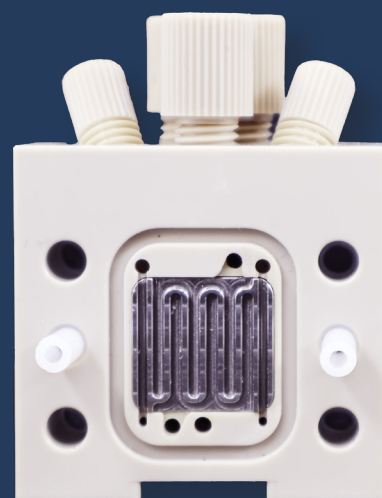
The Full Cell version includes two PEEK flow bodies with individually selectable anode and cathode current collectors, supporting closed cell, open cell, three-compartment, and half-cell operating modes.

Half Cell

Beaker Cell Alternative · Swift Screening

The M-Cell Half Cell is a 1 cm² three-electrode research cell offering a precise and reproducible alternative to traditional beaker cells. Built around a single PEEK flow body with a selectable current collector, it is suited for cyclic voltammetry, catalyst screening, kinetic studies, and half-cell electrolyser or CO₂ reduction testing.

Two M-Cell Half Cells can also be combined to form a flow-body based three-electrode setup, or with the appropriate gaskets, a full flow cell.



System Integration

Advanced Reference Electrode System*

A defining feature of the M-Cell is its precise reference electrode capability. The design incorporates multiple Luggin capillary based arrangements that guide the measurement point to defined locations inside the cell with a spatial precision better than approximately 0.2 mm, while the reference electrode itself remains outside the primary electrochemical environment. This enables:

- Accurate overpotential measurement: deconvolute anode and cathode overpotentials in full-cell operation.
- Reduced uncompensated resistance: Luggin capillary placement lowers IR-drop for more accurate kinetic data.
- Localised potential sensing: place the reference point at the electrode surface, between the electrodes, or through the membrane (Configuration C) to investigate local electrochemical phenomena.
- Flexible positioning: Configuration H allows a 1/16" OD tube to be used as a Luggin capillary directed to almost any point in the cell.
- The reference electrode circuit can be operated in dead-end mode (using a syringe, eliminating shunt currents) or in pump mode (preventing gas bubble accumulation). For detailed guidance, see the assembly manual.

Electrical connections

The M-Cell uses a 4-wire configuration (I+, U+, I–, U–) with ø0.7 mm wires in titanium, nickel, or 316L stainless steel. Wire quick connectors are included for fast and robust connections to a potentiostat or power supply.

Multiport Electrolyte Reservoir

The M-Cell was co-developed with the Multiport Electrolyte Reservoir to form a complete experimental platform. Together they enable:

- Sealed, oxygen-free, or CO₂-saturated electrolyte environments
- Temperature control up to at least 95 °C
- Flexible electrolyte sampling and management

* Reference electrodes not included.

THE M-CELL



Accessories



Inline Pressure Unit

Differential Pressure Measurement Unit.

- Compact, inline design for direct differential pressure measurement
- Monitor hydraulic resistance of electrodes with high accuracy
- Integrated temperature sensing for added diagnostics
- Built from chemically highly resistant materials



Open Circuit Voltage Cell

Reference Cell For OCV & Potential Monitoring.

- For accurate anode/cathode potential measurement
- Multifunctional design for OCV and overpotential studies
- Easy integration into existing setups with internal reference electrolyte chamber
- Durable graphite flow bodies ensure chemical resistance and stability



UV/VIS Flow Cell

UV/VIS Fiber Optical Flow-Cell.

- Adjustable optical path length (0.05–8 mm) for maximum flexibility
- Supports high flow rates (>100 ml/min) with minimal pressure loss from unique design with hydraulic bypass
- Connects with standard fiber based spectrometers using SMA 905 connectors



Flow-through electrode holder

Inline Reference Potential Measurement Unit.

- Fits a wide range of electrode diameters (3–17 mm)
- Durable, chemically resistant construction
- Measures e.g. pH, ORP, or reference potential.



THE M-CELL





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Multiport Electrolyte Reservoir System

With hydraulic pack for a complete setup

The M-Cell was co-developed with the Multiport Electrolyte Reservoir to form **a complete experimental platform**. The M-Cell can be **submerged** in the reservoir, and together they provide:

1. Sealed, oxygen-free, or CO₂-saturated electrolyte environments
2. Temperature control up to at least 95 °C
3. Flexible electrolyte sampling and management

The reservoir

COMPLETE DUAL-RESERVOIR SYSTEM

Suited for testing expensive catalysts, novel membranes, or limited-quantity materials

INTEGRATED TEMPERATURE CONTROL

Each reservoir features a stainless steel heating/cooling plate for precise thermal management.

UNMATCHED FLEXIBILITY

A total of 18 ports (9 per reservoir) for complex flow arrangements, gas purging, and sensor integration.

SUPERIOR CHEMICAL RESISTANCE

Chemically inert PP/PTFE construction is ideal for aggressive electrolytes where glass is unsuitable.

SCALABLE VOLUMES

Choose your reservoir size (250, 500, or 1000 mL) to match your experimental needs.



Usually bundled with



Hydraulic Connection Pack 1/4"

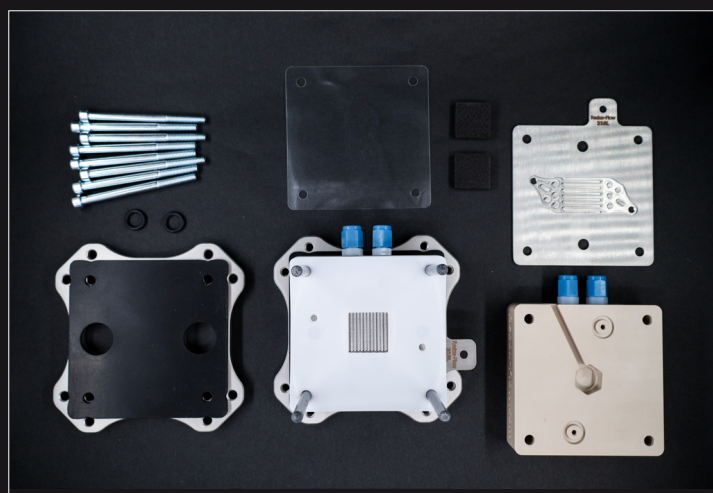
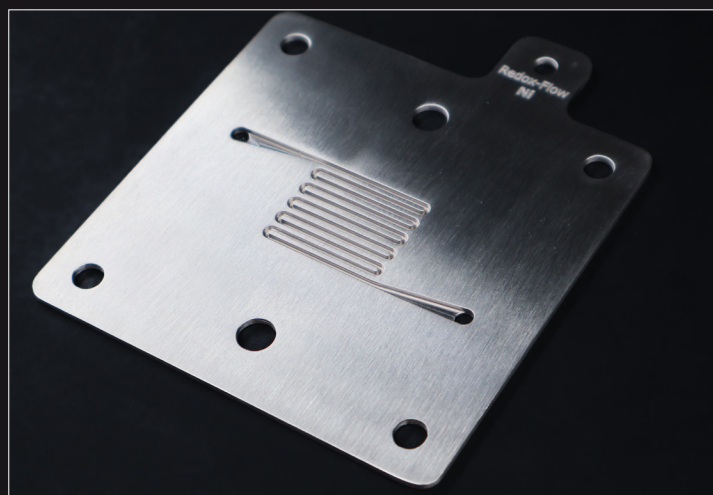
Hydraulic Connection Pack 1/8"

REDOX FLOW

Our Solutions

Born from PhD project that identified *the need for modular design* in flow cell R&D, we've grown in five years into a startup with *over 1,000 customers worldwide.*

WWW.REDOX-FLOW.COM





Custom

Electrochemical research is constantly evolving — and so are we. Whether you want to test a new material, explore a novel geometry, or build something entirely from scratch, we're here to help. Serpentine flow fields, BMED cell designs, custom gasket shapes — these are just a few of the projects we've taken on over the years. From small design tweaks to full custom builds, we've got you covered.

One-Stop



We sell Complete Flow Battery Setups — including the flow cell, pump, hydraulic connection pack, battery control unit, and all the fittings and gaskets needed for a classic R&D setup. Everything arrives ready to run, so you can skip the sourcing headaches and get straight to experimentation. If you're looking for an out-of-the-box solution, this is the easy choice.

Modular & Scalable

Our flow cells are built to be flexible and upgradable. Parts are compatible across our entire cell range, so switching to a completely different chemistry is as simple as swapping a few components — no need for a new cell. Assembly and disassembly are equally straightforward, giving you the freedom to experiment as your research demands. Add extra parts to upgrade a single cell into a stack, or order replacement flow bodies and gaskets for electrode and membrane testing. One cell really can do a lot.

REDOX FLOW

Redox Flow® Family

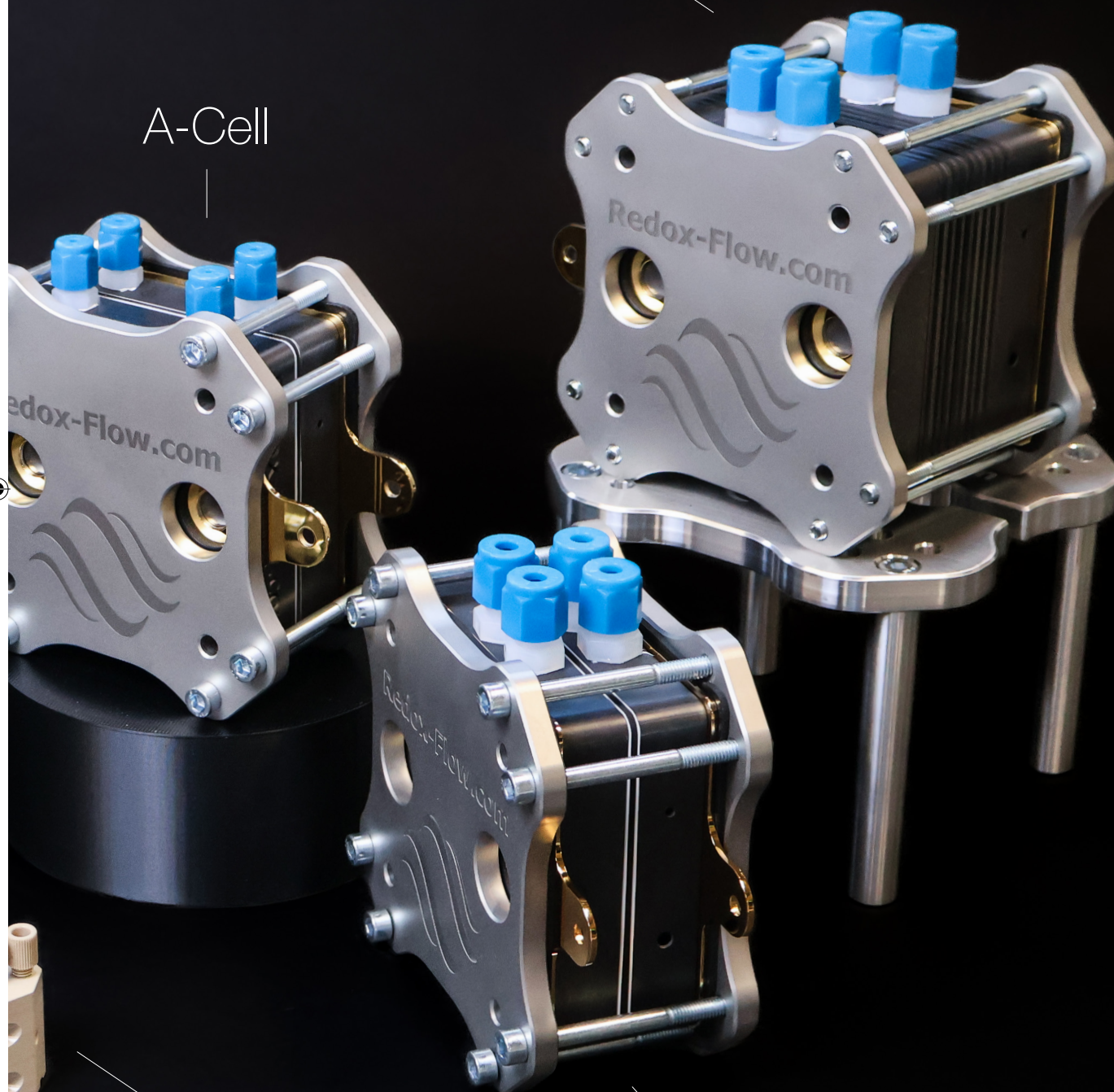
X-Stack

X-Cell

X-Cell with extra ports

S-Stack

A-Cell



M-Cell

S-Cell



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Any questions?
We're happy to hear from you.



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