

A comprehensive overview of global start-ups and their innovations for lithium-ion batteries (LIB)



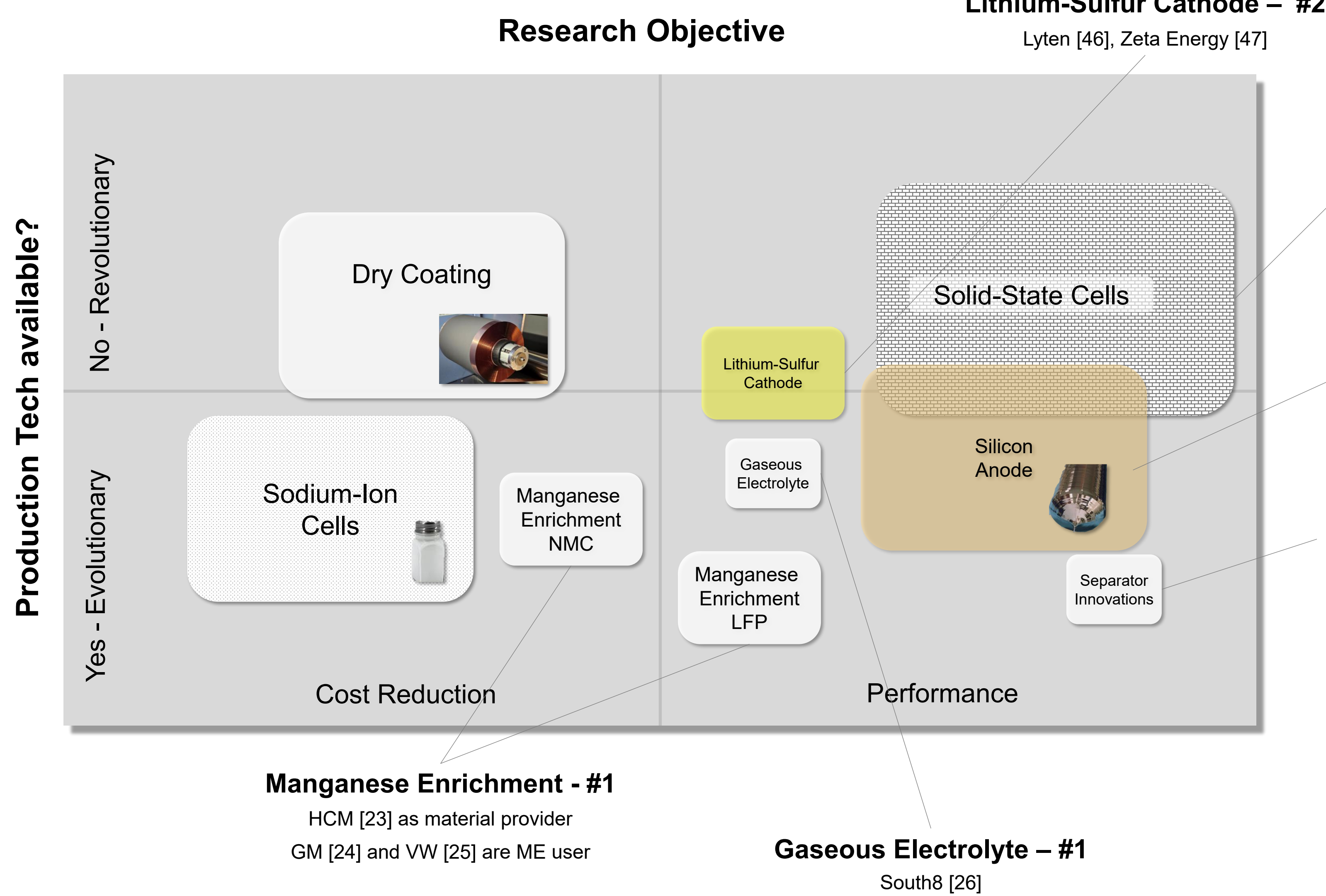
Abstract

- 35 start-ups analyzed – focus on industrial research [1]
- No claim of completeness
- Based on two review papers on cell chemistry [22][29]
- Focus on performance innovations, not cost reduction
- Shift towards **anode** innovation

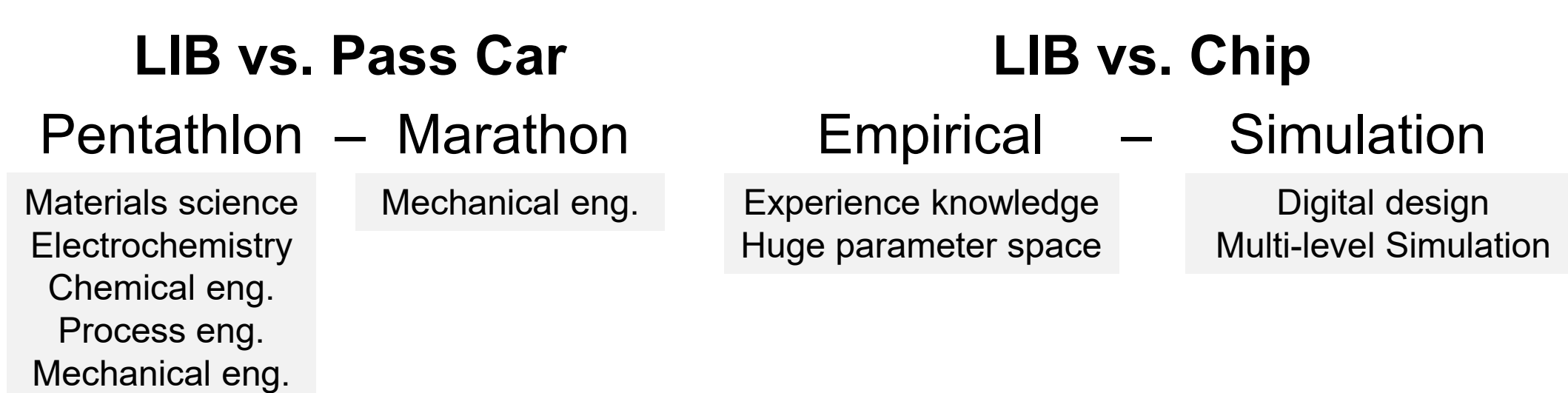
LIB status

- Established industry – 17 million NEVs produced in 2024 [2]
- **NMC** and **LFP** are the dominant cell chemistries [3]
 - NMC: **241 Wh/kg** [4] – premium pass cars, aircraft: ~ (“Otto”)
 - LFP: **160 Wh/kg** [4] – entry-level pass cars, majority of trucks & buses: ~ (“Diesel”)

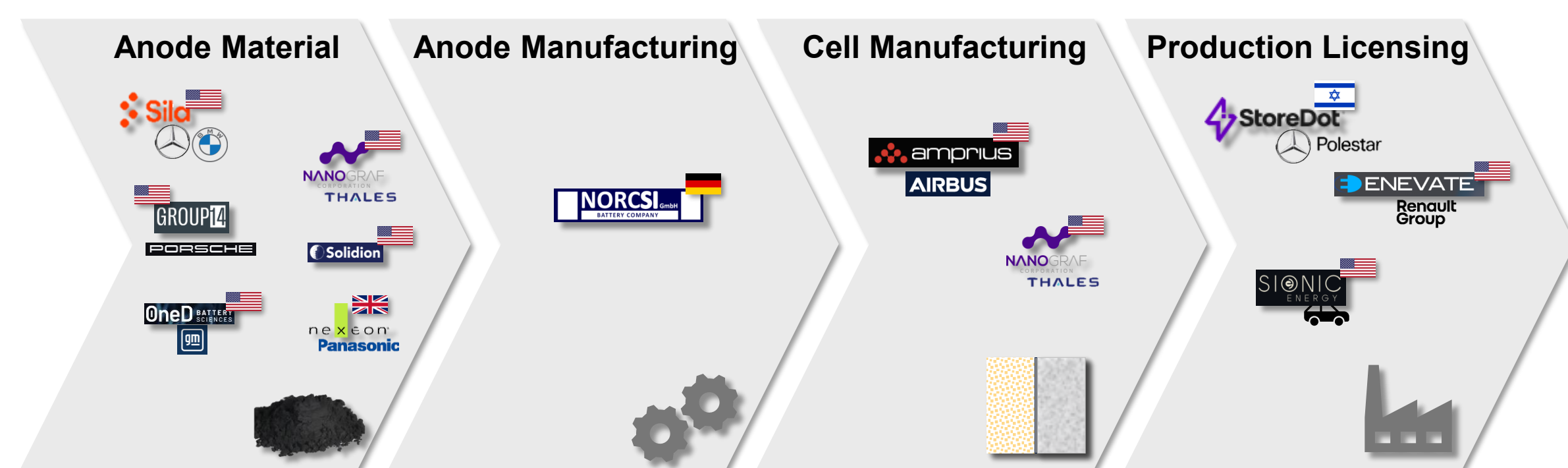
Research Landscape



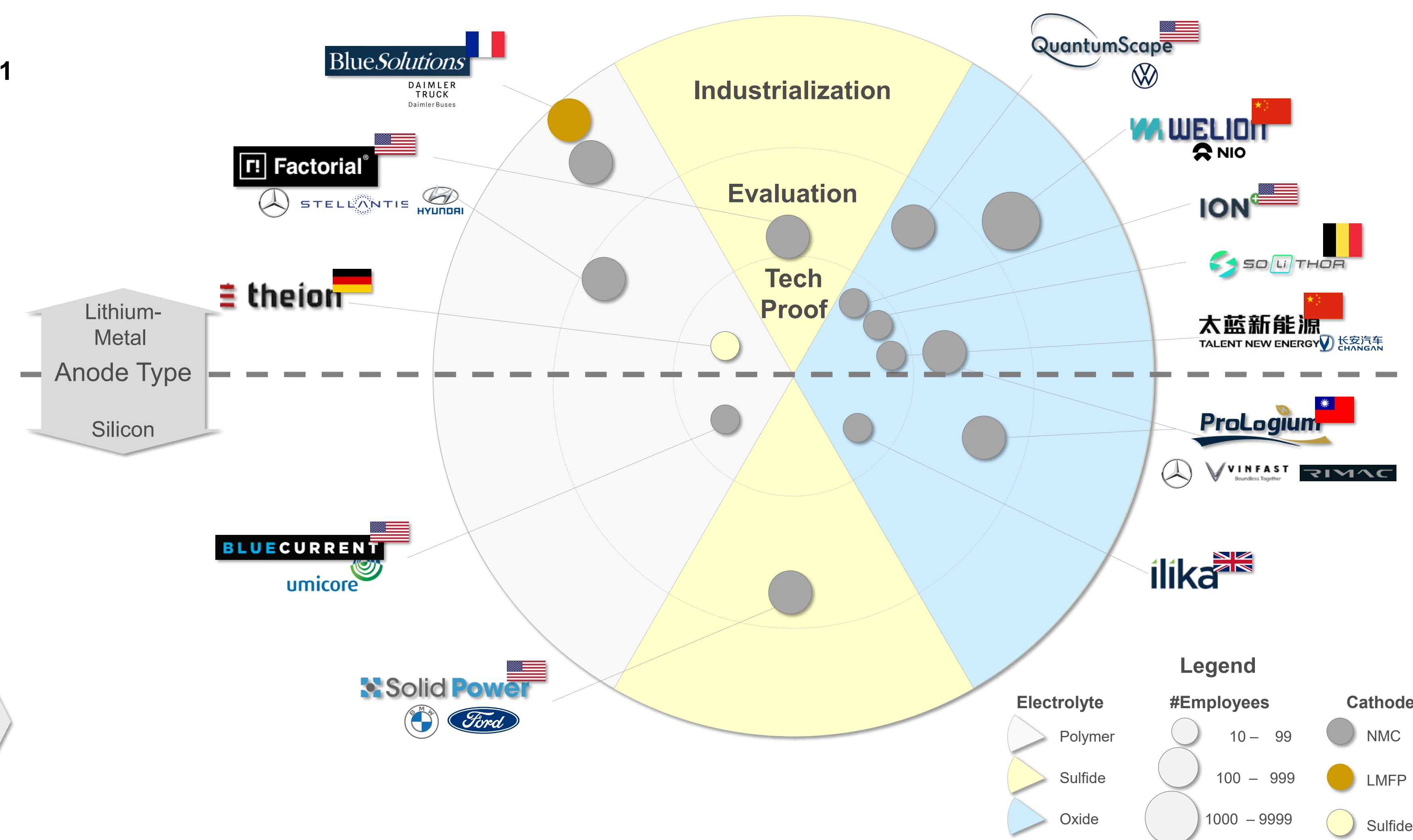
Comparison “LIB production [5]”



Silicon Anode Start-ups



Solid-State Start-ups



Name	Country	Electrolyt/ Separator	Anode	Cathode	Energy Density [Wh/kg]	Estimated / Measured
Adden	US	Ceramic-Sulfide	Li Metal	NMC	500	EST
Blue Solutions	FR	Polymer	Li Metal	LMFP / NMC	350 / 450	EST
Donut Lab	FI	?	?	?	400	MES
Factorial Energy	US	Polymer / Sulfide	Li Metal	NMC	375 / 450	MES / EST
Ilika	UK	Oxide	Silicon	NMC	310	MES
Ionstorage System	US	Oxide	Li Metal	NMC	300	MES
Polyplus Battery	US	Glass	Li Metal	Air / Seawater	800	MES
ProLogium	TW	Oxide	Silicon / Li Metal	NMC	359.2 / 450	MES / EST
QuantumScape	US	Oxide	Li Metal	NMC	301	MES
Solid Power	US	Sulfide	Silicon / Li Metal	NMC	350 / 440	MES / EST
Solithor	BE	Solid Composite	Li Metal	NMC	384	MES
Talent New Energy	CN	Oxide	Li Metal	LRMO	720	MES
Theion	DE	Polymer	Li Metal	Sulfur Comp.	500	EST
WeLion	CN	Oxide-Polymer	Li Metal	NMC	360	MES

Conclusion

- New LIB technologies compete with established ones (NMC, LFP)
- Timing of the solid-state battery breakthrough is hard to predict
 - Established companies are quite conservative – e.g., CATL
 - Start-ups more optimistic
- Occasionally “wonder batteries” pop up – currently Donut Lab
- **Tracking LIB research and innovation is challenging**

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Poster



Full Paper

Literature

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