

Characterization

Electrical characterization

To measure electrical performance of active components and energy storage devices

[Maccor 4300](#) test station (8 channels) for electrical characterization of

- Supercapacitors
- Batteries

[Zahner Zennium](#) potentiostat

[Keysight 1750](#) Semiconductor analyzer for testing

- Transistors
- Diodes

[Cascade and Semiprobe](#) probe stations

[Piezometer PM300](#) piezomaterial tester

[aixACCT TF 2000](#) ferroelectric material tester

Other characterization

Visual inspection

Optical microscopes

- Olympus metal microscope
- Olympus stereo microscope

Mechanical testing

Devices for

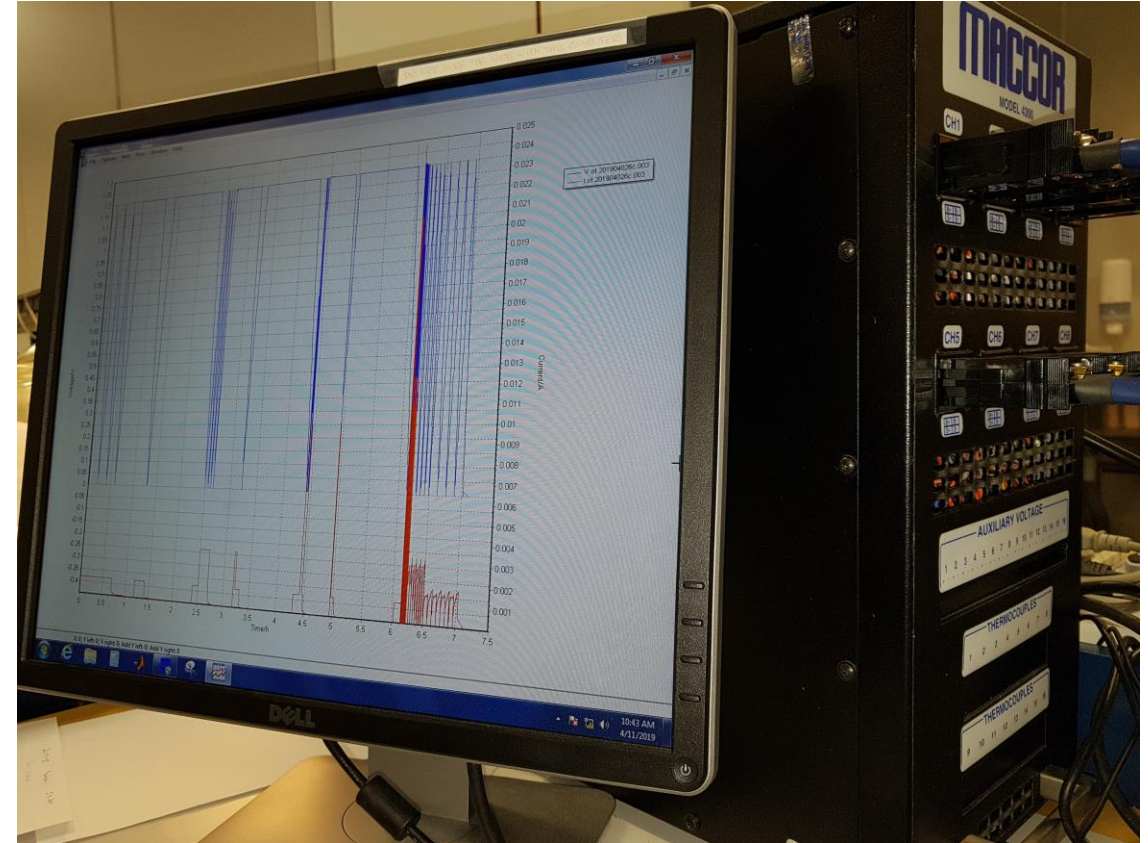
- Stretching
- Bending

Supercapacitor and battery analyzer

Defining the energy capacity, power level, output/input resistance and self-discharge of energy storage devices

Maccor 4300

- 8 channels
- Controlled charging and discharging cycles
- Constant voltage or current measurements
- Cyclic voltammetry
- Voltage range from - 2 to + 8 V
- Current control range ± 300 nA - ± 5 A

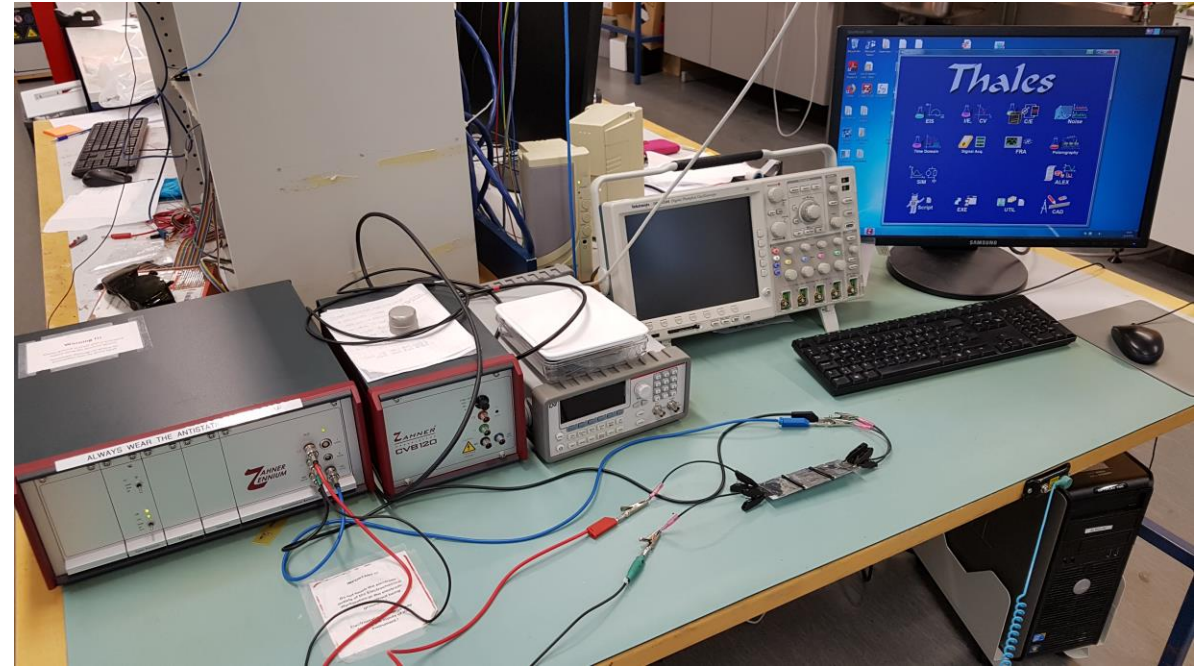


Potentiostat

For measuring electrochemical devices and components
Cyclic voltammetry, constant voltage and constant current measurements
Impedance spectroscopy

Zahner Zennium

- 1 channel
- Equipped with high impedance probe and compliance voltage booster
- Galvanostatic output ranges
 - ± 100 nA to ± 2.5 A
 - ± 1 nA to ± 0.5 A
- Compliance voltage up to ± 120 V
- Input impedance up to 1000 T Ω
- Frequency range 10 μ Hz - 4 MHz



Semiconductor analyzer and Probe stations

Measuring the properties of electronic devices and components

Keysight 1500A

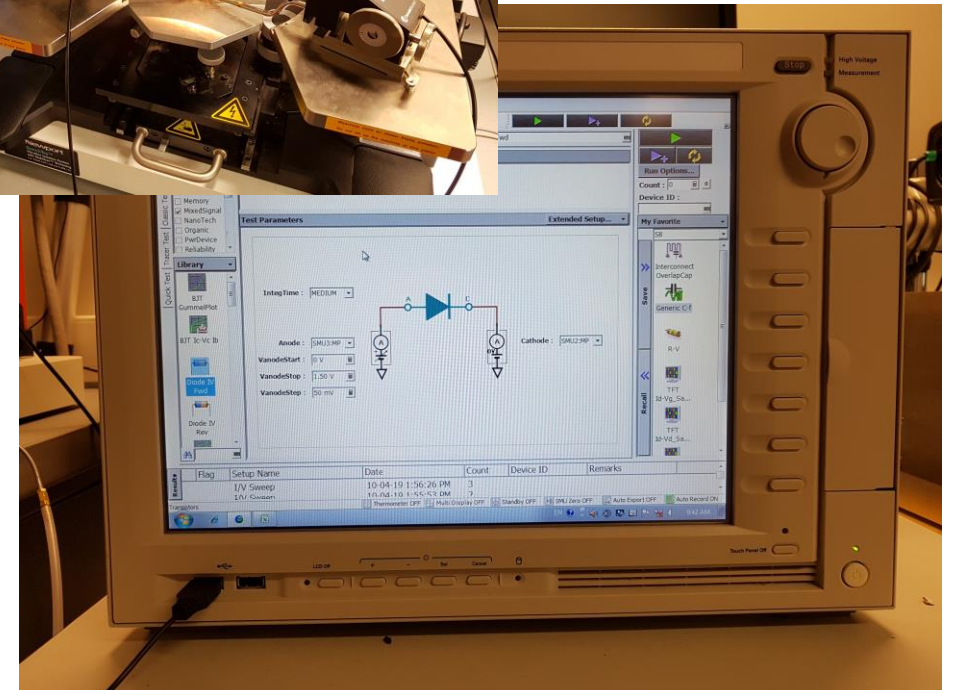
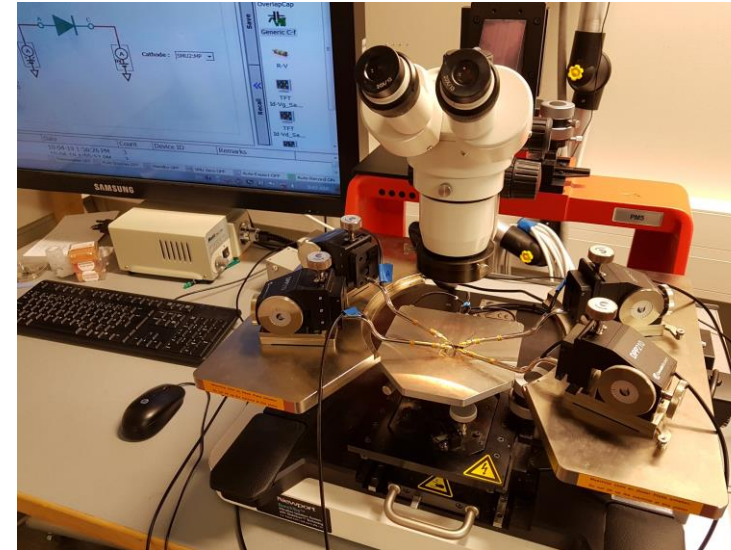
- Measuring semiconductor device parameters, e.g. thin film transistors or diodes
- Current-voltage (IV) measurement capabilities of spot, sweep, sampling and pulse measurement in the range of 0.1 fA - 1 A / 0.5 μ V - 200 V

Cascade PM5 probe station

- Accurate positioning of contact needles on the device

SemiProbe LA-100 DC probe station

- Installed inside the glove box for oxygen and humidity free measurement



Piezoelectric material testing

Characterization of piezoelectric sensor sensitivity through the measurement of d-coefficients (i.e. d33, d15 and d31 for parallel plate capacitor structures).

Piezometer PM 300

- Measurement range 0.01 pC/N to 10000 pC/N
- Simultaneous measurement of dielectric loss tangent and sample capacitance
- Adjustable static force, dynamic excitation force (0.05 to 0.5 N) and frequency (30 to 300 Hz)



Ferroelectric material testing

Testing of ferroelectric materials to determine their electronic characteristics.

aixACCT TF 2000

- Dynamic/static hysteresis
- Fatigue measurements
- Leakage current
- Coupled with TREK 610C 10 kV high voltage amplifier
 - Hysteresis measurements for relatively thick samples of high coercive field materials
- Main application in our lab is the characterization of sensors fabricated using piezoelectric polymeric materials (e.g. P(VDF-TrFE))

