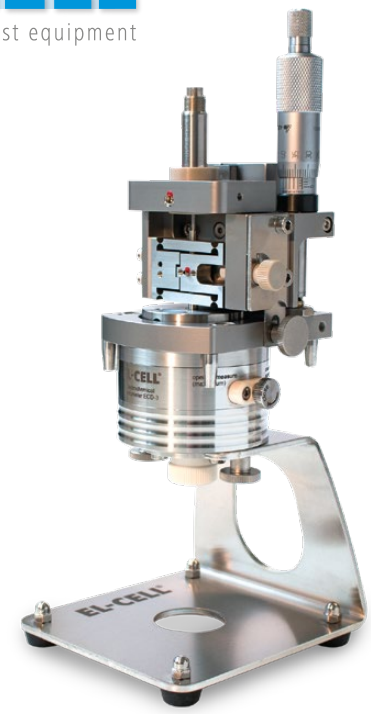
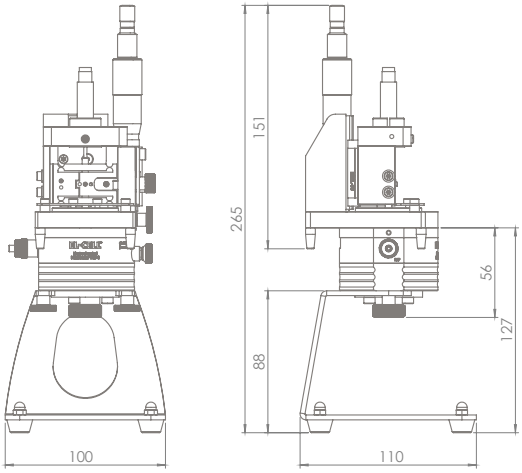


Measurements in mm:



ECD-3

Test cell for the measurement of electrode strain (thickness change)

The ECD-3 is a research grade instrument dedicated to the measurement of charge-induced strain (expansion and shrinkage) of electrodes down to the sub-micrometer range. The ECD-3 is particularly developed for the investigation of Li-ion battery and other insertion-type electrodes. It may be used in organic as well as aqueous electrolyte solutions.

The ECD-3 is the result of more than 10 years experience in this field. The heart of the ECD-3 is an electrochemical cell, which is hermetically tight against ambient atmosphere. The two electrodes inside are separated by a stiff glass frit, which is fixed in position. The upper (working) electrode is sealed through a thin metal membrane, which transmits any charge-induced height change to the sensor/load unit on the top.
A high-resolution displacement transducer detects dimensional changes ranging from a few up to 500 micrometers during an experiments, which can take between a few seconds and many days. A simple weight serves to adjust the load on the working electrode. The potential of the working electrode can either be controlled against the counter electrode (cell voltage control) or against an additional reference electrode.

Use Cases:

- 2- and 3-electrode setup
- Measurement of electrode strain (thickness change)
- Aprotic and aqueous electrolytes

Product website:

Manual (PDF):

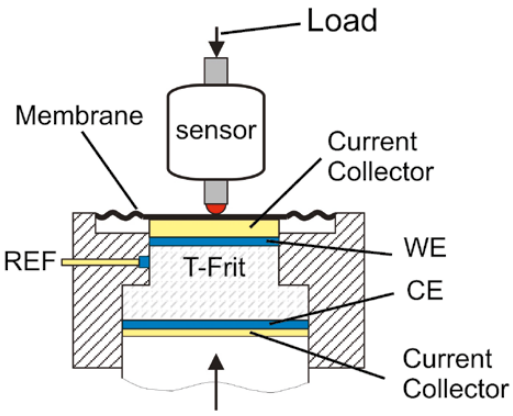
Key Features

- Displacement resolution ≤ 50 nanometer
- Displacement range: 500 µm
- Compatible with aprotic as well as aqueous electrochemistry

EL-Cell GmbH Tempowerkring 8 21079 Hamburg, Germany +49 (0) 40 79012 737 sales@el-cell.com el-cell.com

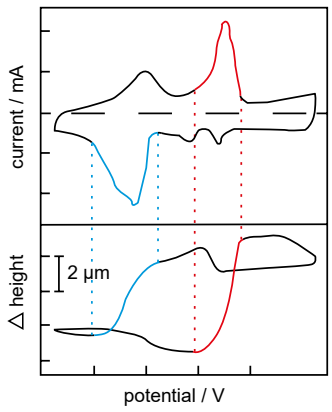
Specifications	
Height	265 mm
Width	100 mm
Depth	110 mm
Weight	1.5 kg
Separator diameter	12 mm
Working (upper) electrode diameter	10 mm
Counter (lower) electrode diameter	12 mm
Displacement sensor system	LVDT
Displacement range	500 µm
Displacement resolution	≤ 50 nm
Signal drift (sample-free)	≤ 100 nm / hour
Test specimen	Electrode films, optional single crystals / grains (Diameter ≤ 10 mm, thickness ≤ 1 mm)
Load on test specimen	approx. 1 N
Chemical compatibility	Aprotic organic electrolytes; optional aqueous electrolytes
Cell electrolyte volume	approx. 0.5 ml
Operational temperature range (Cell and Sensor)	-20 to +70 °C
Operational temperature range (Conditioning electronics and data logger)	0 to +40 °C

Working principle



The working electrode (WE) and the counter electrode (CE) are separated by a stiff glass frit soaked with electrolyte. The upper WE is sealed by means of a flexible metal membrane, through which any charge-induced thickness change is transmitted towards the sensor/load unit attached on top. The fixation of the glass frit ensures that only the thickness change of the working electrode is being detected without interference from the CE. Optionally, a reference electrode REF can be placed at the edge of the frit close to the working electrode.

Sample test result



Current response and height change of layered ruthenium oxide (HRO) in 2M H_2SO_4 during slow scan voltammetry. Courtesy of Prof. Wataru Sugimoto, Shinshu University, Japan.