



Dry Coating Forum



Shaping the Future of Dry Battery
Electrode Processing

IKA CONTERNA – Fully Scalable Process for the Dry Electrode Manufacturing

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Productmanagement Battery Solutions

CONTERNA – What is it ?

Multi-Chamber continuous mixing and kneading machine

Ingredients

- > Solid powders
- > Solid granules
- > Liquid additives

Products

- > High viscous pastes
- > Coatings
- > Compounds
- > Dry materials

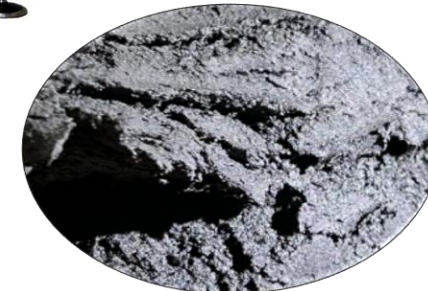
Characteristics

- > Modular & scalable design
- > Each chamber with own drive & speed
- > Customizable chamber size & number



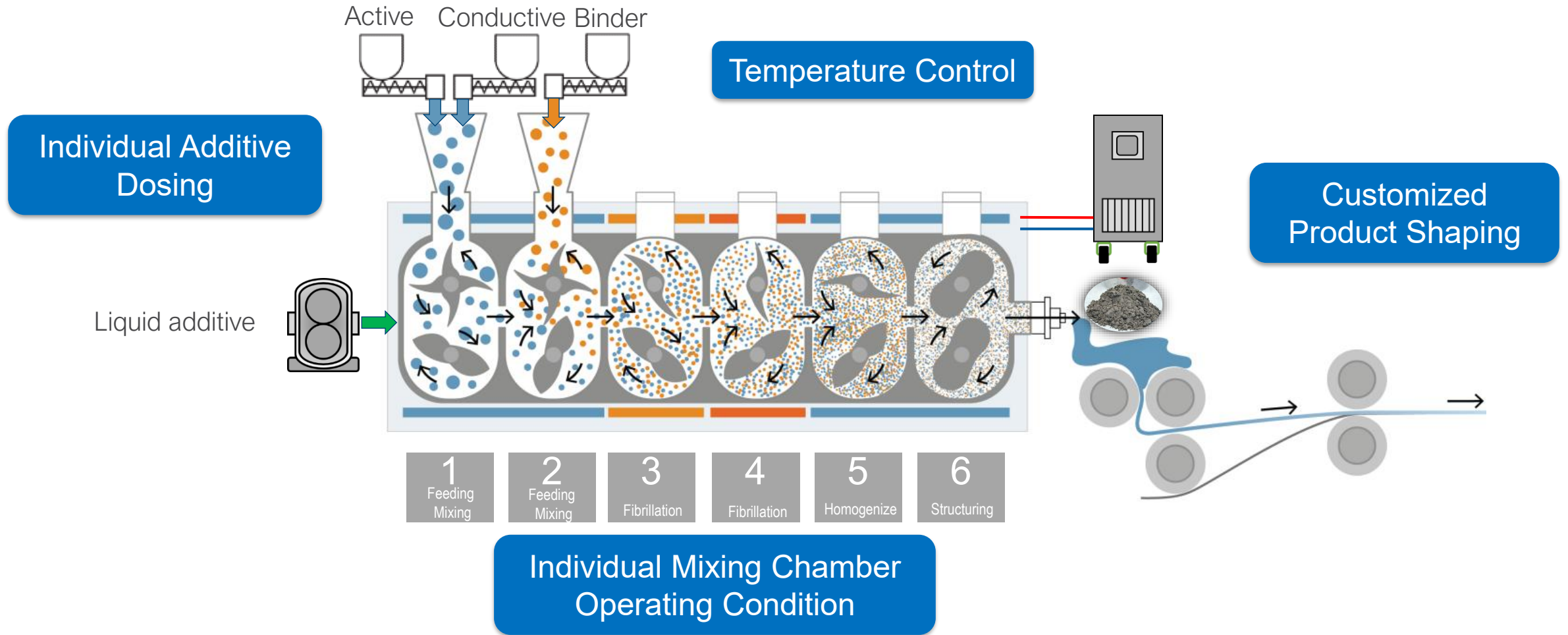
Process

- > Mixing
- > Kneading
- > Dispersing
- > Homogenization
- > Conditioning



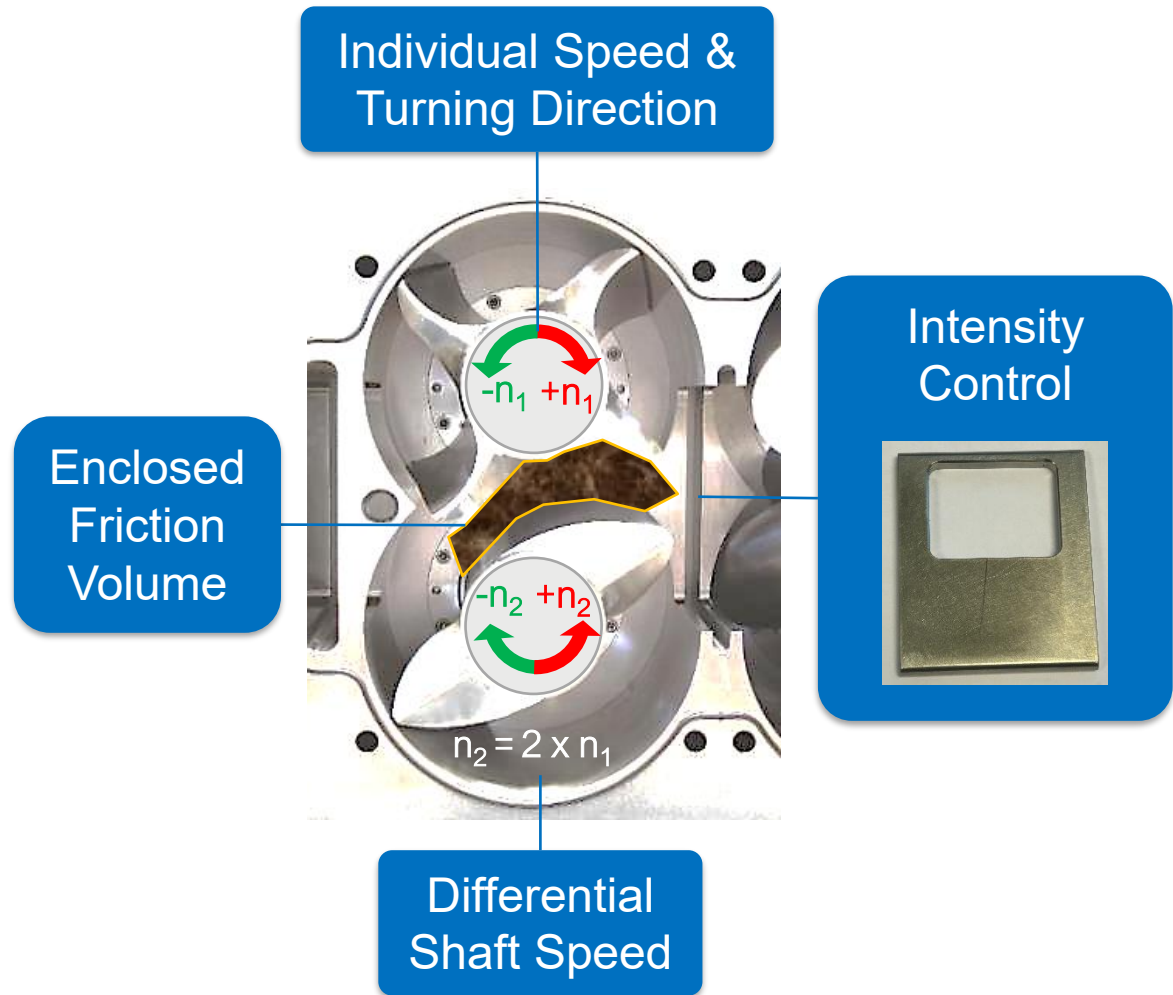
CONTERNA – Characteristics

Machine main functionalities

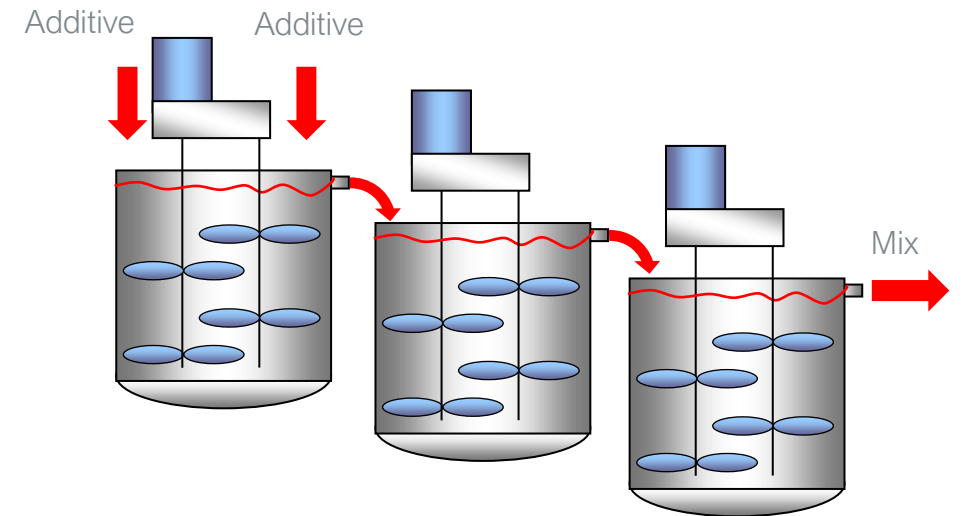


CONTERNA – Characteristics

What sets this machine apart



Visual Process Monitoring



Total Additive Input Rate = Blend Output Rate

CONTERNA – Scale up

Parameter & Machine sizes

Mixing intensity

- > Mixing tools speed & shear
- > Mixing tools turning direction
- > Mixing chamber filling level

Residence time

- > Feeding rate of the ingredients
- > Total volume mixing chambers
- > Mixing tool action frequency

R & D



CONTERNA LAB
HKC 4/0,3
1 – 10 kg/h

PILOT



HKC 6/2
10 – 100 kg/h

PRODUCTION



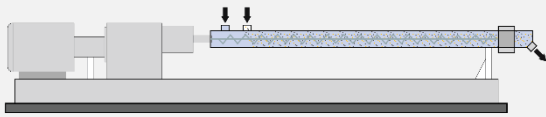
HKC 6/25
≈ 1000 kg/h

HKC 6/100
≈ 4000 kg/h

CONTERNA – Benefits

Achieve all in one simultaneously

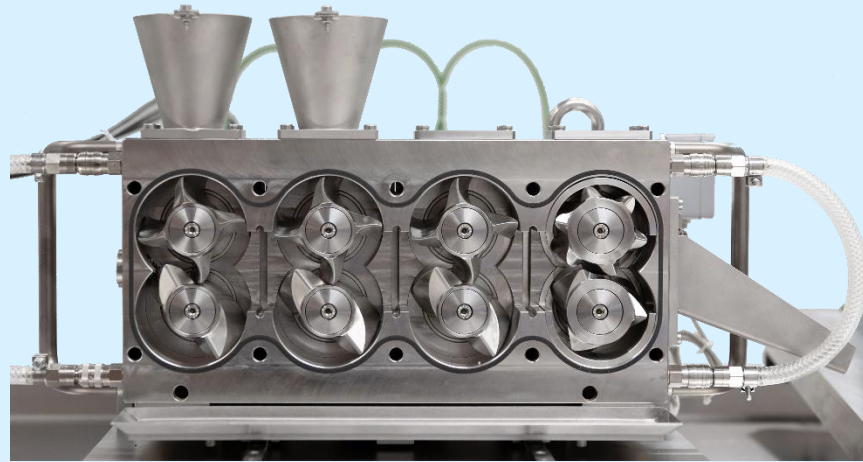
Twin Screw Extruder



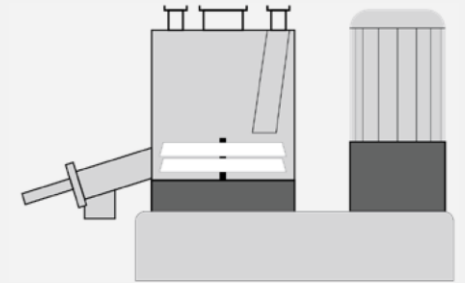
- + Conti mass production
- + Efficient inline process
- + Good temperature control
- + Low noise emission
- + PFAS-free binder ready



IKA CONTERNA



High Intensity Mixer

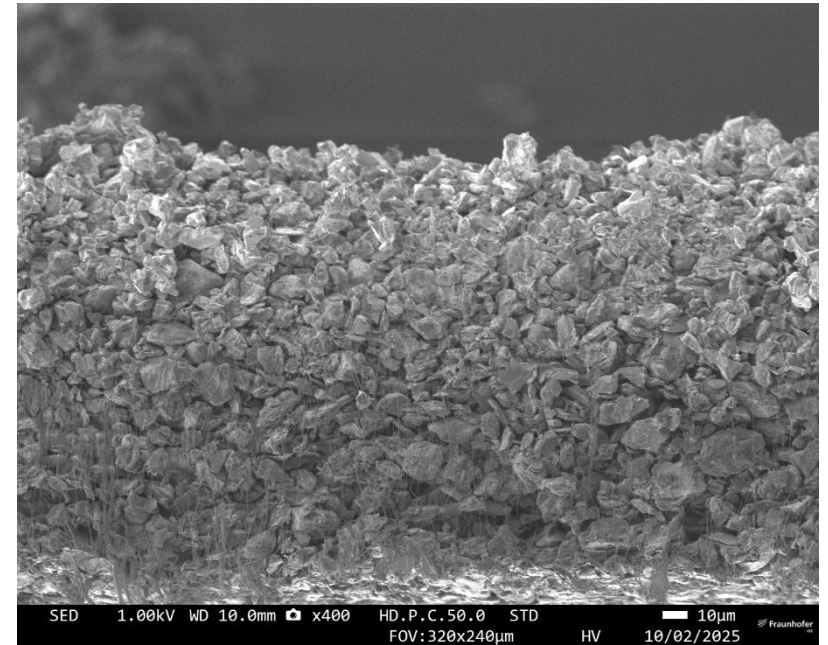
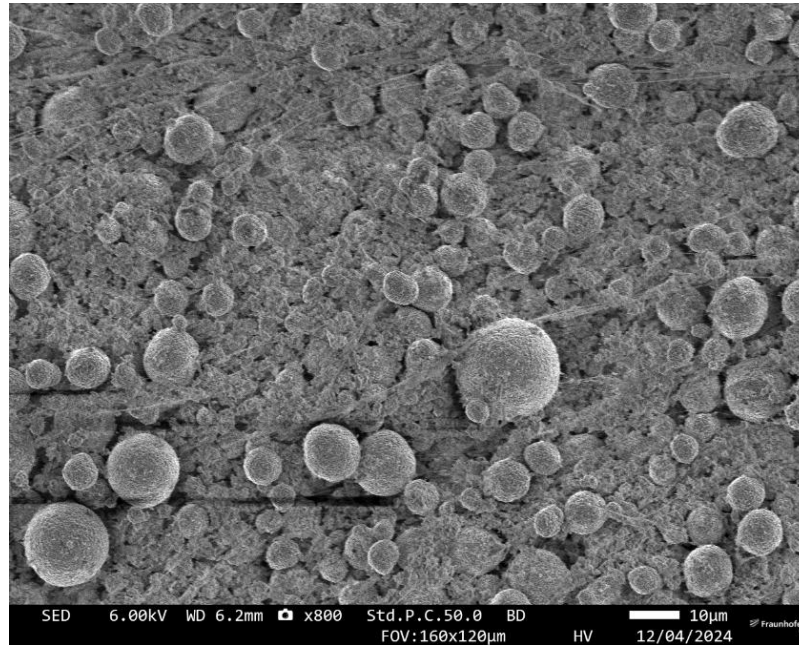
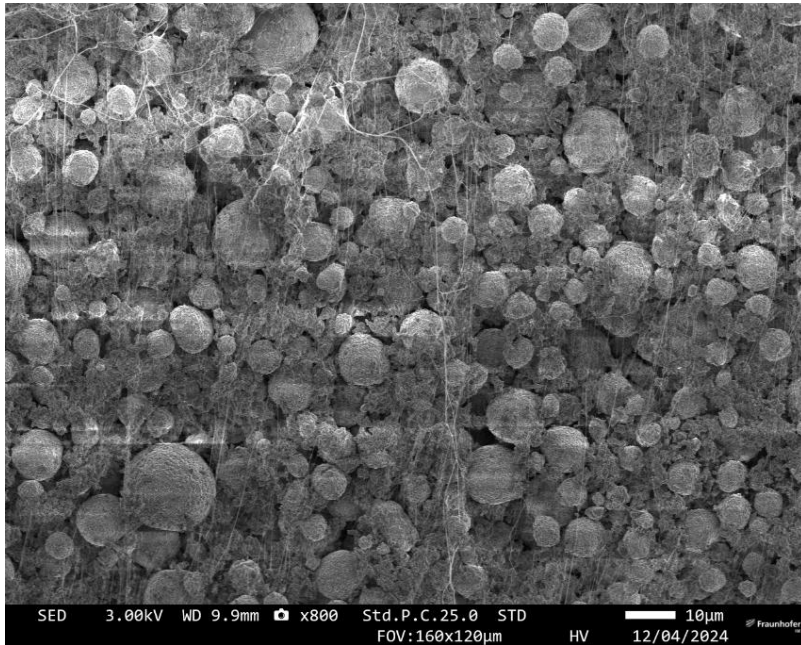
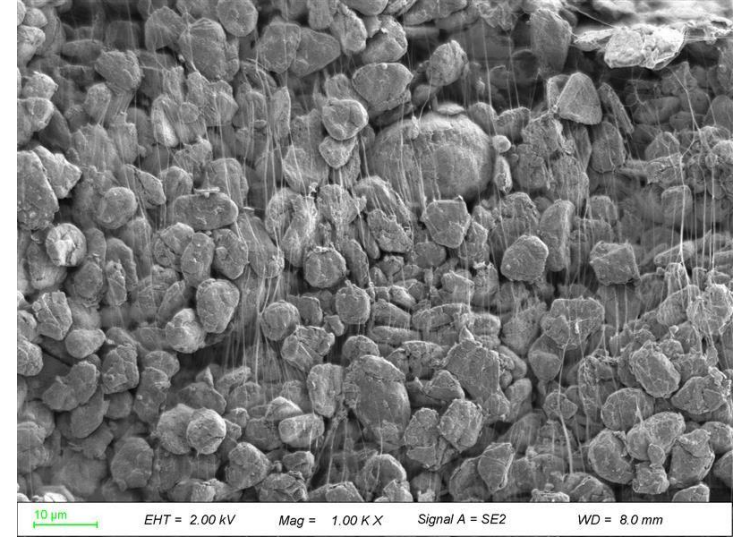
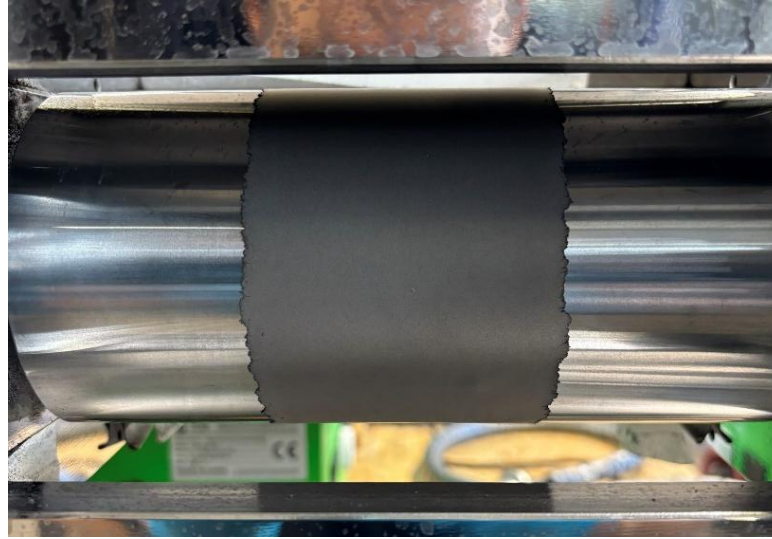


- + High speed mixing
- + Homogenous product
- + Short fiber length
- + Even fibrillation
- + Compact machine size
- + Easy maintenance

CONTERNA – Products

IKA material experience

- > Standard LIB – Graphite Anode
- > Standard LIB – NMC Cathode
- > Standard LIB – LFP Cathode
- > All solid state battery (ASSB) – Electrolyte
- > All solid state battery (ASSB) – Cathode



CONTERNA – Achievements

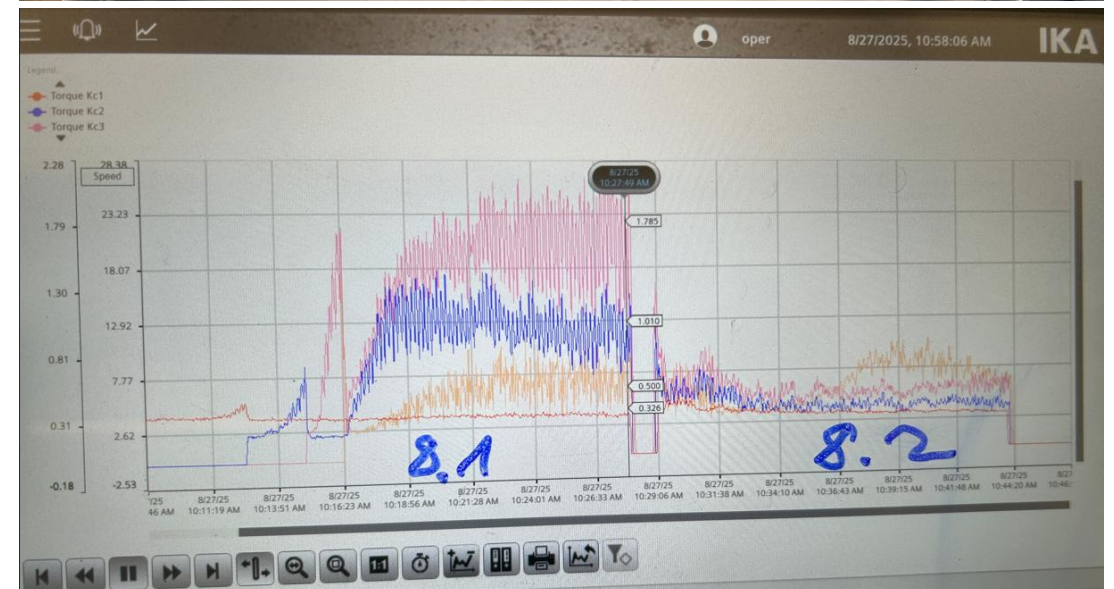
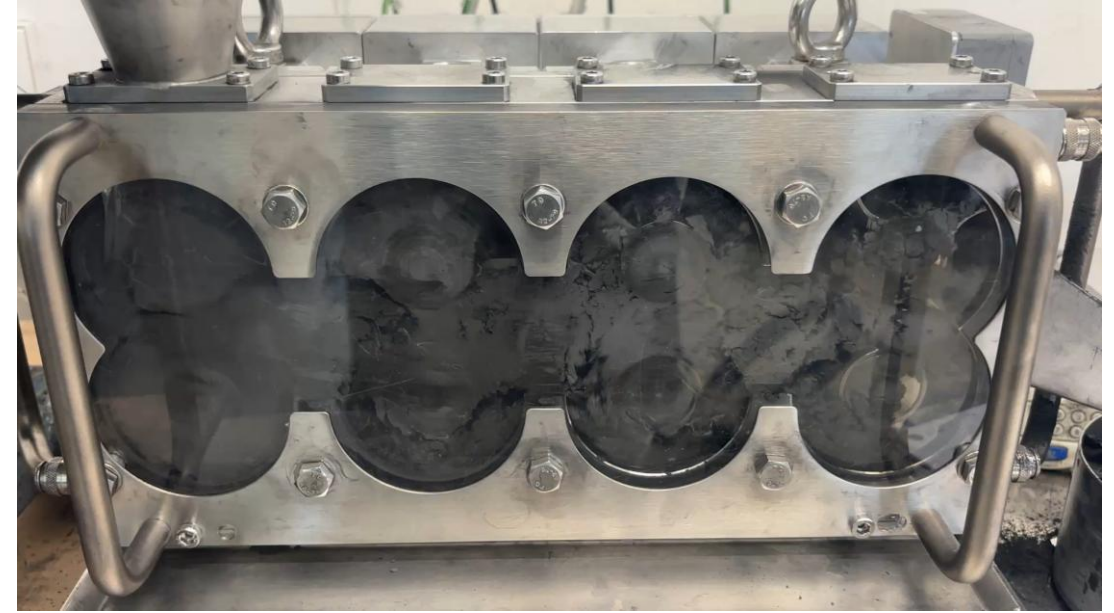
Current status of development

Challenges

- > Ideal shear forces for fibrillation
- > Pre-mixing of materials
- > Conditioning of mixed-fibrillated product

Modifications

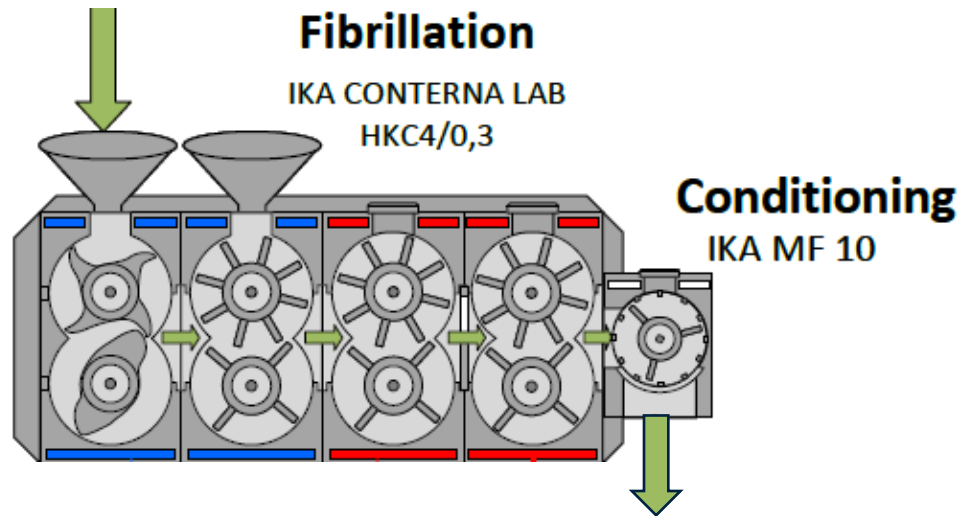
- > Development of improved mixing tools for specific tasks and shear
- > Addition of IKA mills as 1 chamber module for powder conditioning



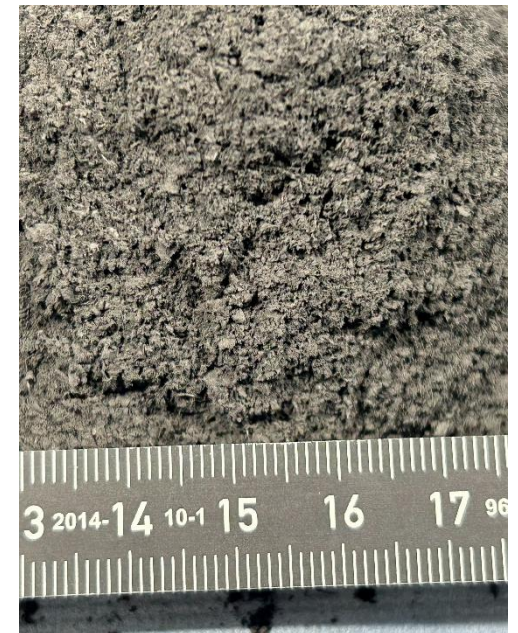
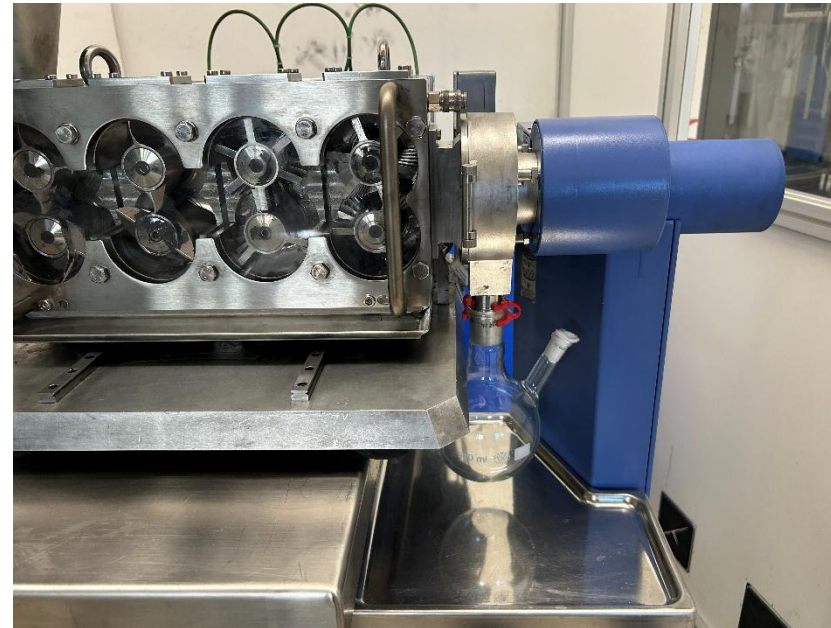
CONTERNA – Achievements

Current status of development

- > Continuous processing
- > Real time visual monitoring of fibrillation process with transparent cover
- > Torque correlations with fibrillation degree
- > Fibrillation without additional heating or cooling
- > Success with various PTFE grades (e.g. Daikin F104, F106, F201, F-Lab grade)
- > Conditioning of mixed and fibrillated product
- > Running Anode & Cathode materials



IKA

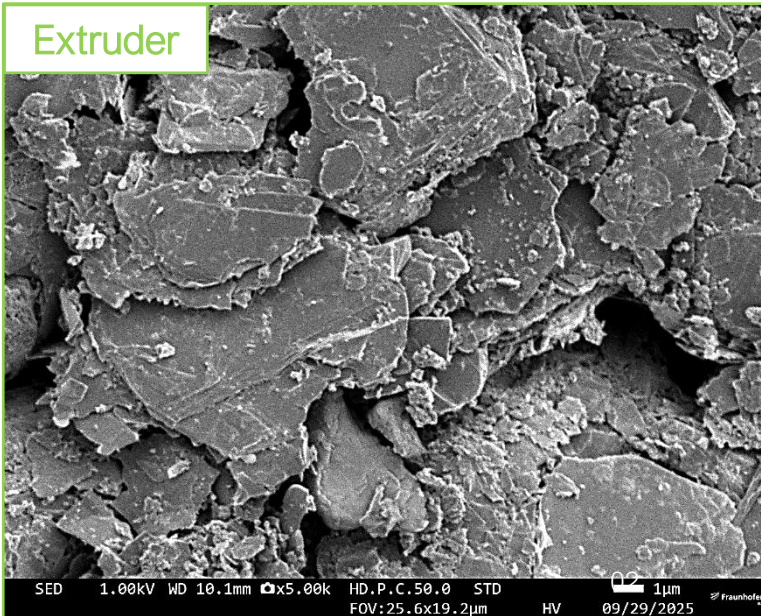


CONTERNA – Results

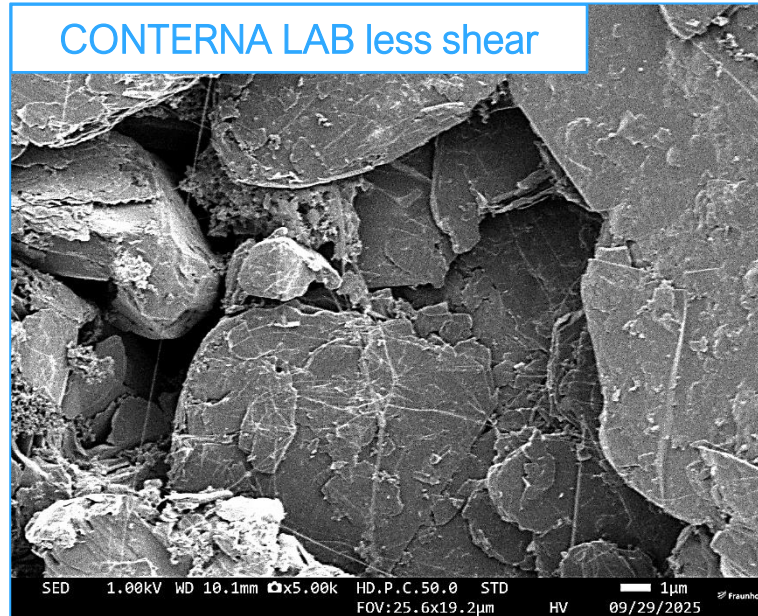
Anode - Tool influence

- > Adjustment of the ideal shear forces
- > Tool selection based on the target fibrillation degree

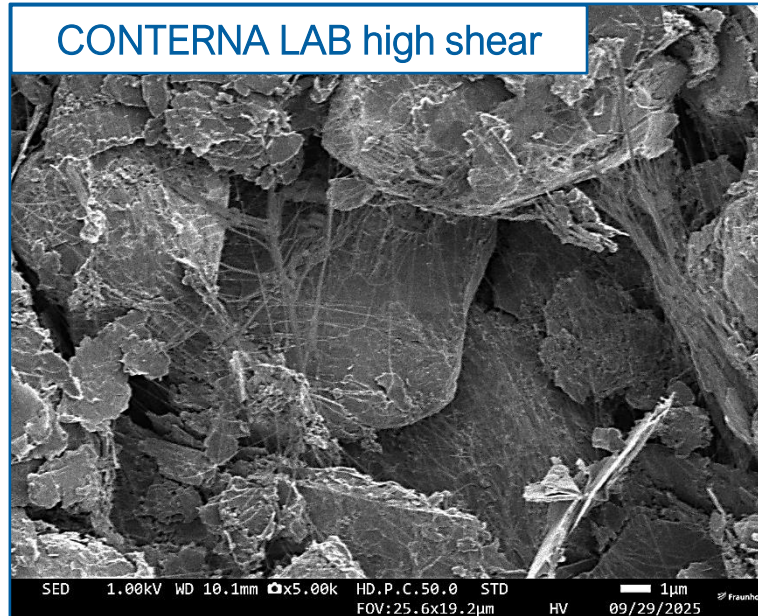
Extruder



CONTERNA LAB less shear



CONTERNA LAB high shear



High Intensity Mixer

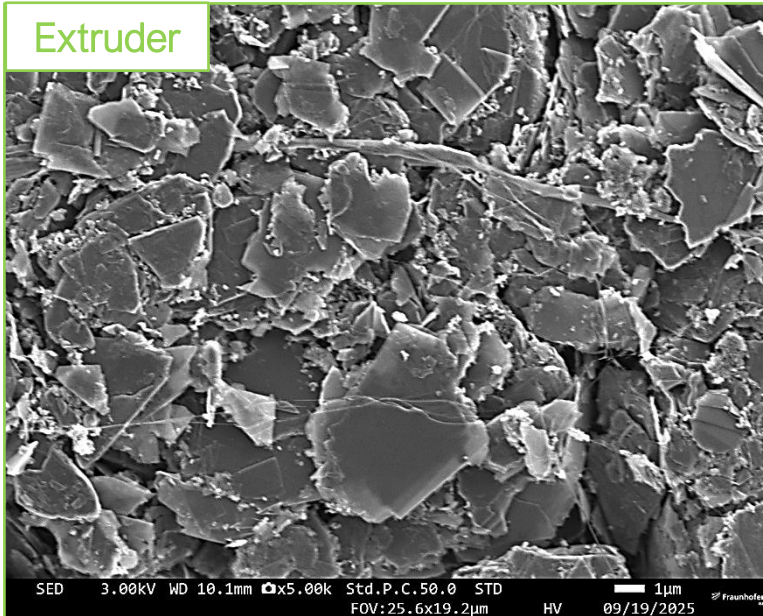


CONTERNA – Results

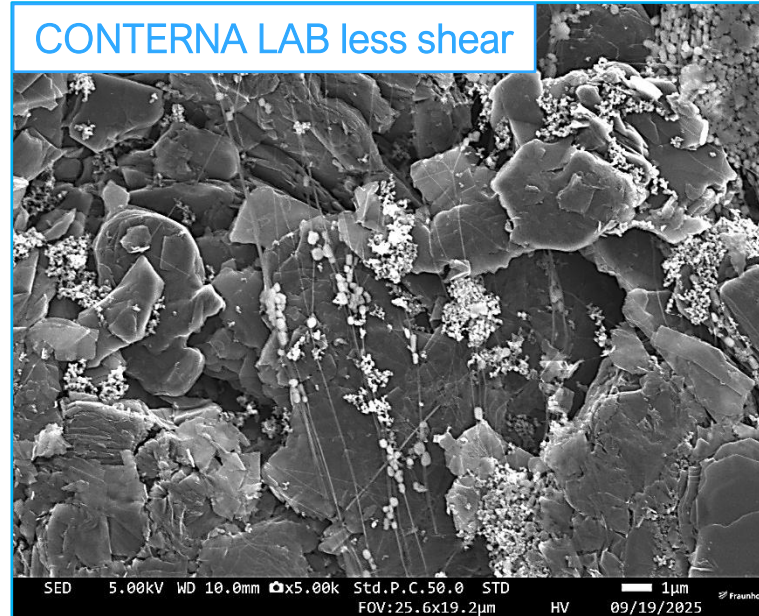
Anode - Tool influence

- > High shear → More and longer fibrils
- > Less shear → Fine fibrils
- > High intensity → Fine fibrils

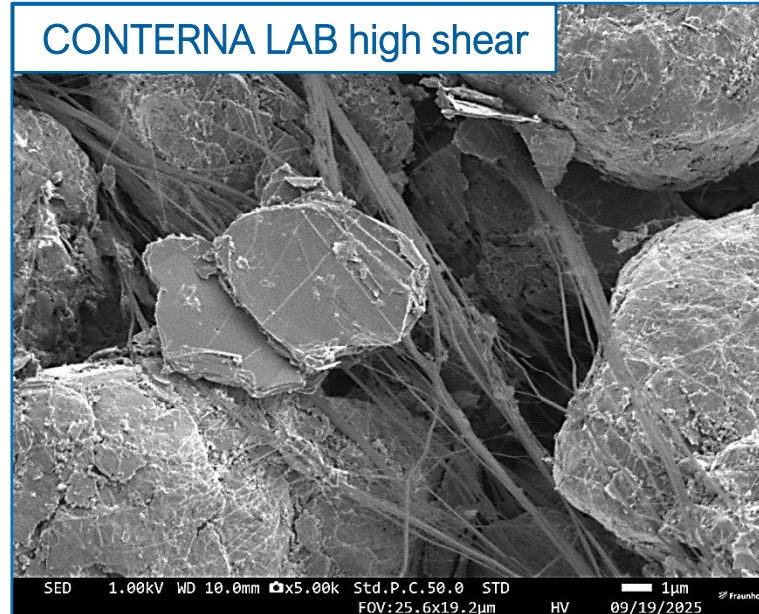
Extruder



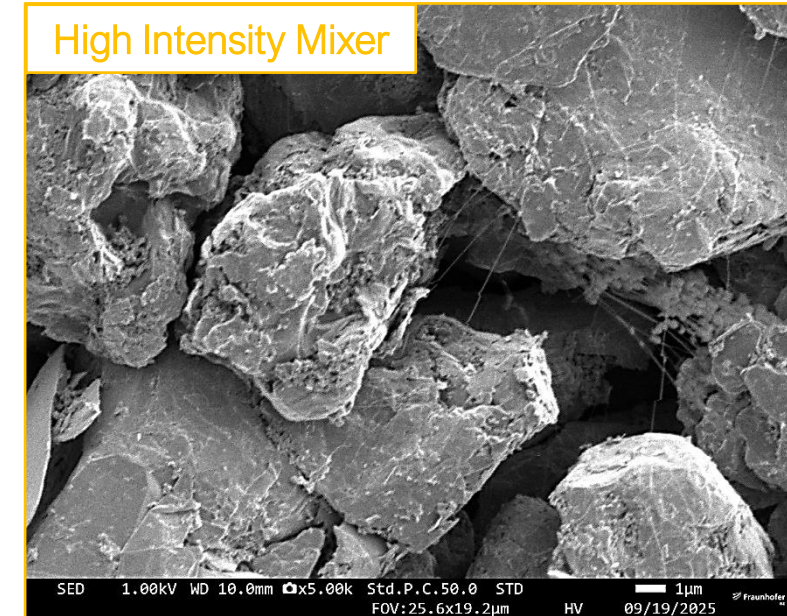
CONTERNA LAB less shear



CONTERNA LAB high shear



High Intensity Mixer

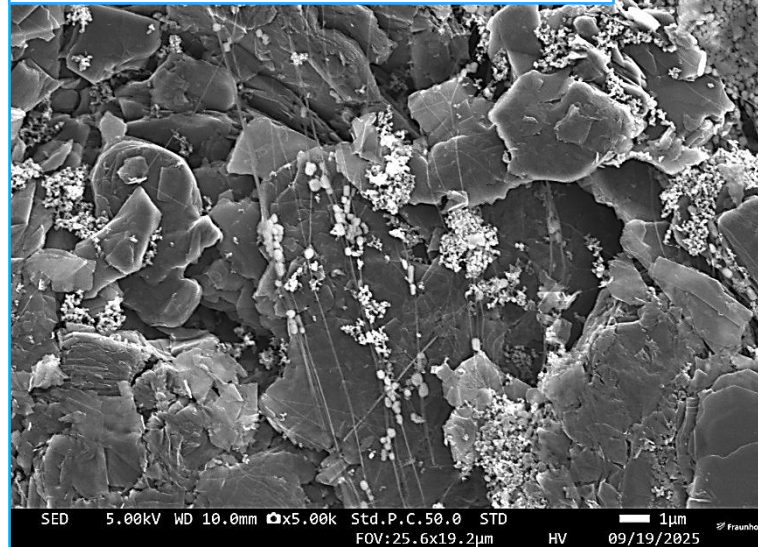


CONTERNA – Results

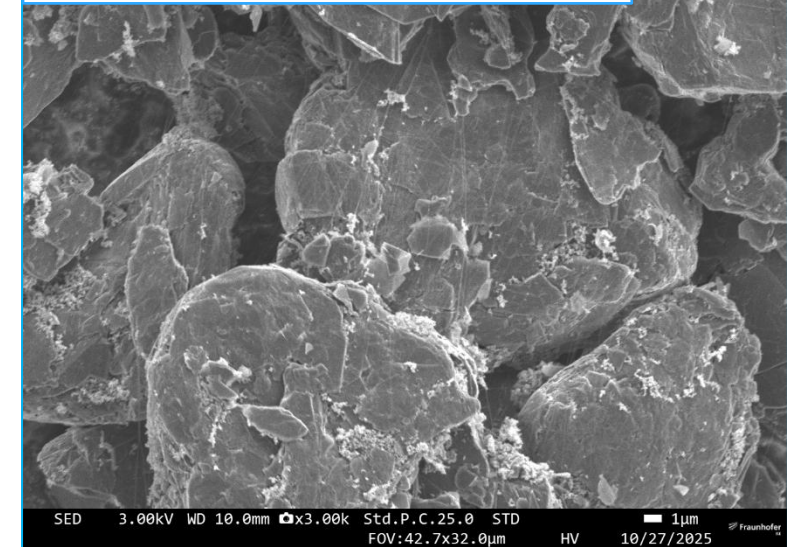
Anode - Tool influence

- > High shear → More and longer fibrils
- > Less shear → Fine fibrils
- > High intensity → Fine fibrils
- > Reduced binder content → Finer fibrils

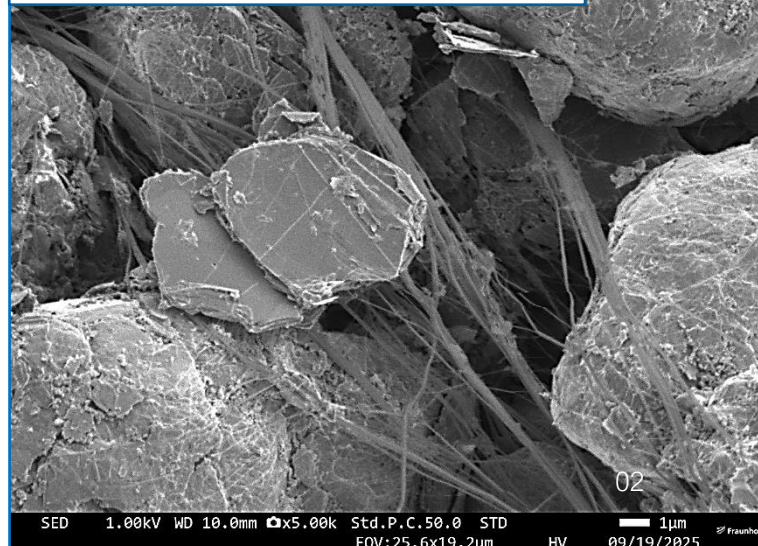
CONTERNA LAB less shear 2%



CONTERNA LAB less shear 1%

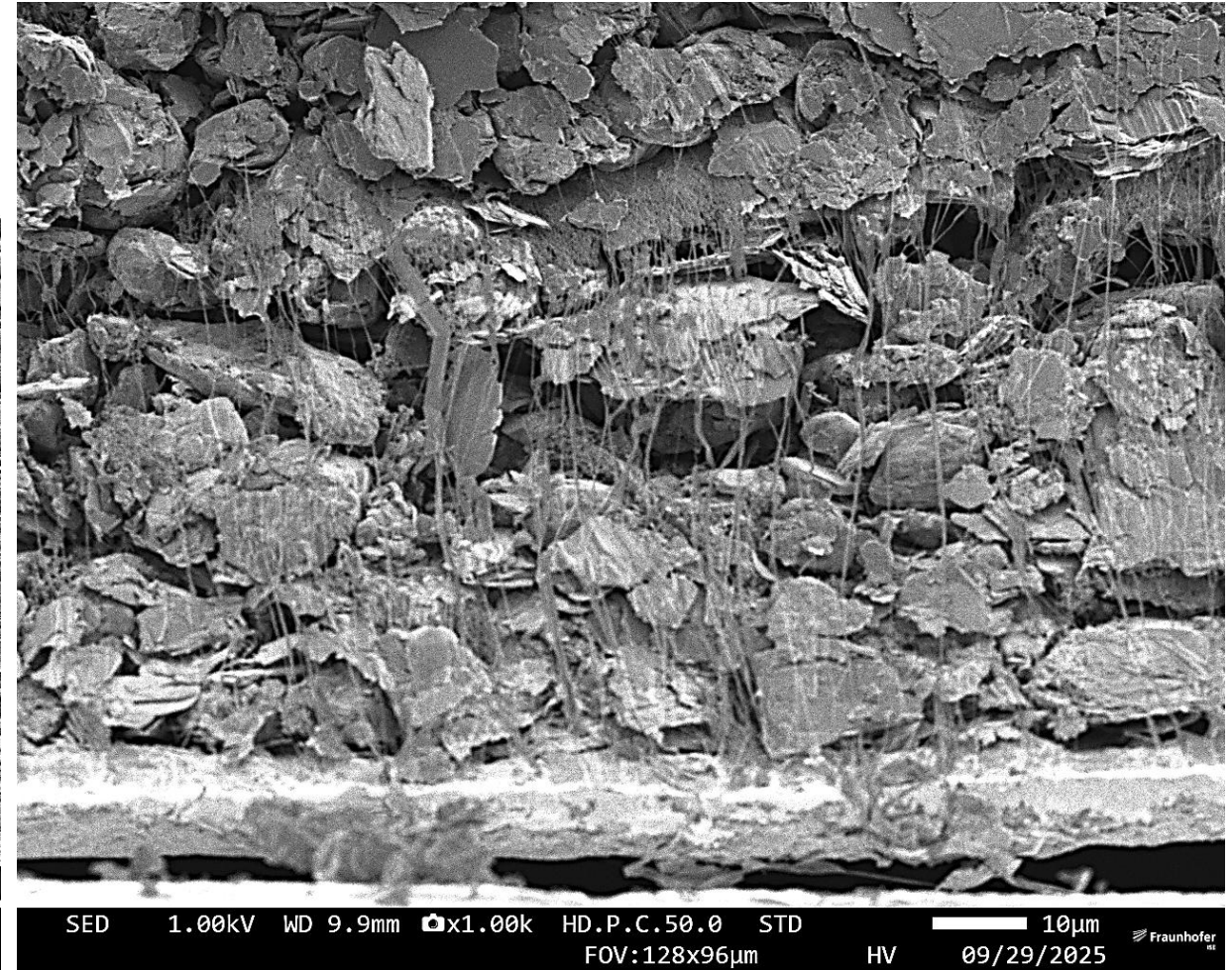
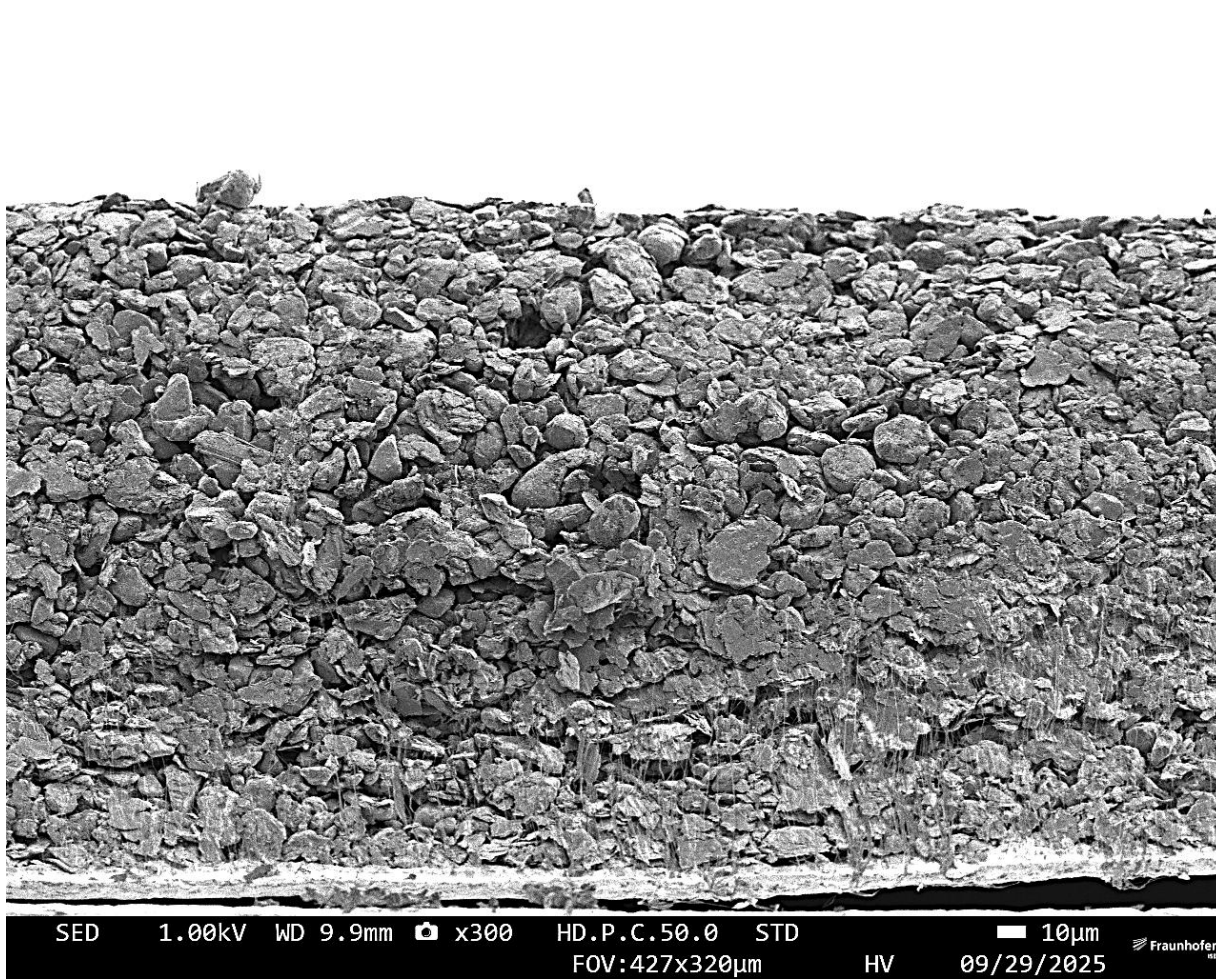


CONTERNA LAB high shear



CONTERNA – Results

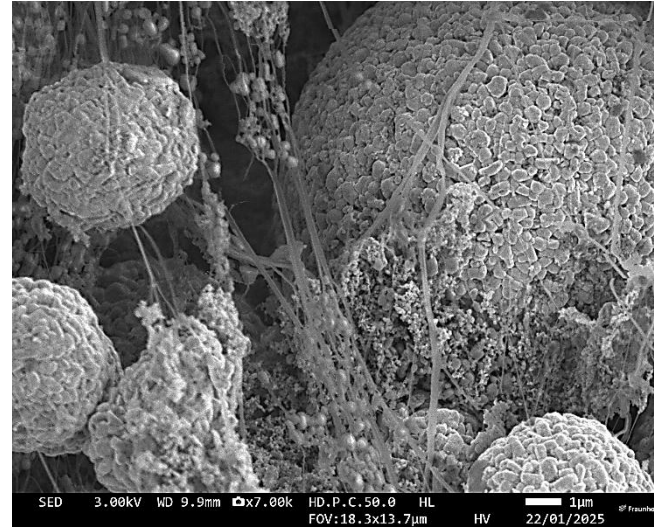
Anode after calendaring



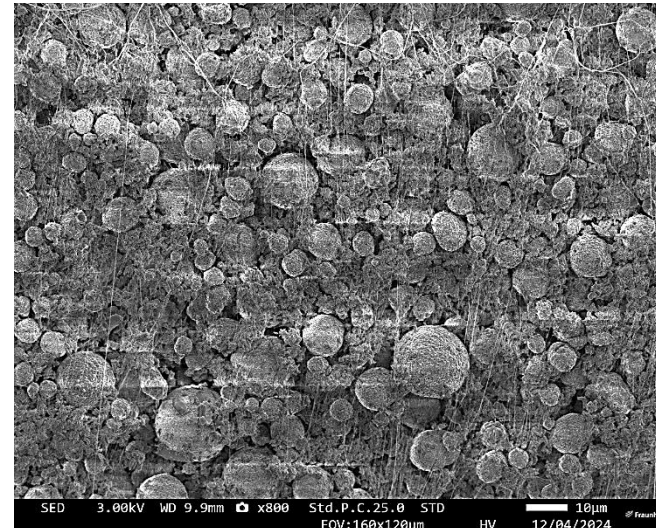
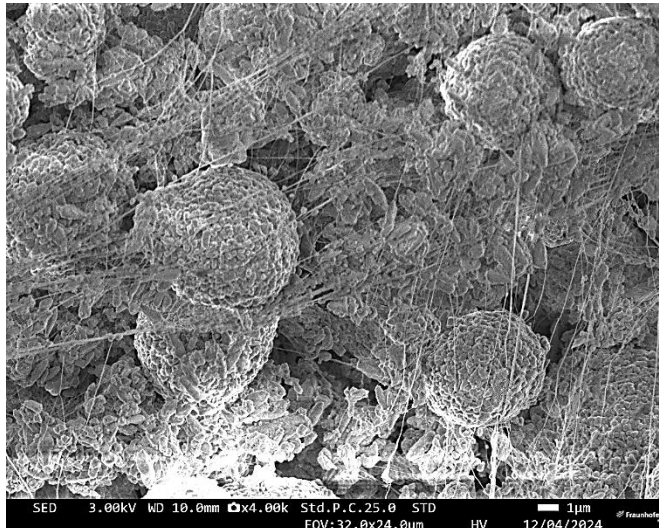
CONTERNA – Results

Cathode materials

LIB Cathode
1,5% PTFE



ASSB
1,5% PTFE



CONTERNA – Projects

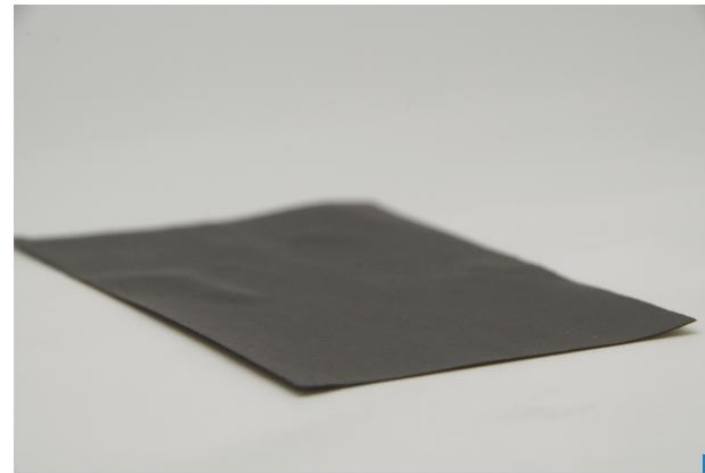
Research project LAENDLE



Solvent- and PFAS-Free Battery Electrode Coating Processes from Baden-Württemberg for High-Performance Sodium-Ion Batteries

LAENDLE

The LAENDLE project is developing a solvent- and PFAS-free dry coating process for sodium-ion battery electrodes. IKA-Werke GmbH and Fraunhofer ISE are combining their expertise in mechanical engineering and battery research to promote local value creation in Baden-Württemberg. The added value for the industry lies in the reduction of production costs and resource consumption while improving environmental compatibility.



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Dry-processed electrode film for sodium-ion batteries.

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Duration:
07/2025 - 06/2027

Contracting Authority / Sponsors:
Ministerium für Wirtschaft, Arbeit und
Tourismus Baden-Württemberg

Project Partners:
IKA-Werke GmbH & CO. KG

Thank you !



Please visit our booth