Cells & Batteries Made in Italy!

The first plant in Italy & Southern Europe for the mass production of Li-ion cells, modules and battery packs

FAAM

01 Intro/About Us

02 Battery Process

03 Closing Remarks

About Us

Made in Italy

Cobalt-free

95% Recyclable

/// About Us

Organisation

- FAAM is a subsidiary of Seri Industrial, a company listed on Milan's Euronext ("EXM") stock exchange

- **Seri industrial** is a vertically integrated player along the supply chain of batteries and plastic materials

/// About Us

Location & Activities

FAAM | Teverola

Li-ion Batteries

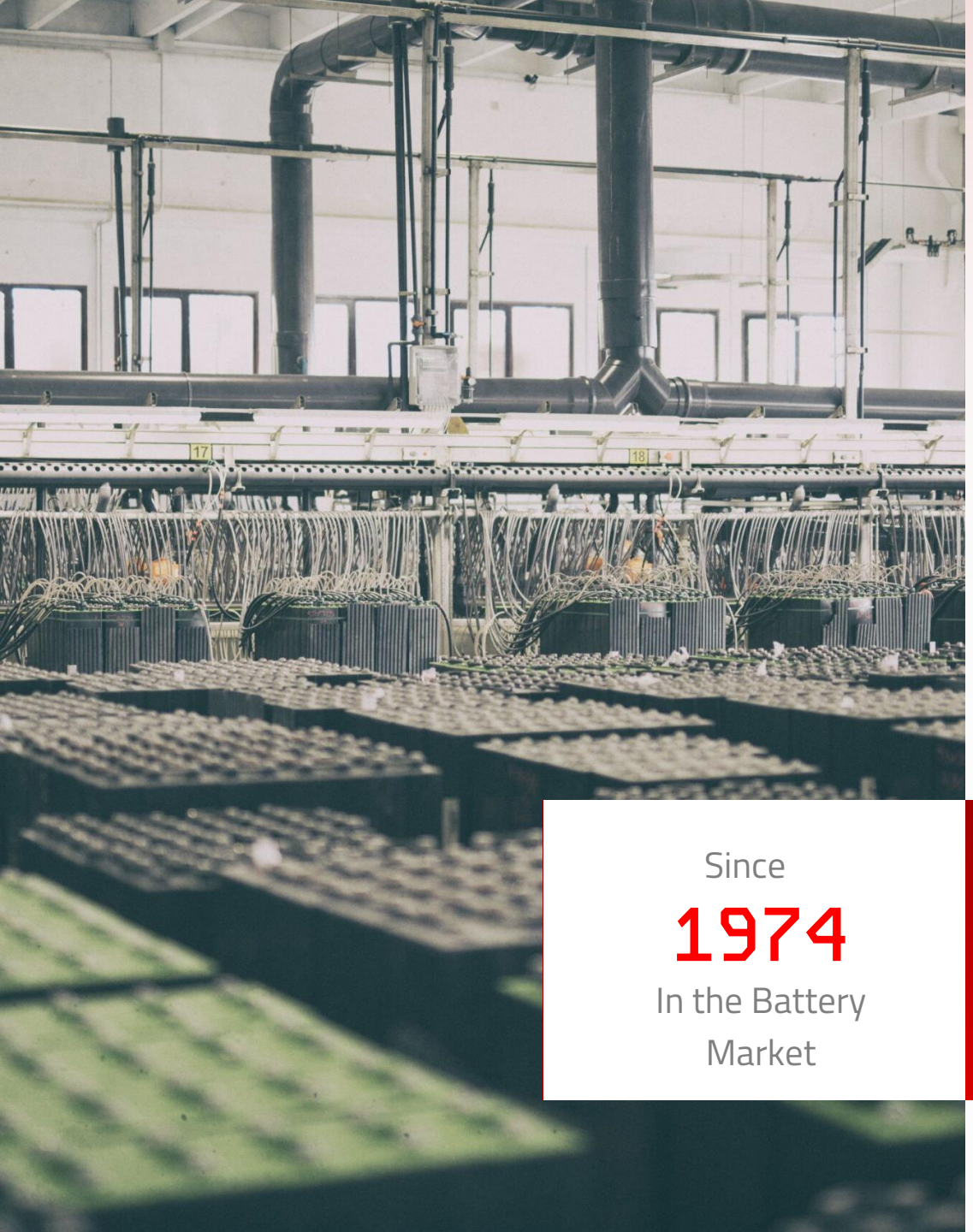
FAAM | Monterubbiano & Monte Sant'Angelo

Lead Acid Batteries

Overseas Locations

Yixing , China

Lead-acid Batteries Production



/// About Us

Facts & Stats

FAAM is active in various Segments

- Production and recycling Li-ion cells, modules and battery systems for Storage and Traction applications
- Production and recycling of lead acid batteries for Motive Power, Stationary, and Starter applications
- Recycling of end-of-life batteries (Plant Division & Repiombo)
- After sales services

Since
1974
In the Battery Market

380+
Employees

€600M
Investment

Ministero delle Imprese e del Made in Italy

IPCEI BATTERIES

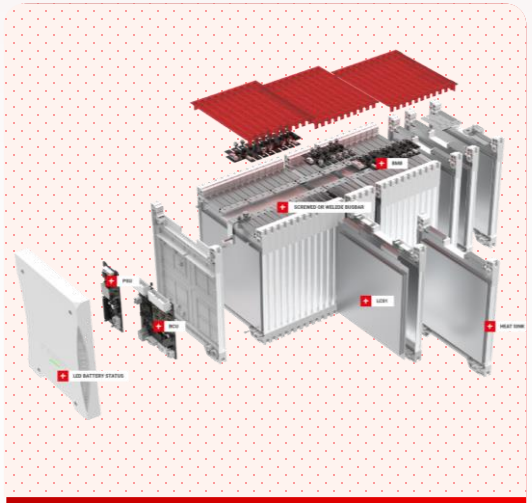
European Commission

/// About Us

4 Pillars

LFP
CAM Technology

Aqueous Processing
instead of organic solvents in cathode production



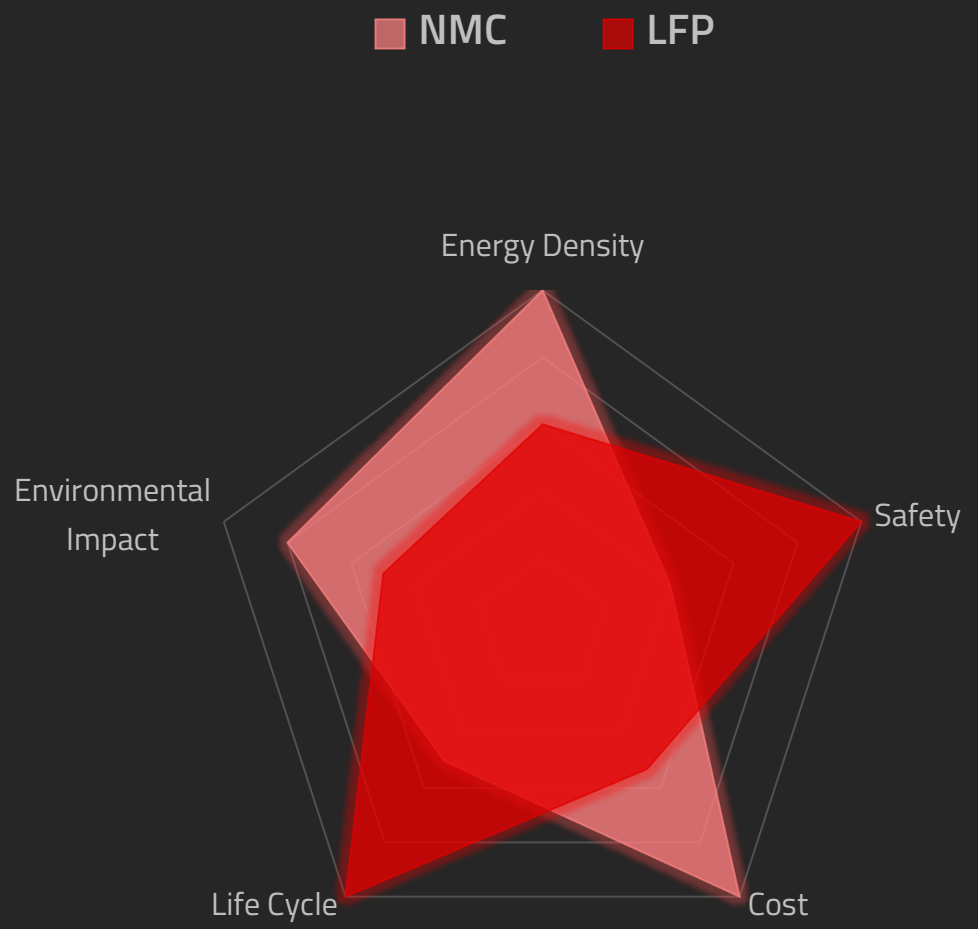
Customised battery
in-house development of BMS & converters

Recycle at end-of-life
through a clean hydro-process

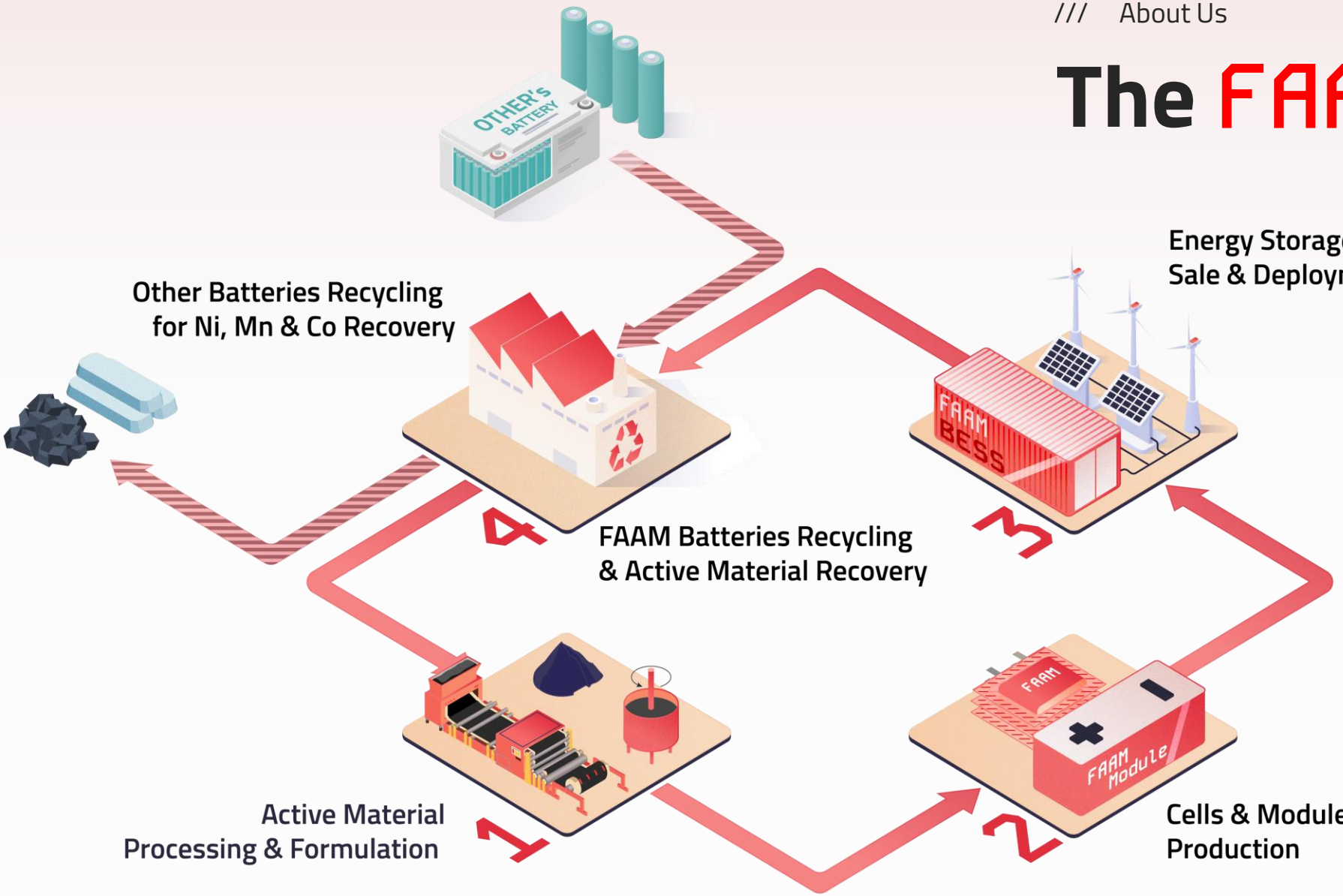
/// About Us

Why LFP?

- **Safety**: ideal for applications prioritizing safety like residential energy storage
- **Lifecycle**: long cycle life of ≥7500 cycles. It's effective for frequent charge/discharge cycles, such as in public transport or energy storage.
- **Cost-Effectiveness**: While having lower energy density, LFP's lower cost per cycle throughout its lifespan makes it economically favourable for large-scale or stationary uses.
- **Environmental Considerations**: Free of cobalt, LFP avoids the ethical and environmental issues linked to cobalt, positioning it as a more sustainable choice than NMC.



The FAAM loop



Leveraging the Vertical Integration of SERI Group

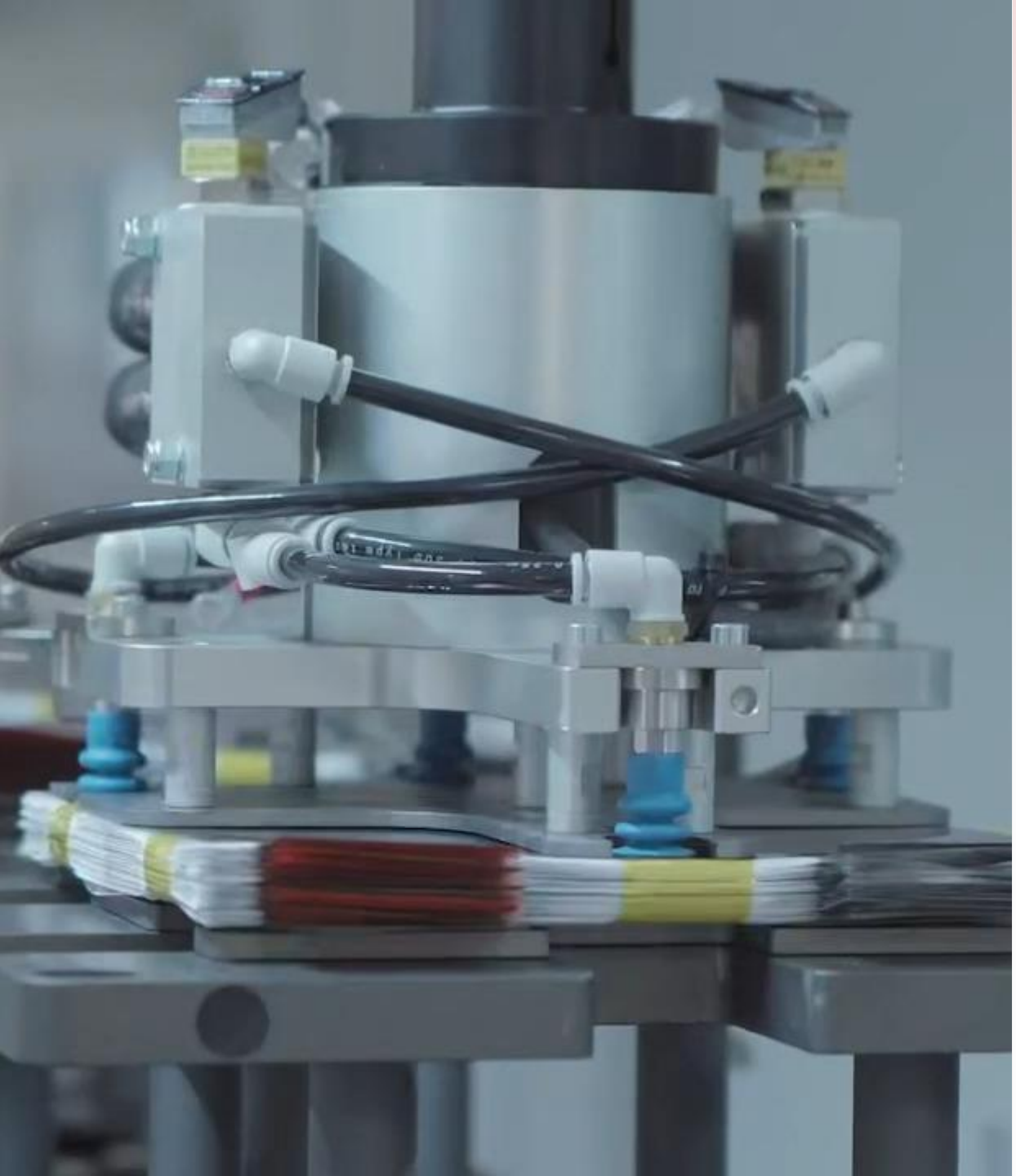
IPCEI | European Battery Value Chain

RAW MATERIALS AND ADVANCED MATERIALS	CELLS/ MODULES	BATTERY SYSTEMS	REPURPOSING, RECYCLING AND REFINING
BASF	ACC	BMW	BASF
KELIBER	BMW	ENDURANCE	ELEMENTAL STRATEGIC METALS
NANOCYL	ENDURANCE	ENEL X S.R.L.	ENDURANCE
SYENSQO	FAAM	FLASH BATTERY SRL	FAAM
TERRAFAME	SEEL SWEDISH ELECTRIC TRANSPORT LABORATORY	SEEL SWEDISH ELECTRIC TRANSPORT LABORATORY	FORTUM RECYCLING & WASTE
UMICORE AG & CO. KG	VARTA		SEEL SWEDISH ELECTRIC TRANSPORT LABORATORY
			UMICORE AG & CO. KG

IPCEI BATTERIES

European Commission

€3.2 Billion



/// About Us

Teverola 1

- 300 MWh/year Capacity
- Soft Pouch Cell Format
- Water processing of LFP Electrodes
- High energy density applications with integrated BMS.
- €70M Investments
- Operating from Q4 of 2022, aimed through full capacity ramp up by Q4 2024
- Energy Storage Systems - Motive Power - Public transport - Naval and Defense

Teverola 2

- 8 GWh/year Capacity
- Prismatic Cell Format
- LFP-Graphite, Na-ion, and Gen4 Batteries
- Recycling Pilot Line with 50 ton/day Capacity
- Energy Storage Systems – Motive Power – Public transport – Special Applications

/// About Us

R&D Centre

1200 m^2 Labs with 500m^2 dry room Co-located with Production

Capability

- Coin cells to multi-layer pouch cells
- Dedicated R2R coater
- Semi-automated cell assembly
- 300+ testing channels
- Characterisation equipment
- Alternative processing equipment
- 20-25 Staff

Focus Areas

- Synthesis
- Formulation/Processing
- Forensics
- Electrochemistry
- Modelling
- Recycling

Battery Technologies

- LFP
- Na-ion
- LMFP
- Solid-State Batteries

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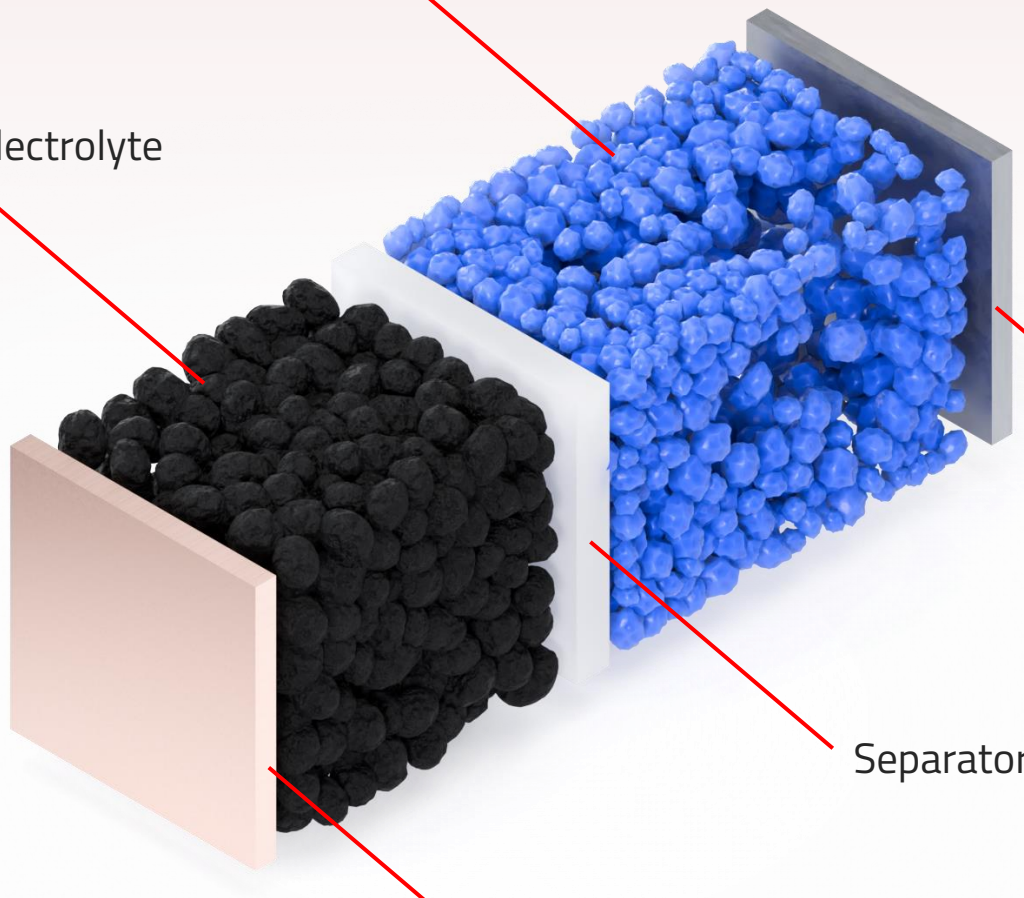
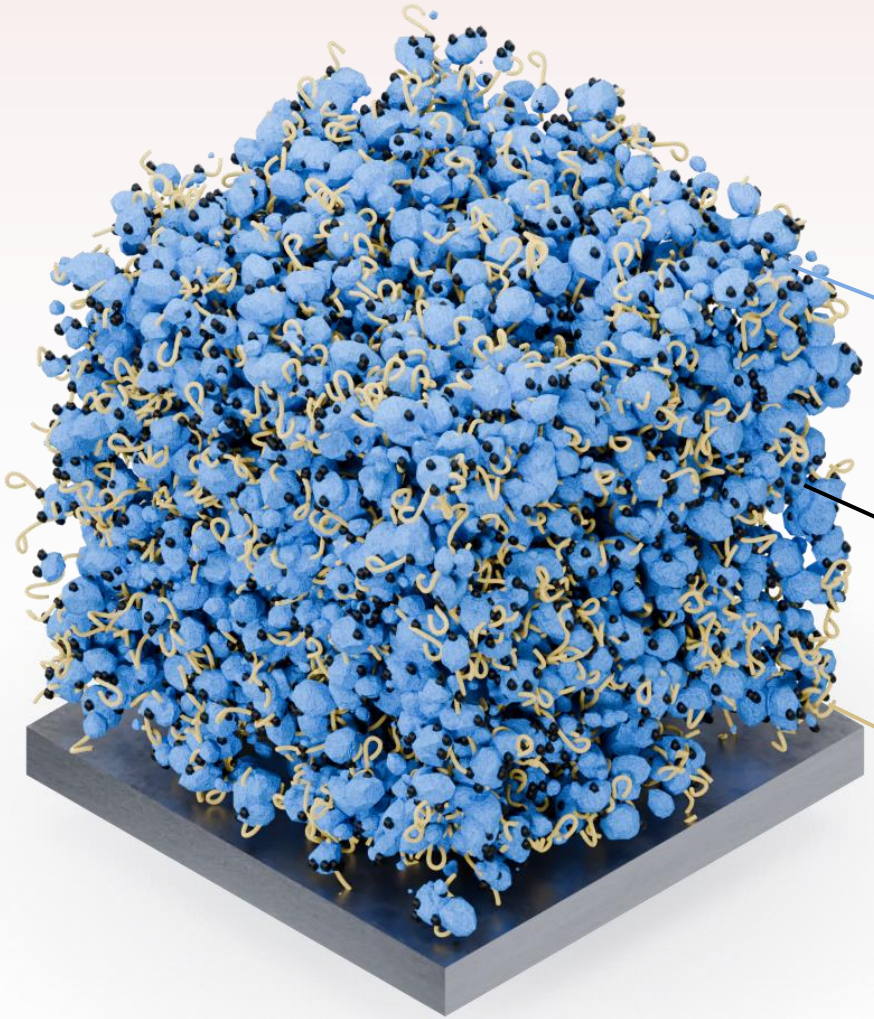
/// Industrial Process

Li-ion Cell Anatomy



/// Industrial Process

Electrode Anatomy



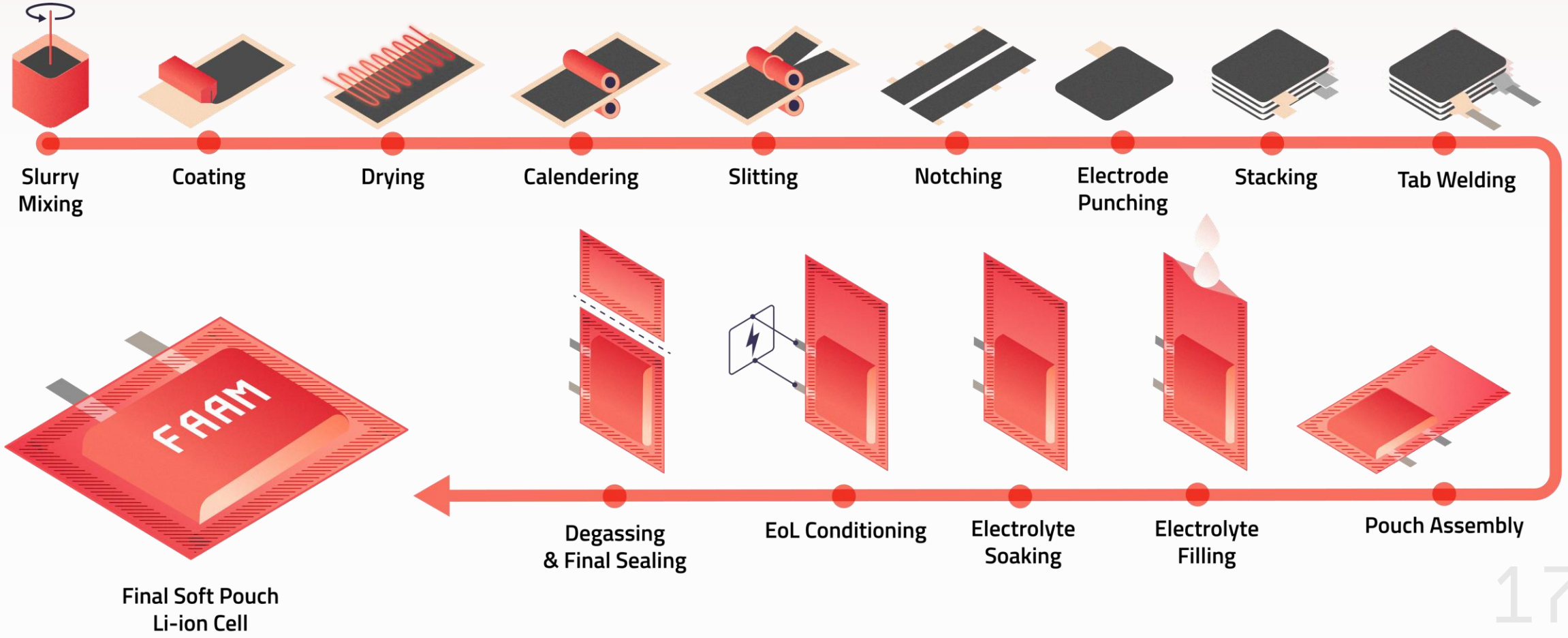
LFP – Cathode Active Material (CAM)

Carbon Black – Conductive Additive

Binder – Adhesion & Cohesion

/// Industrial Process

General Overview of Cell Production

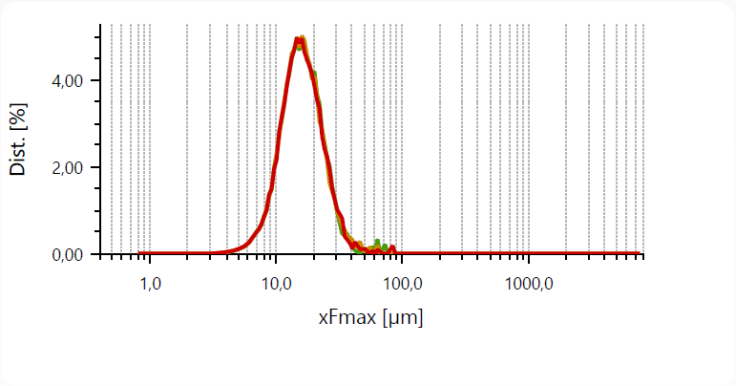


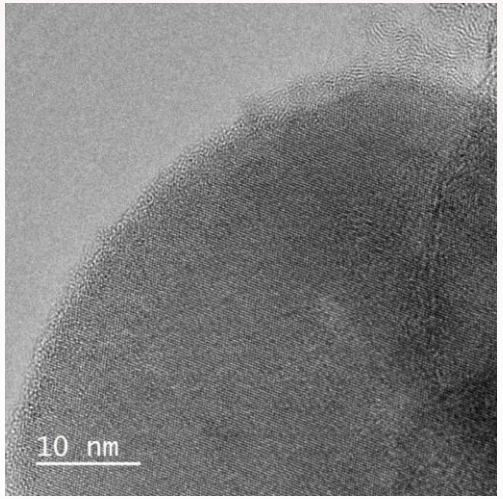
/// Industrial Process

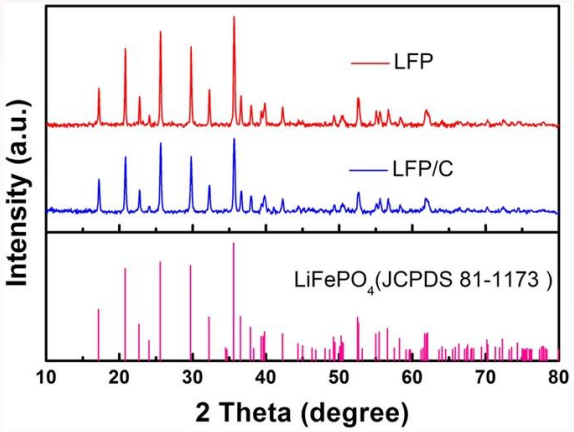
Raw Materials Quality

Graphite

LFP







Particle size

Particle size distribution in colloidal suspensions to determine the diffusion coefficients and hydrodynamic radius. Study of aggregation and stability of dispersions.

Particle Shape

Tested by SEM, TEM, and Computed Tomography (CT). Particle shape influence processability and electrochemical performance

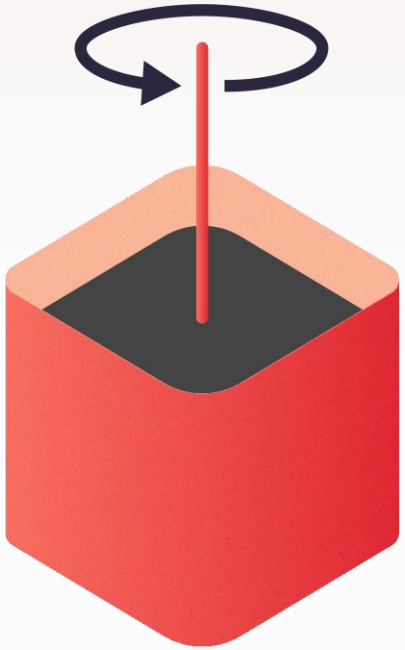
Atomic & Microstructure

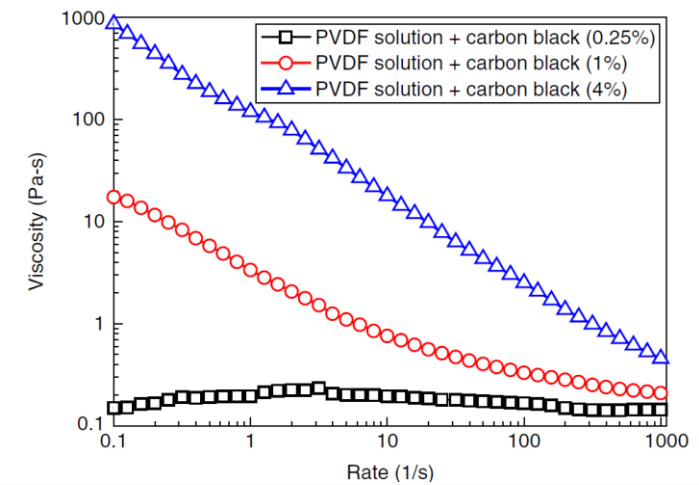
X-ray Diffractometer (XRD, Cu and Mo sources), Pair Distribution Function(PDF), Hard SAXS

https://doi.org/10.1038/srep25942

/// Industrial Process

Slurry Quality



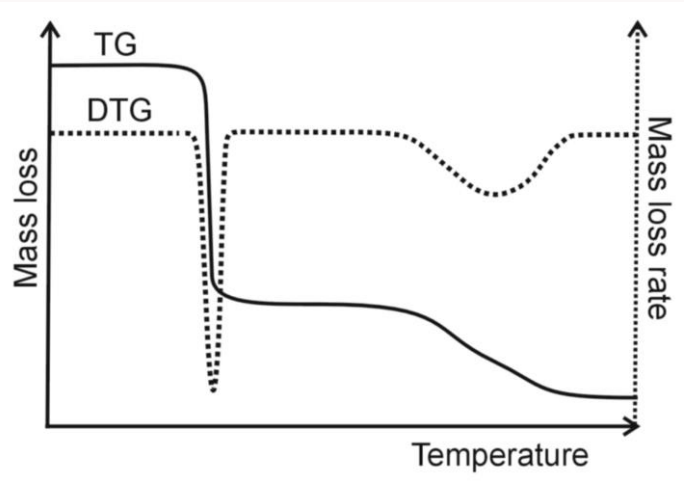


Rheology

avoid shear-thickening, and adequate viscosity for the given coating technique

Homogeneity

avoid the presence of agglomeration



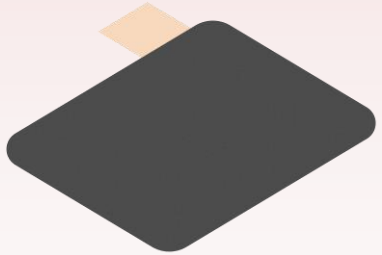
Solid content

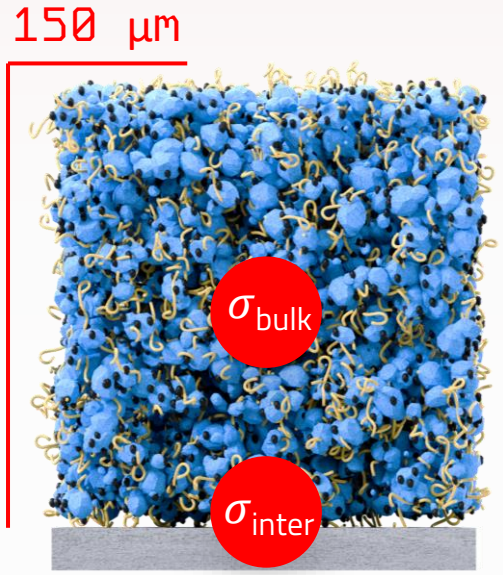
Verifying the solid content via thermogravimetric techniques

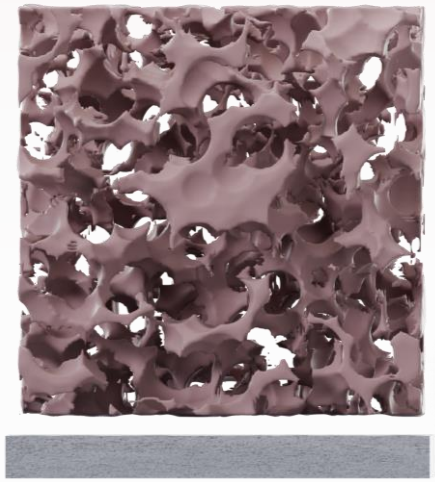
https://doi.org/10.3390/pharmaceutics15061596

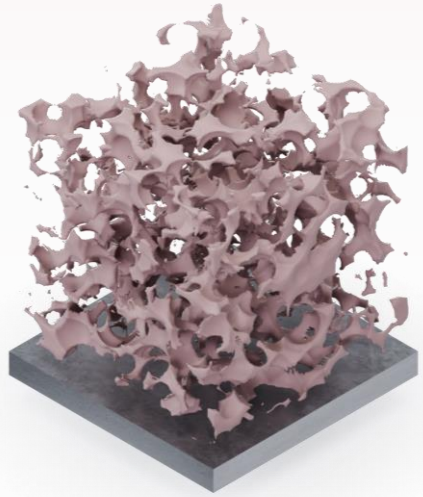
/// Industrial Process

Electrode Quality









Thickness

Ensures the correct loading of active material in the electrode

Electronic Conductivity

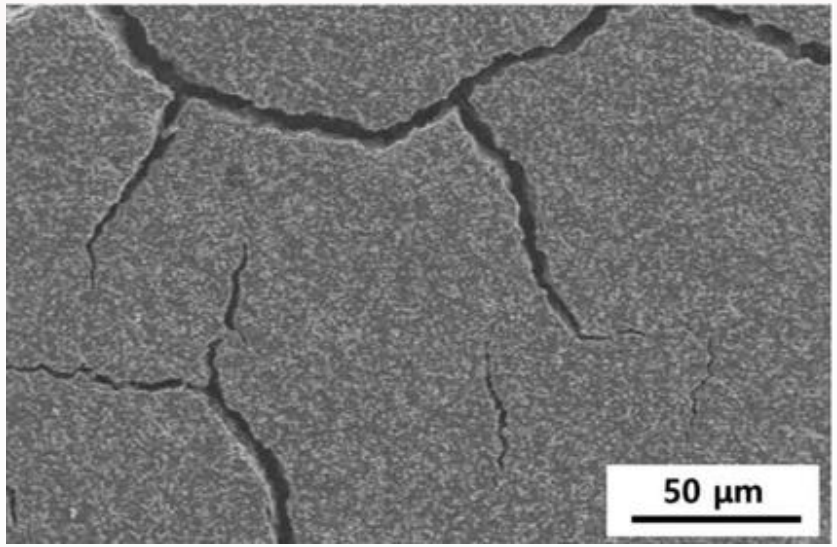
In the Bulk (σ_{bulk}) and at the interface ($\sigma_{interface}$)

Porosity & Tortuosity

Measured by Hg porosimeter and electrochemical methods. Electrolyte wetting and performance are highly dependent

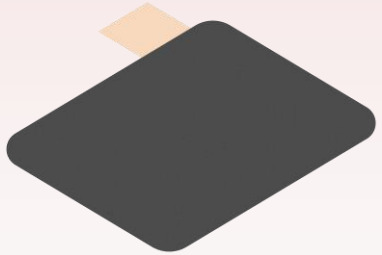
/// Industrial Process

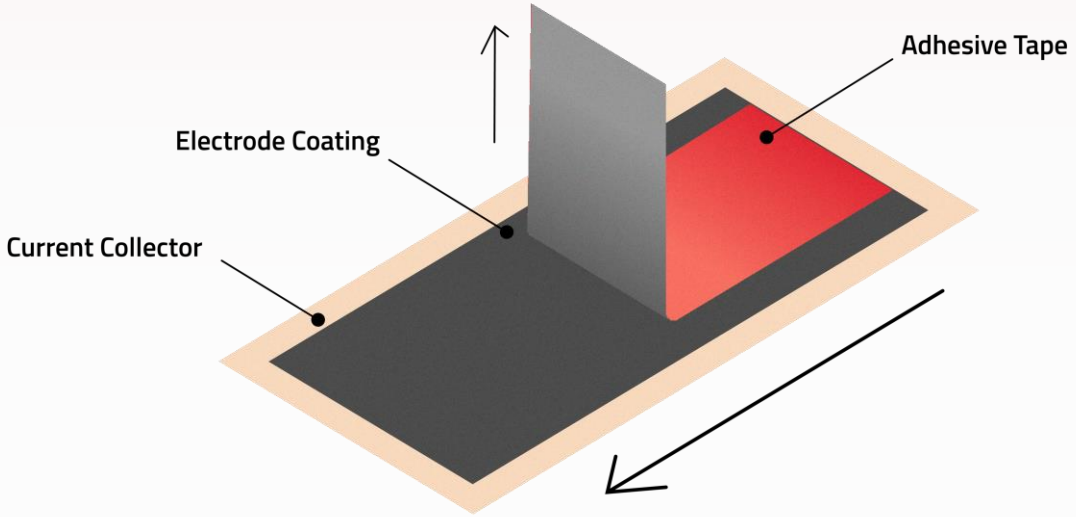
Electrode Quality



Electrode Morphology

Quality check for microcracks and homogeneity of the electrode

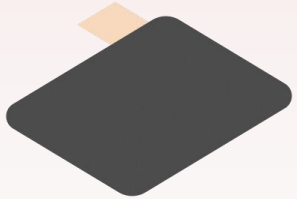




Adhesion

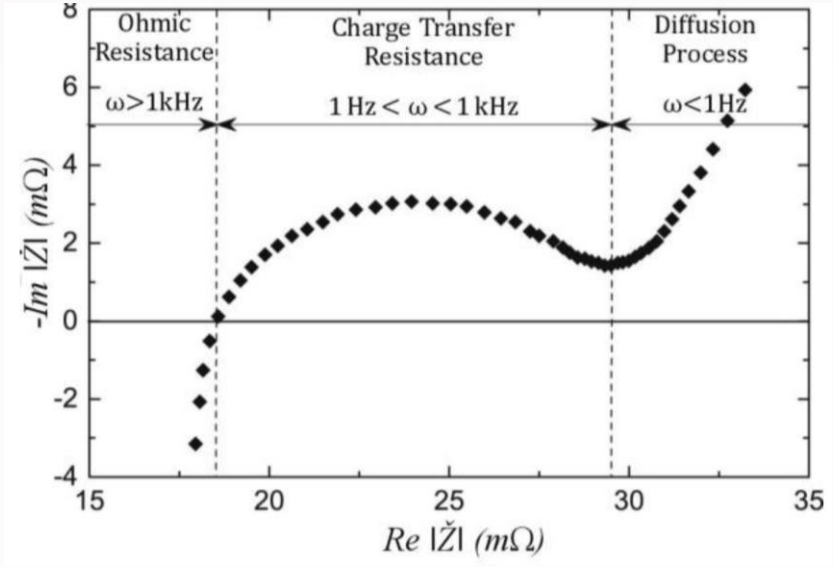
Tests the adhesion and cohesion of the coated electrodes

Byoung-Sun Lee et al 2018 J. Electrochem. Soc. 165 A525

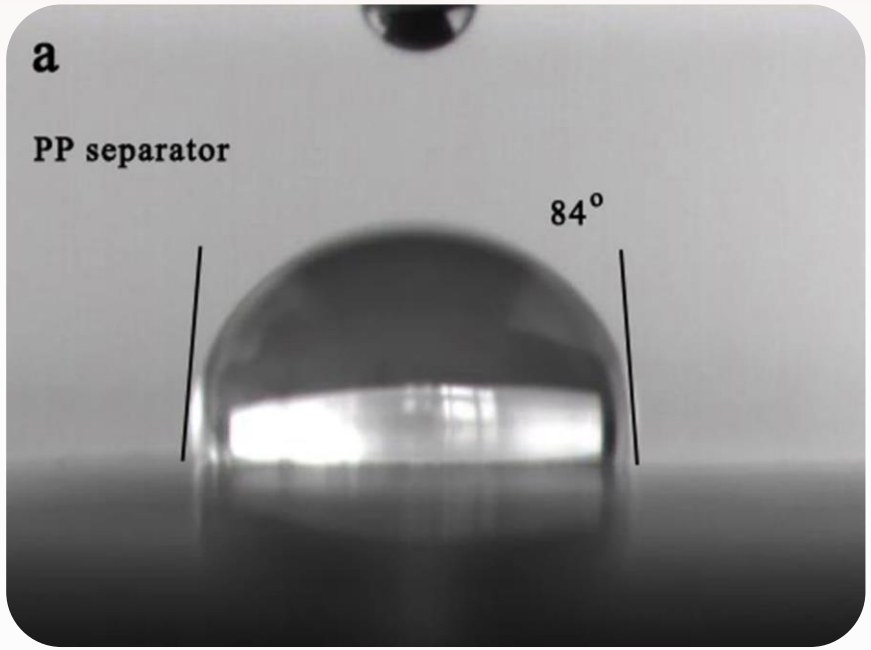


/// Industrial Process

Electrolyte Properties



EIS



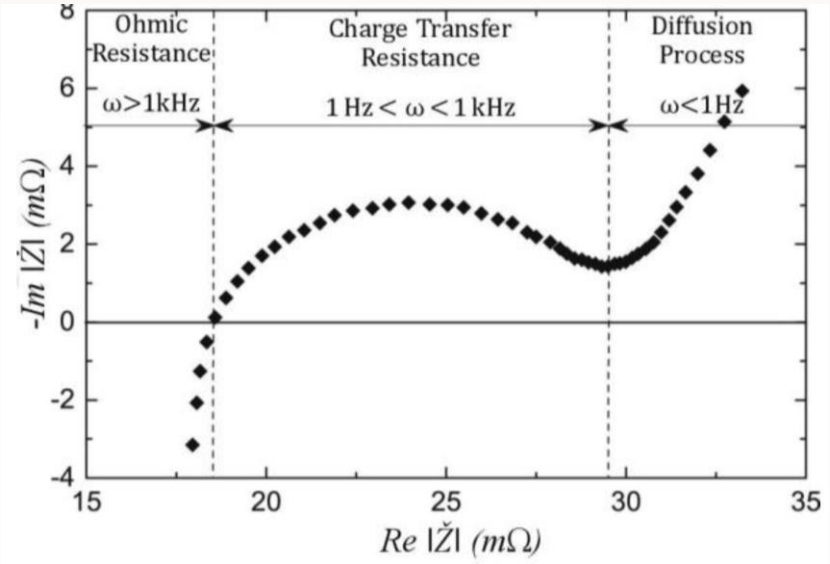
Force or Optical Tensiometer

Wetting and contact angle of electrolyte with separators & electrodes

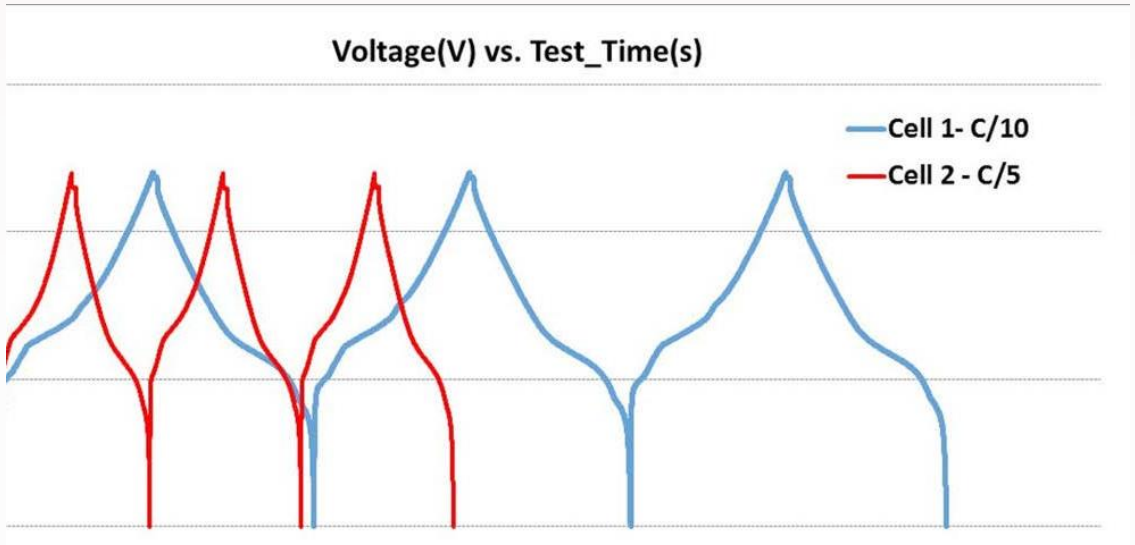
World Electr. Veh. J. 2021, 12(2), 77
Sci Rep 4, 3935 (2014)

/// Industrial Process

Cell Performance & Forensics



EIS



Galvanostatic Cycling

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Industry / Academia

How to work together?

Where Academia can be Impactful?

Advanced Characterisation

Large Facilities

XPS

Operando Studies

Physics & Data Driven Modelling

Finite Element

Course-Grain Modelling

Machine Learning

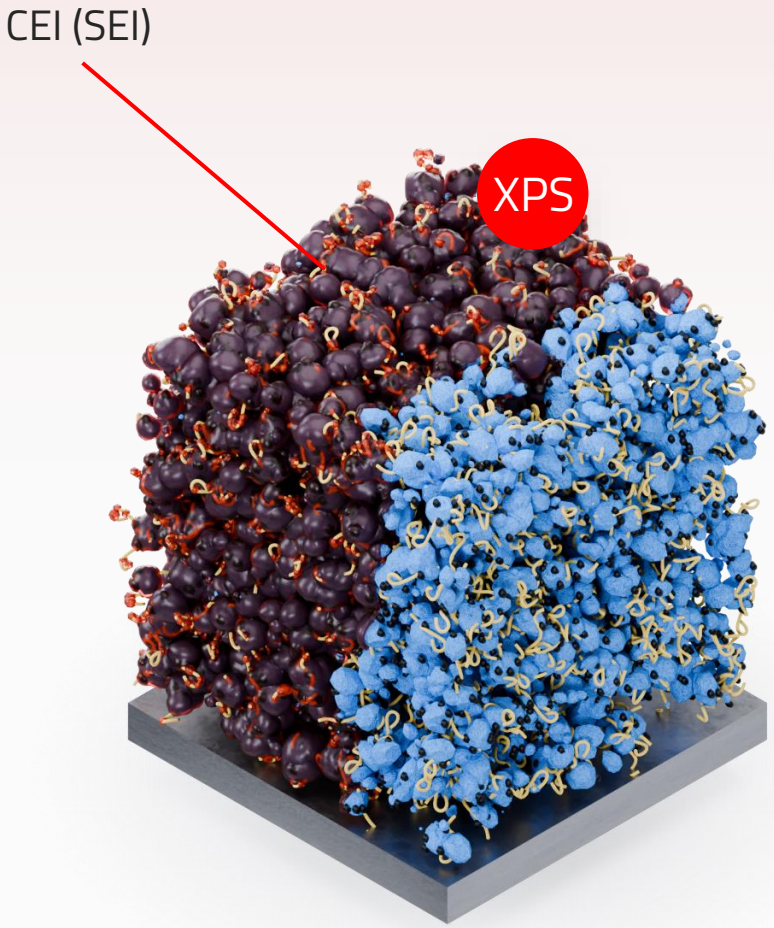
Next Gen Battery Technology

Na-ion

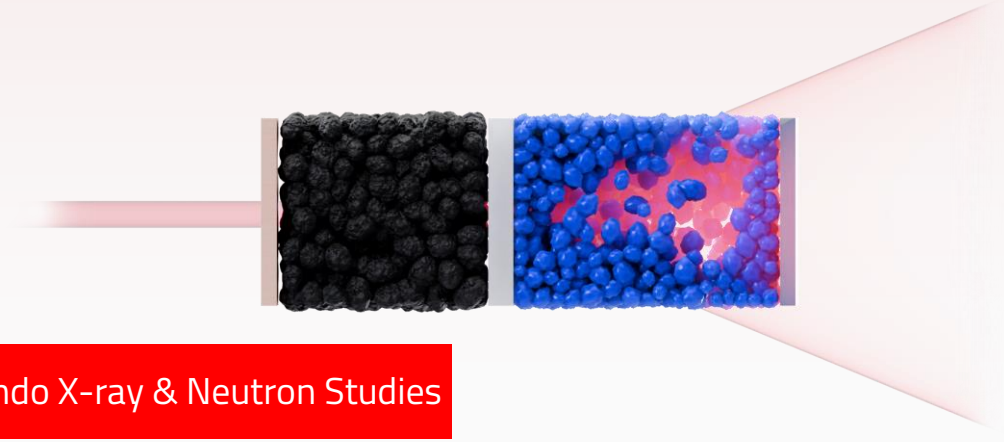
Solid-State Batteries

Emerging Electrode Materials

Recycling



Operando XPS for SEI/CEI Study



Operando X-ray & Neutron Studies

Na-ion Batteries

Battery ML Modelling

/// Contact Us

Get In Touch

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Thank You