

DRYtraec[®] R&D Infrastructure at Fraunhofer IWS and FFB

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DBE R&D @ Fraunhofer IWS

Fraunhofer IWS as R&D Driver in DBE Technology

DBE@IWS Highlights

2012

1st IWS DBE patent
DE10 2012 203 019 A1

2016

invention DRYtraec
DE10 2017 208 220 A1

2018

invention DBE for SSB
DE10 2018 222 129 A1

2022

PFAS-free binder
DE10 2021 209 121 B4

2023

1st Dry Coating
Forum

2025

Dry Platform
Fraunhofer award
DRYtraec @ FFB



2010
„V0“



2014
V1 self made 2/3-
roll calender



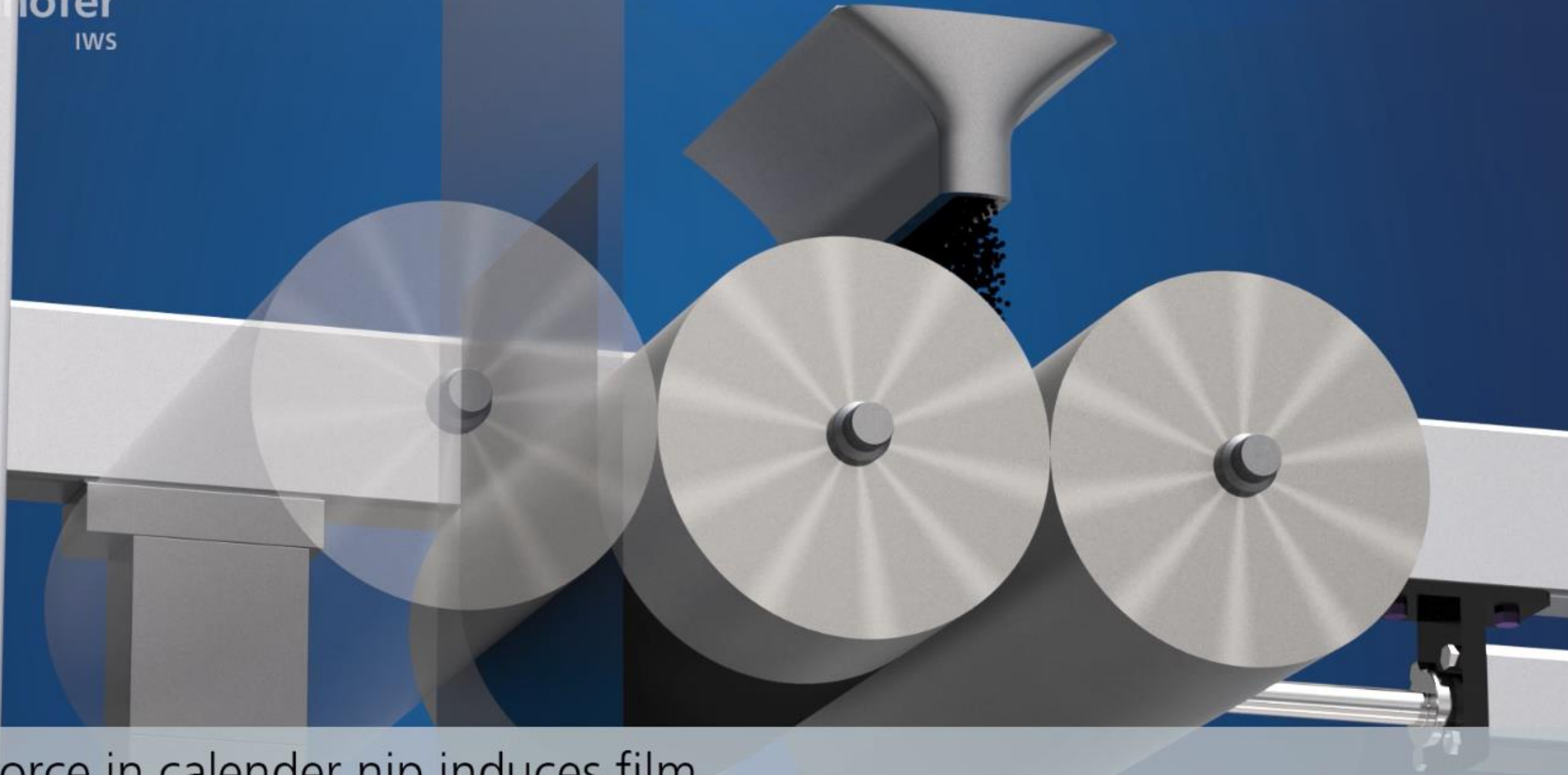
2020
V2 Saueressig 4
roll calender



2022
V3 Saueressig 3 roll calender
(microenvironment)



2025
Dry platform at
IWS



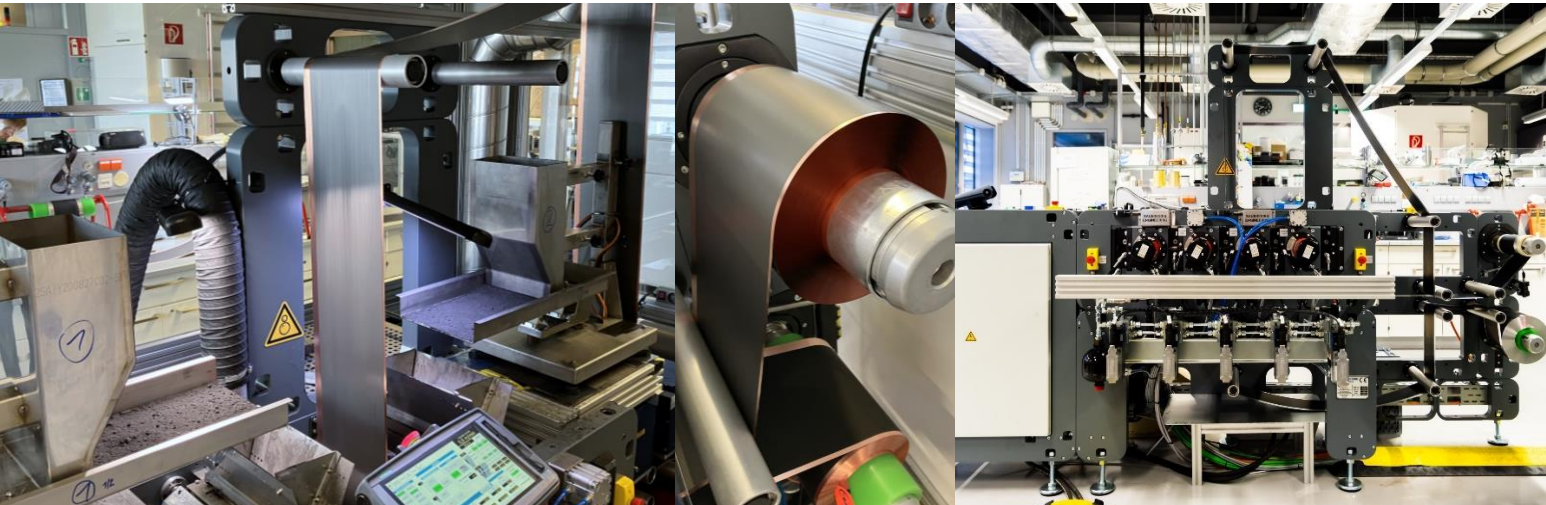
Shear force in calender nip induces film formation on faster rotating roller

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Dry coating systems

Calender equipment

- Batch coating: ~10 cm x 30 cm
- Continuous R2R coating: max. 10m/min at 24 cm width (TRL-6)
- Used for NMC, Graphite, LFP, SiB, SSB, Li-S
- Today, IWS is running 4 machines: 2-roll system (2x), 3-roll, 4-roll

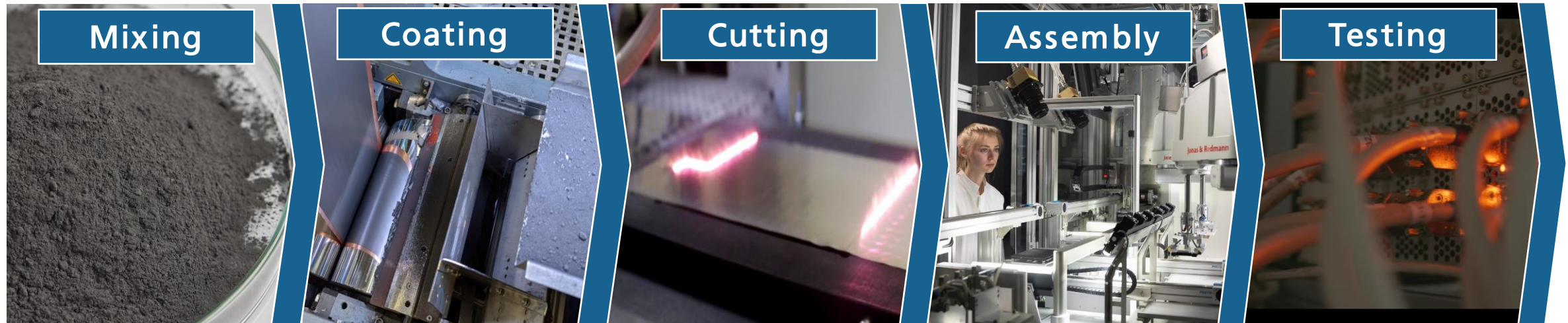


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TRL-6 DBE Process Line at IWS

Flexible process line for dry battery electrode R&D

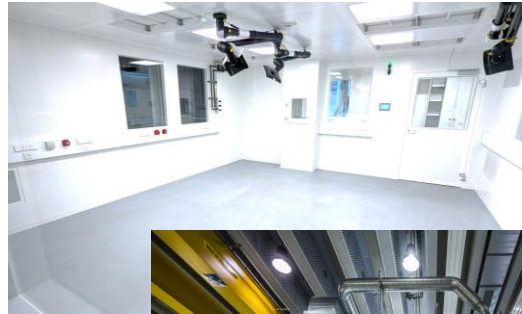
- Electrode manufacturing: Batch and continuous mixing and coating w/ in-line monitoring
- Laser processes for cutting, microstructuring and welding
- Assembly and tests of lithium-ion-, sodium-ion-, lithium-sulfur and solid state batteries



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The TRL 1-6 DRYplatform infrastructure at IWS

Dry battery electrode R&D along the value chain



Process Room

TRL-6 DRYtraec® equipment fully digitalized



Dry Air Environment

3 dew point modi: -55 °C /
-40 °C / ambient humidity



PAmos System

- cmr-Particle + dust monitoring



Analytics Room

- Powder/Mixture characterization
- Electrode characterization



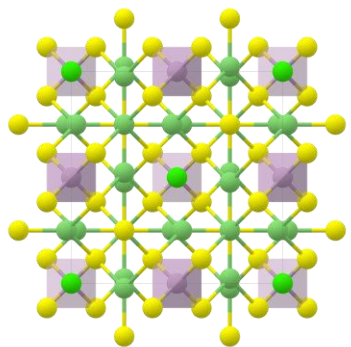
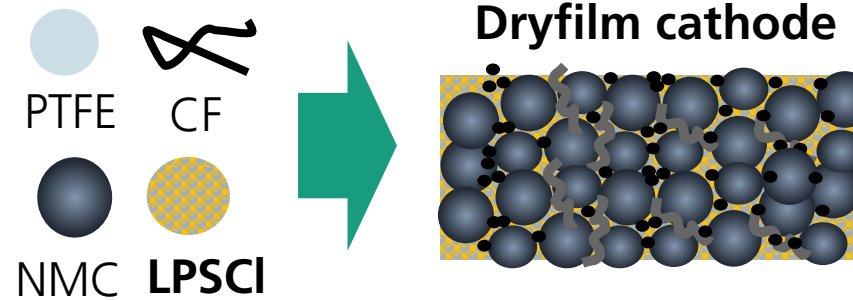
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R&D Example: DRYtraec for solid-state batteries

Posters:
A. Dupuy,
F. Hippauf

SSB Cathode & separator: solvent-free processing via DRYtraec®

- Demonstrating dry film NCM/LPSCI cathode [1] and LPSCI separator [2]
 - Flexible films with binder content < 1 wt-%
 - Dry process avoids any side reaction with solvents
- Upscaling with DRYtraec®



Solid electrolyte
Li₆PS₅Cl (LPSCI)

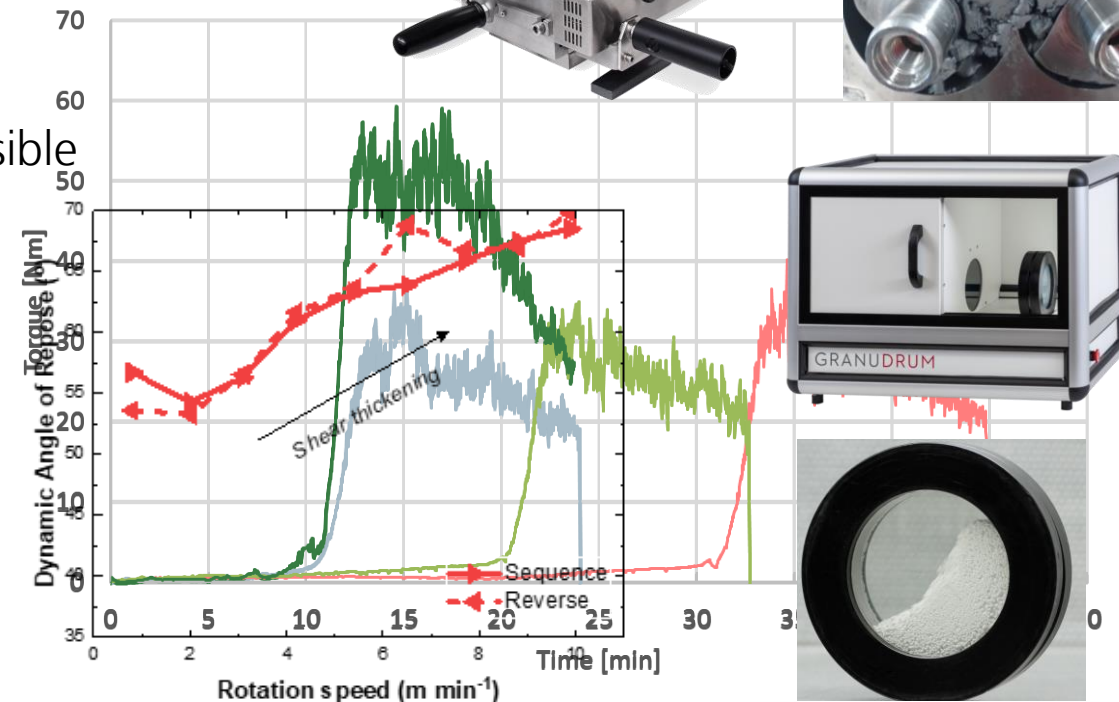
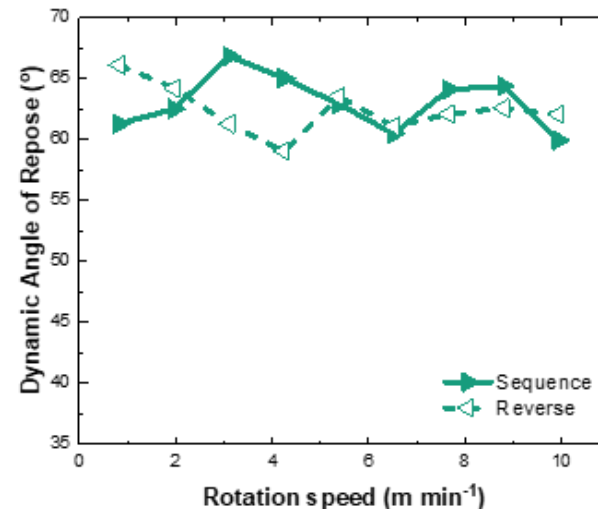
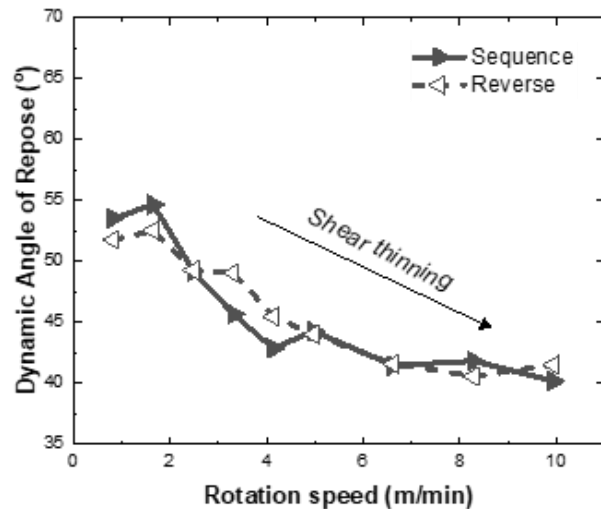


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R&D Example: Dry mixture preparation and characterization

Dry mixture optimizing

- Meta station with various mixing tools (extruder, measurement kneader)
- Different binder fibrillation behaviours can be detected
- Granu Drum: Dynamic Angle of Repose measurement
- Differentiation of under-/over-/well fibrillated mixtures possible

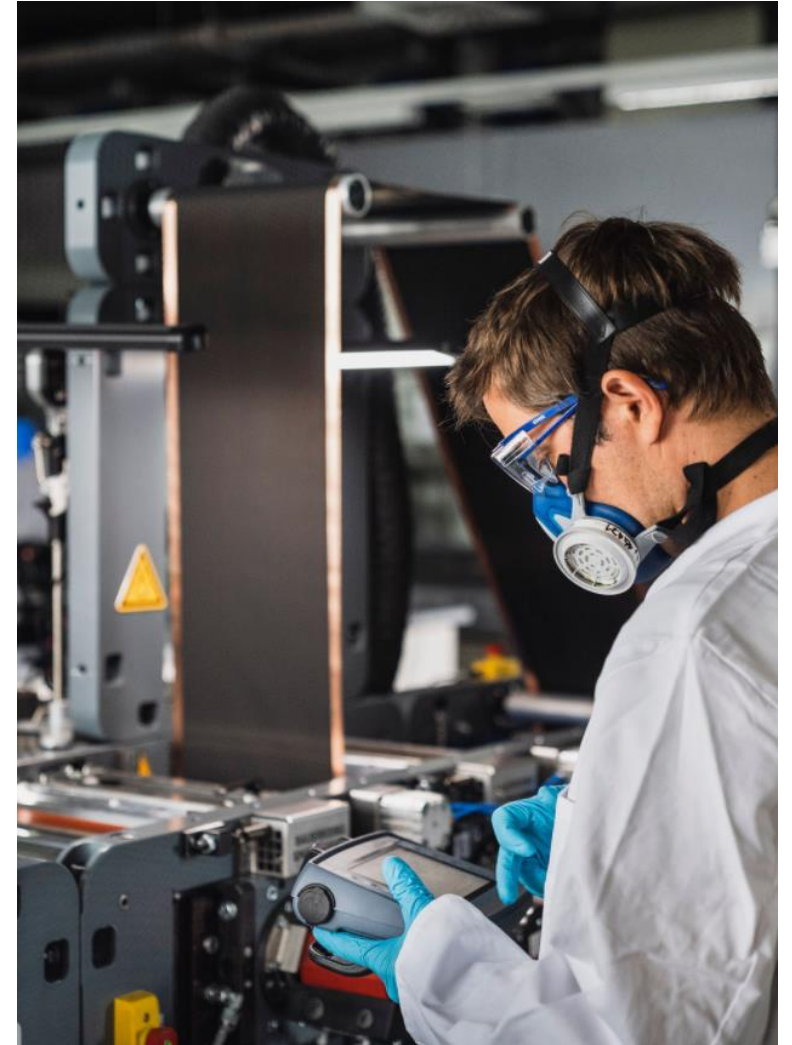


Dry Battery Electrode Coating at Fraunhofer IWS: DRYtraec®

Conclusion

IWS is your competent R&D partner for DBE development at TRL 1-6.

- Dry mixing, coating and testing process line at TRL-6
- R&D infrastructure for material and product development for LIB and next-gen. (SSB, SIB, Li-S) technologies.
- Evaluation of material/process/product-property relations
- DRYtraec®
 - Patent portfolio accessible through licensing
 - Scale-up with partners, FFB for R&D at TRL>6





Contact

www.drytraec.de

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Funding:

- KontElPro 03XP0325A
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- FestBatt Prod 03XP00432E



Bundesministerium
für Bildung
und Forschung



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