

The logo for FLEXOO, featuring the word "FLEXOO" in a bold, sans-serif font. The letter "O" is stylized as two overlapping orange circles.

FLEXOO

The logo for BaMoS, featuring a small icon of a battery with a bar chart on top, followed by the text "BaMoS" and the tagline "The Battery Monitoring Solution for R&D" in a smaller font.

BaMoS
The Battery Monitoring Solution for R&D

Battery Monitoring Solution

FLEXOO GmbH
an InnovationLab company

✓ BaMoS – Battery Monitoring Solution

FLEXO

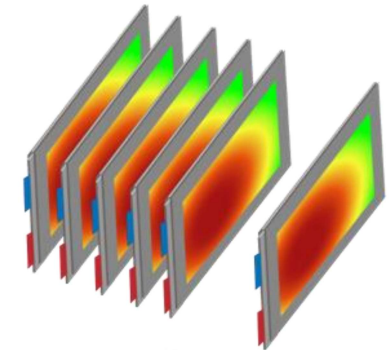
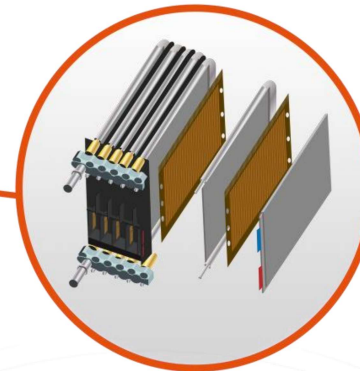
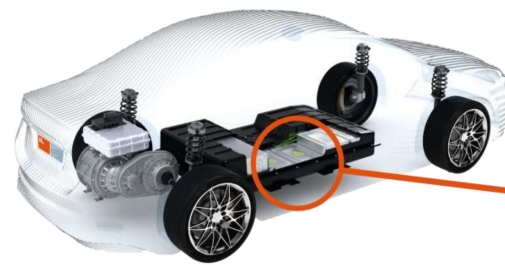
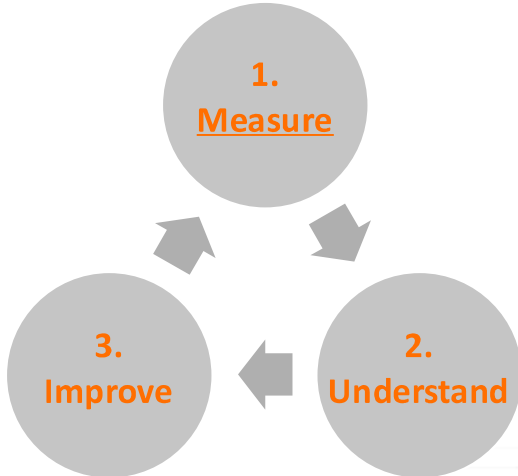


Acquiring meaningful data is the foundation for improvement. Often, however, this data is just not accessible.



This is the case for rechargeable batteries. We don't really know what is happening within a battery system during charging cycles and stress tests in terms of **pressure** and **temperature distribution**.

How can a measure of improvement be defined without properly understanding the system?



How to Measure Inside a Battery System

Thin foil sensors can be placed between the cells and thus solve this issue.

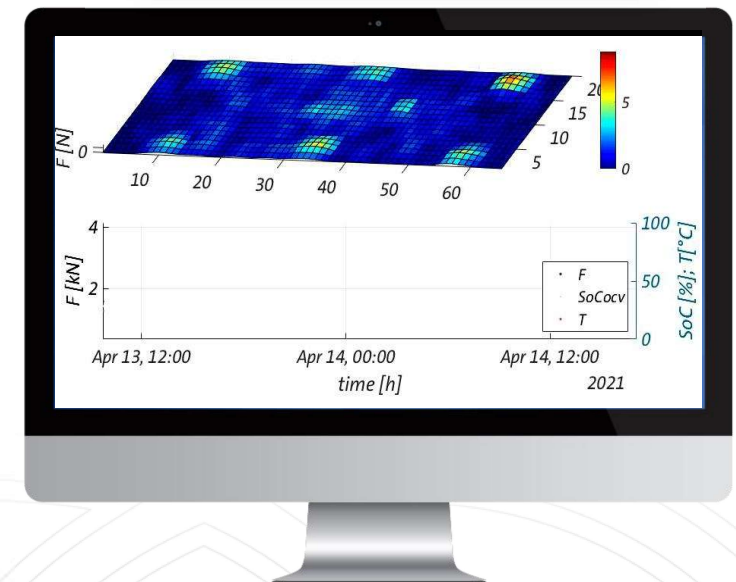
An example:

During the charge/discharge cycle, batteries undergo continuous volume and temperature changes. These changes aren't uniform. The only way to capture them is by using foil sensors.

This allows to...

- ✓ measure the state of charge (SoC) directly,
- ✓ implement preload and cell balancing measures,
- ✓ detect irregular behavior,
- ✓ prevent overcharging,
- ✓ and gain information on state of health (SoH)

**Foil sensors enable getting data from inside of the battery system.
Both spatially & temporally resolved.**

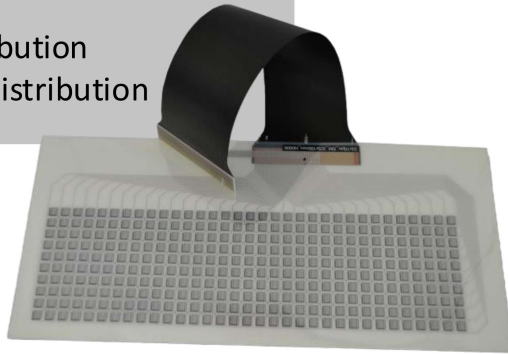


Battery Monitoring Solution Overview

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1. Sensor Foils:

- Pressure distribution
- Temperature distribution



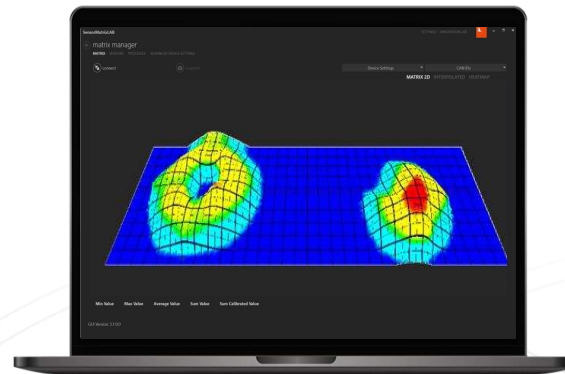
2. Read-out Electronics:

- State-of-the-art with reduced cross-talk
- 12-bit digital resolution
- Electro-magnetic interferences protection
- Several communication interfaces



3. Software:

- Live 3D/2D data visualization, storage and analysis
- Data filtering
- Real-time streaming via API
- Calibration option

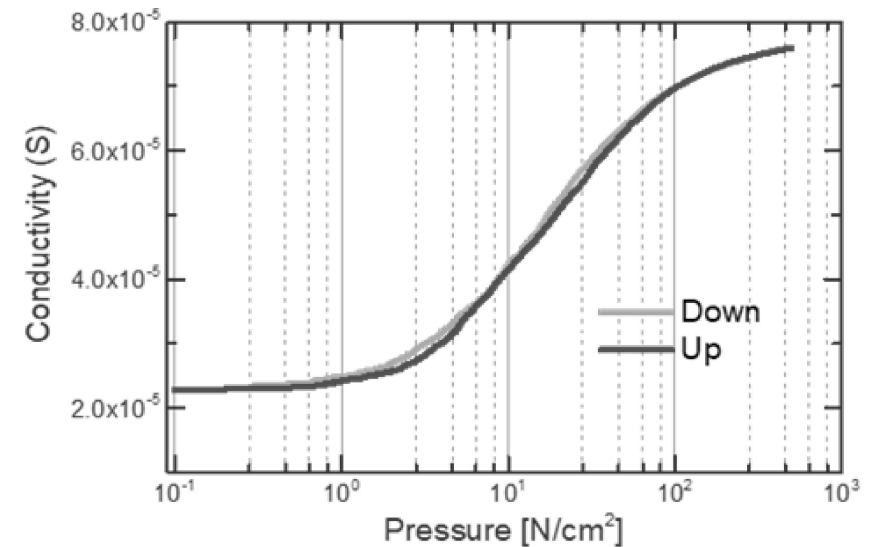


Pressure Mapping



Matrix of printed piezoresistive pixels on thin polyimide substrate.

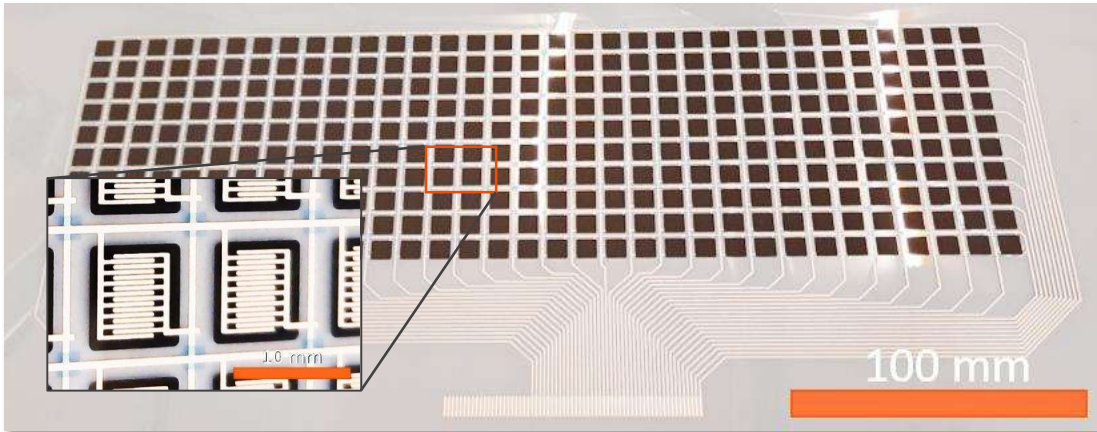
High Performance (Prime Mode):



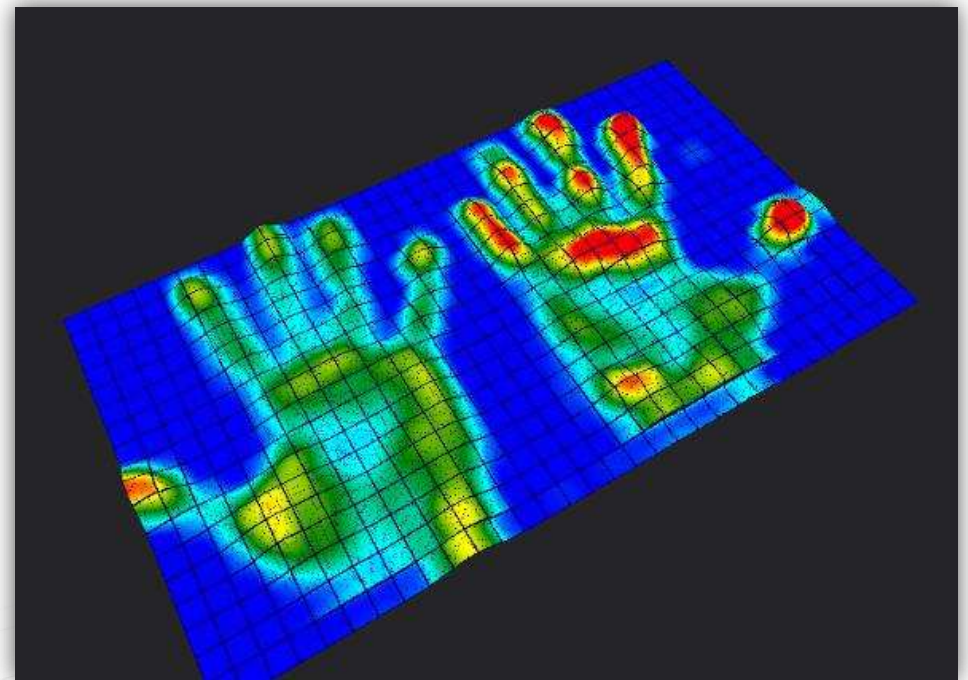
Strong performance: (General values)

- ✓ **Huge measurement range:** 0.1 – 500 N/cm^2
- ✓ **High repeatability:** 0.2% - 5 % (repeatability error)
- ✓ **High durability:** < 5 % (loss after 1 Mio. Cycles of 150 N/cm^2 load)
- ✓ **Overall thickness:** 110 - 250 μm
- ✓ **Operating Temperature:** -20°C – 100°C

Temperature Mapping



Temperature-sensitive resistors printed on interdigitated electrode structures enable **spatially resolved temperature measurements** on very thin foils (< 80 μm).

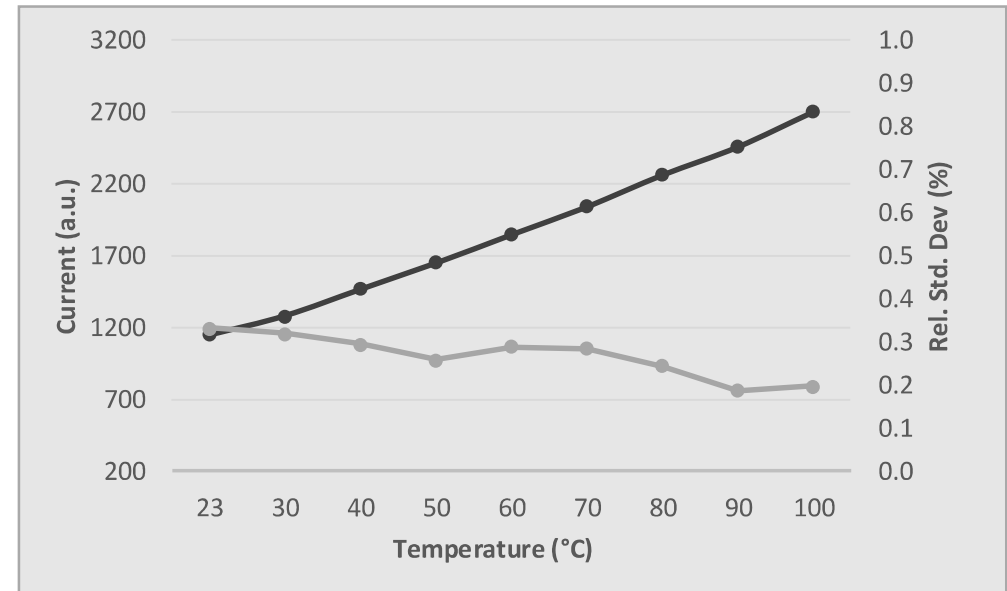


Color-coded image of the temperature distribution induced by a hand.

Temperature Mapping

Portfolio:

	Standard	Custom
Resolution (# of pixels)	32 x 10	up to 96 x 96
Active Area (cm ²)	32 x 10	up to 35 x 55
Pixel size (cm ²)	0.62 x 0.57	down to 0.2
Foil material	PET (2 x 75 μm)	PI, PET, PEN



- Typical performance:**
- ✓ Highly linear behavior
 - ✓ Accuracy: < 1 °C
 - ✓ Range: 10 - 100 °C and beyond
 - ✓ Pressure independent

Dependency of the measured current on the temperature. A clear linear behavior is observed.

Read-out Electronics

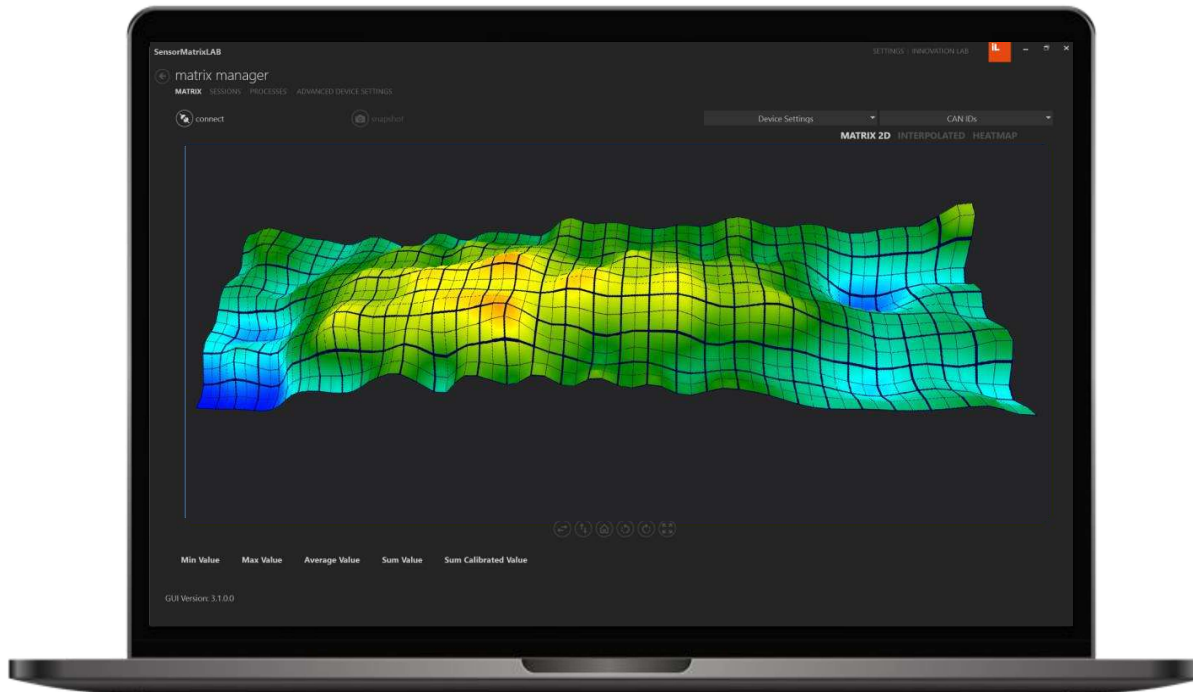
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- High-resolution for matrices with up to 96x96 sensor pixels
- Low noise 12-bit ADC signal
- Protected from electro-magnetic interference
- Strongly reduced crosstalk between pixels
- Typical read-out frequencies of about 100 fps
- Usable for pressure- and temperature-sensitive matrices
- Communication via serial USB, CAN, Ethernet or Wi-Fi



Software: SensorMatrixLAB v5.x

FLEXOO



Advanced 2D & 3D data visualization



Data recording and replaying



Real-time streaming via API



Supports different communication Interfaces



Multi-matrix real-time readout possibilities



Support of customized printed sensor matrices



HDR function: adjustment of measuring range via V_{ref}



Sensor calibration option

More information at: <https://www.flexoo.de/products/sensormatrixlab/>

✓ We sense your needs



We specialize in delivering **end-to-end solutions** for smart **sensors** and **electronics** from initial development to final manufacturing.

Our dedicated team takes pride in tackling challenges head-on. Experience firsthand fast and purposeful problem-solving **tailored** to your unique needs.

Collaboration & Partnership

FLEXCO

Partnership based on bilateral expertise

Broad network of leading ink, materials and equipment providers to assure consistency in large volume production and bring the best solution to our customers.

ELANTAS

Henkel

ACI

CHASM™

Copprint

BASF
We create chemistry

EVONIK
Leading Beyond Chemistry

DUPONT™

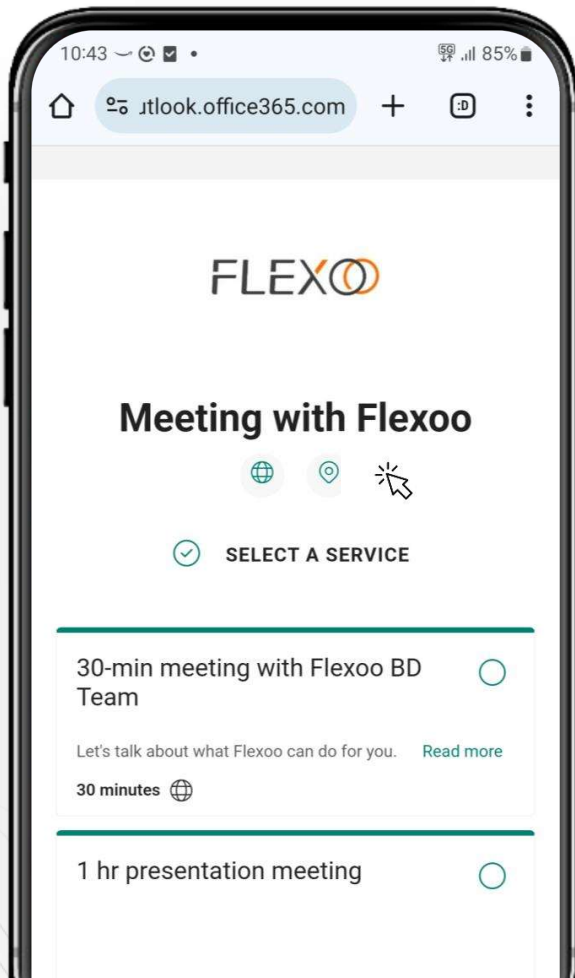
ATG
SERVICE

Customers who trusted us



Challenge us!

FLEXOO



Bart Jarkiewicz
Head of Sales



Lars Keiz
Sales Manager



Dominik Stasiak
Indirect Sales Manager

[Schedule an appointment](#)