



**Electrochemical Cell for Li Battery
Material Research**

Operator's Manual



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Lithium Battery Materials Electrochemical Cell Kit

Operator's Manual

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Introduction

The electrochemical cell kit has been designed for electrochemical testing of lithium battery materials in general. The electrodes and holders are designed to hold foils and electrode materials in different configurations. Three different configurations are shown in this manual.

This cell can be used with electrolyte volumes up to 25 mL. The minimum volume is determined by your electrode configuration. Gamry Instruments has three different electrode holders for this materials research kit, not all of which may be present in the kit you purchased. The three different kit parts lists are shown later in the manual.

The cell was designed to provide an air-tight seal using the specially tapered PTFE joints. The main purpose of this seal was to allow for cell assembly inside a glovebox followed by removal for electrochemical testing outside the glovebox.



The materials of these kits have been designed for easy disassembly and cleaning. We recommend that you completely disassemble and clean your electrodes after each use in order to ensure a long lifetime of use.

Chemical Compatibility of Lithium Battery Materials Cell

The components in the received cell were selected to be as chemically inert as possible. In normal use the only materials that may come in contact with the electrolyte are:

- Your lithium foils
- Stainless steel from bottom of electrode holders
- borosilicate glass (Pyrex[®] or equivalent),
- PEEK (polyether ether ketone)
- Fluororubber

Chemical resistance tables for these materials are available through a quick web search. This electrochemical cell was not designed for use in electrolytes that dissolve glass (extremely basic solutions or HF-containing solutions).

Unpacking and Checking a Cell Kit

This section is primarily intended for the user who has just received a new Lithium Battery Materials Cell Kit.

Checking for Shipping Damage

Your new kit was shipped disassembled to minimize shipping damage. All of the pieces were carefully packaged in anticipation of rough handling in shipment. Unfortunately, no matter how carefully glass pieces are packaged, damage sometimes occurs.

When you first receive your kit, please check it for any signs of shipping damage. Be especially careful if the shipping container shows signs of rough handling.

Obviously, the glass piece is the most susceptible to damage. Check the glass piece for chipping and small cracks as well as for major damage.



Warning: Never use any glass parts that are chipped or cracked. Any damage to glass increases the probability of additional damage. Broken glass can have extremely sharp edges that represent a significant safety hazard. Injuries from broken glass can be quite severe.

If any parts were broken in shipment, please take a photograph and contact our USA facility or your local Gamry representative as soon as possible. In most cases, Gamry should have replacement parts in stock. Please retain the shipment's packaging material for a possible claim against the shipping company.

Parts List

Please check the contents of your kit versus the packing list in Table 1, Table 2, or Table 3. When shipped, all of the components should be labeled with their Gamry part number. If you are checking the completeness of an older kit, most of the components are shown in photographs throughout this manual.

Unpacking and Checking a Cell Kit

Table 1
Standard Cell Kit, 990-00342

Quantity	Part Number	Description
1	988-00032	Manual
1	930-00060	Glass cell
1	935-00082	Metal stand
1	935-00084	Foil electrode holder (small)
2	935-00083	1.5 mm substrate holder
1	935-00093	14/20 ground-glass stopper
2	935-00094	PTFE sleeve

Table 2
Full Cell Kit, 990-00343

Quantity	Part Number	Description
1	988-00032	Manual
1	930-00060	Glass cell
1	935-00082	Metal stand
1	935-00084	Foil electrode holder (small)
2	935-00085	Foil electrode holder (large)
1	935-00093	14/20 ground-glass stopper
2	935-00094	PTFE sleeve

Table 3
Half Cell Kit, 990-00344

Quantity	Part Number	Description
1	988-00032	Manual
1	930-00060	Glass cell
1	935-00082	Metal stand
2	935-00084	Foil electrode holder (small)
1	935-00085	Foil electrode holder (large)
1	935-00093	14/20 ground-glass stopper
2	935-00094	PTFE sleeve

Assembly of and Use of Your Cell Kit

This section of the manual tells you how to assemble and use the Standard Kit (990-00342) in its usual configuration.

This “standard” cell configuration has:

- A standard cell body for use at room temperature
- A metal stand for holding the cell body
- One foil (or lithium wire) electrode holder
- Two substrate holders

General Information

A picture of an assembled cell (less foil electrodes) is shown in Fig. 1.



Fig. 1. Configuration of a cell setup

Pay careful attention to cell cleanliness. In most electrochemical testing situations, contaminants in the cell and test solution can lead to poorly reproducible results. If you touch the cell components with your fingers, you can inadvertently add salts and organic compounds to your cell solution. We recommend that you wear gloves while handling the cell and electrode holders.

Assembly

1. Prepare a soft metal electrode either as a wire or as a plate, with one end thin enough to fit through the screw cap on the end of the small foil (or lithium wire) electrode holder (935-00084) as shown in Figure 2.

Fig. 2. 935-00084 prior to adding foil electrode.



2. Push the foil through the hole in the cap.

Fig. 3. 935-00084 with foil through screw cap.



3. Screw the cap on the electrode holder as shown in Fig. 4.

Fig. 4. 935-00084 assembled with foil electrode.



4. Place the electrode holder into the center port on the cell, and adjust the height by sliding the PTFE fitting up or down.
5. Prepare your substrates according to desired dimensions.
6. Use an Allen key to loosen the screw on the substrate holder (935-00083).
7. Place your substrate in the holder and tighten using the hex wrench.
8. Place the holder into your cell and adjust height using the PTFE fitting.
9. Repeat steps 6–8 for a second substrate holder.

10. The other two kits contain a large electrode holder (935-00085) that can be used to hold foil electrodes such as the one just shown, or circular substrates such as described below. Cut a foil electrode 8.5 mm in diameter.
11. Invert the large electrode holder, remove the screw cap, and place the foil electrode on the holder as shown in Figure 5.



Fig. 5. Large electrode holder with foil electrode placed on top.

12. Screw the cap onto the electrode as shown in Figure 6.



Fig. 6. Fully assembled large electrode holder.

Cleaning the electrodes

Each of the electrodes can be disassembled for cleaning. We recommend that you clean each electrode after use. Each of the electrode types can be disassembled as shown in Fig. 7 (935-00084 and 935-00085 only differ by the diameter of the hole at the end) and Fig. 8.



Fig. 7. Disassembled 935-00084 or 935-00085.



Fig. 8. Disassembled 935-00083.

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