



Release 1.00

ECC-Opto-10 Electrochemical test cell



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### **1 Product Description**



The ECC-Opto-10 test cell is designed for operando characterization of electrodes using optical methods such as light microscopy or Raman spectroscopy in reflection mode.

The ECC-Opto-10 is connected to the battery tester via 2 mm cell cable with banana plugs. It can be used with the PAT-Tester-x-8 as well as potentiostats and battery testers from third-party manufacturers.

#### Features

- 2- and 3-electrode cell with optical window for aprotic and aqueous electrochemistry.
- High cycling stability due to glass-to-metal seals
- Suited for light microscopy and Raman spectroscopy
- Fits on standard microscope sample stages (76 × 26 mm (DIN ISO 8037-1))



### Working principle of the ECC-Opto-10 (side-by-side setup of electrodes):

## 2 Technical data

- Length: 77.5 mm
- Width: 51 mm
- Height: 21.5 mm
- Weight: 0.3 kg
- Temperature resistance: -20 to 70°C
- Electrode R diameter: <= 10 mm</p>



## 3 Intended use

The ECC-Opto-10 test cell is an electrochemical measuring instrument designed for use in a laboratory environment. It may only be used by trained personnel and only as described in this manual.

# **4** Safety Precautions

Use proper safety precautions when using hazardous electrode materials and electrolytes. Wear protective glasses and gloves to protect you against electrolyte that may accidentally spill out during filling and disassembly. Upon cell disassembly, dispose all materials properly. Metallic lithium and some insertion compounds may decompose heavily in contact with water and other solvents, and can cause fire.

## 5 Assembly

Generally, all assembly steps are to be carried out in inert glove box atmosphere. All components used are to be dried upfront in a vacuum oven at 80°C for at least 12 hours. Once fully assembled, the cell is hermetically sealed so that it may be operated in ambient atmosphere.

The test cell can be used in several different configurations, which mainly differ in the type and size of the working electrode used, the charging geometry (the position of working and counter electrode relative to each other), and the connection to the potentiostat (2- or 3- electrode connection). In the following, the cell assembly is described for the side-by-side arrangement of electrodes.

### Assembly instructions:



1.Turn the lid upside down. Insert the foil sealing into the lid.



2. Insert the window.









6. Use the loading tweezer to push the piston into the sleeve.

- 5. Insert the lower piston into the inner sleeve.

4 Attach the window flange and screw in the screws using the torque screwdriver 0.2 Nm.

3. Insert the window thrust ring.











7. Place the assembly into the cell base.

8. Insert the sample holder into the loading tweezers.

9. Squeeze the tweezer together to lift the sample holder bracket. Then attach the first electrode strip to the sample holder.

10. Turn the sample holder around and place the second electrode strip.







12. Put the separator on top. The separator must not be more than 10 mm in diameter. A smaller separator may be useful to prevent the sample holder from coming into contact with the electrolyte.

11. Put the electrode R, lithium metal in this

case, on top of the piston.



13. Use the loading tweezer again to push the cell stack further down.



14. Attach the sample holder. Make sure the markings 1 and 2 on the sample holder and cell base are aligned.

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16. Drop the electrolyte onto the separator / electrodes. Use only the amount of electrolyte necessary to impregnate the porous material. Avoid an excess of electrolyte. Typically, less than 50  $\mu$ l of electrolye is suitable. Note that electrolyte will be squeezed out of the separator when the cell lid is attached.

15. Insert the second foil seal.



17. Put on the cell lid. Make sure that the flat side of the cell base and the straight line on the lid are parallel.



18. Finally, screw the cover on with the 2.5 mm hexagon screwdriver.





19. The ECC-Opto-10 is now ready for testing.

# 6 Connecting the test cell

Connect your potentiostat to the 2 mm sockets of the cell. Note that sockets 1 and 1S are short-circuited inside the cell housing, as are sockets 2 and 2S.



# 7 Disassembly and Cleaning

Right after use, disassemble the cell in the reverse order of assembly. All chemicals used have to be disposed properly. All wetted parts are to be cleaned with water and/or other appropriate solvents. All parts are to be dried immediately after cleaning at 80°C.

**NOTE**: Leaving cell parts in contact with ambient atmosphere while still being wetted with electrolyte may result in severe corrosion.

# 8 Unpacking

Check the contents of the packages against the list given below to verify that you have received all of the components. Contact the factory if anything is missing or damaged.

**NOTE**: Damaged shipments must remain with the original packaging for freight company inspection.

### List of Components:

- 1. **ECC-Opto-10** test cell with flat socket, fully equipped for use in both 2-electrode and 3-electrode configuration
- 2. Windows seal (10 pcs.) ECC1-05-0016-B/X
- 3. Separator 10.0 mm x 0.26 mm, GF/A (10 pcs.) ECC1-01-0012-R/X
- 4. **PE Sealing foil (10 pcs.)** ECC1-05-0032-A/X
- 5. Loading tweezer ECC1-09-2010-A
- 6. **Tweezer antiacid / stainless (pointed)** WZG9020
- 7. Torque screwdriver, 0.2 Nm, cross handle WZG9021
- 8. Inbus bit 1.5 mm x <sup>1</sup>/<sub>4</sub> inch WZG9046
- 9. Hexagon screwdriver 2.5 mm, cross handle WZG9047

## 9 Components ECC-Opto-10

### ECC-Opto-10



### Lid (OPTO-10) 18 mm, assy





Lid (OPTO-10) 18 mm ECC1-05-0029-C

Guide pin ECC1-05-0037-A

Window seal ECC1-05-0016-B

ECC-OPTO Sapphire window (0.3 mm) ECC1-00-0149-A

Window thrust ring II (Opto-10) ECC1-05-0012-C

Window flange II (OPTO-10) ECC1-05-0013-B

Socket screw DIN 912 M2 x 5

## **10 Technical Support**

Technical support for this product is exclusively provided by EL-Cell GmbH.

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### 11 Warranty

For a period of one year from the date of shipment, EL-Cell GmbH (hereinafter Seller) warrants the goods to be free from defect in material and workmanship to the original purchaser. During the warranty period, Seller agrees to repair or replace defective and/or nonconforming goods or parts without charge for material or labor, or, at the Seller's option, demand return of the goods and tender repayment of the price. Buyer's exclusive remedy is repair or replacement of defective and nonconforming goods, or, at Seller's option, the repayment of the price.

Seller excludes and disclaims any liability for lost profits, personal injury, interruption of service, or for consequential incidental or special damages arising out of, resulting from, or relating in any manner to these goods.

This Limited Warranty does not cover defects, damage, or nonconformity resulting from abuse, misuse, neglect, lack of reasonable care, modification, or the attachment of improper devices to the goods. This Limited Warranty does not cover expendable items. This warranty is void when repairs are performed by a non-authorized person or service center. At Seller's option, repairs or replacements will be made on site or at the factory. If repairs or replacements are to be made at the factory, Buyer shall return the goods prepaid and bear all the risks of loss until delivered to the factory. If Seller returns the goods, they will be delivered prepaid and Seller will bear all risks of loss until delivery to Buyer. Buyer and Seller agree that this Limited Warranty shall be governed by and construed in accordance with the laws of Germany.

The warranties contained in this agreement are in lieu of all other warranties expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

This Limited Warranty supersedes all prior proposals or representations oral or written and constitutes the entire understanding regarding the warranties made by Seller to Buyer. This Limited Warranty may not be expanded or modified except in writing signed by the parties hereto.

