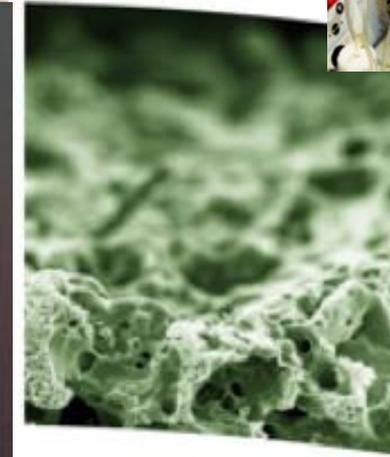


IREC^R
Institut de Recerca en Energia de Catalunya
Catalonia Institute for Energy Research

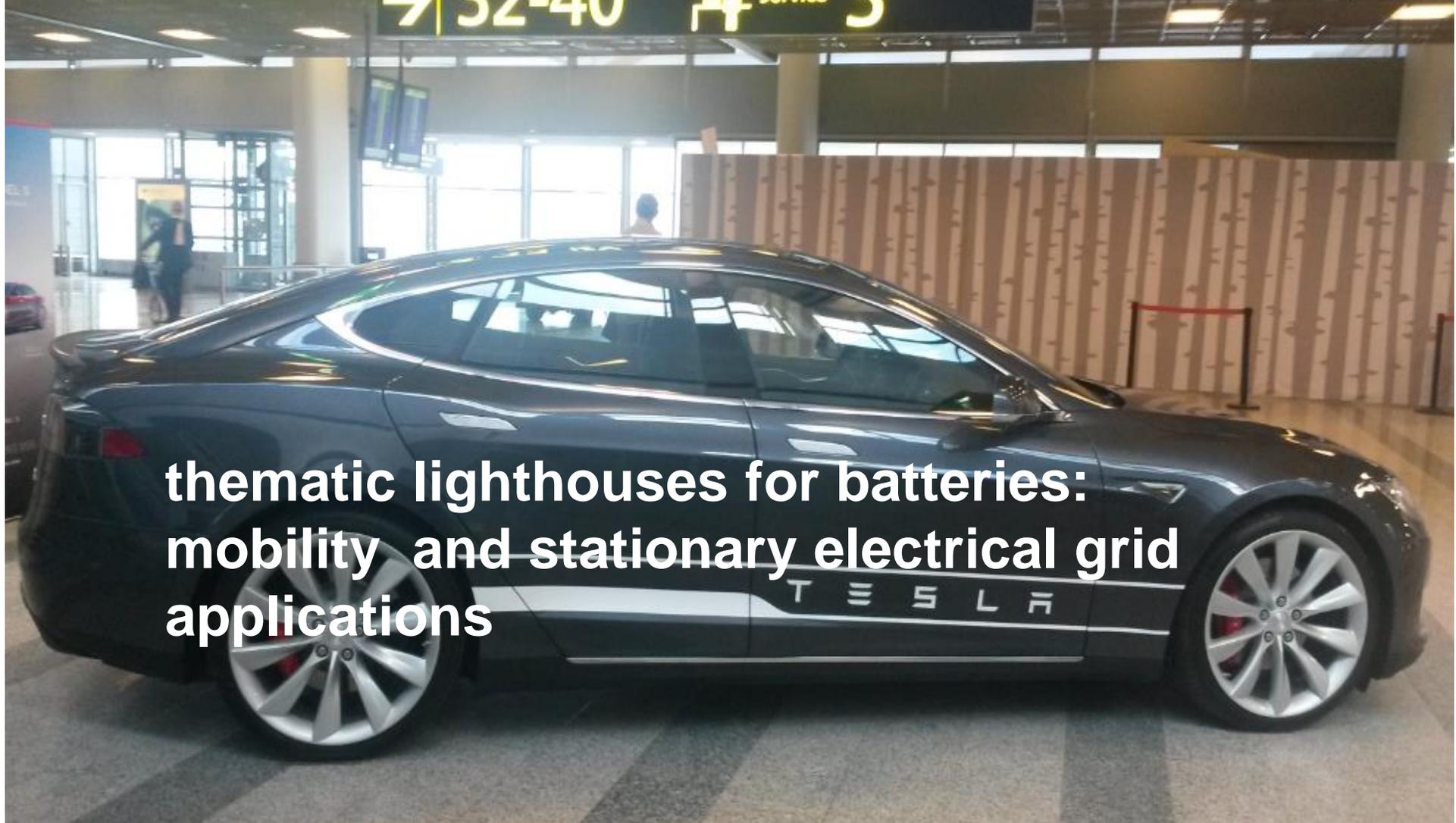


Energy Storage Research&Development BAT-TECH

J.R.Morante

IREC, Catalonia Institute for Energy Research, Plaça de les Dones de Negre,1.
Sant Adrià del Besòs, 08930. Spain.

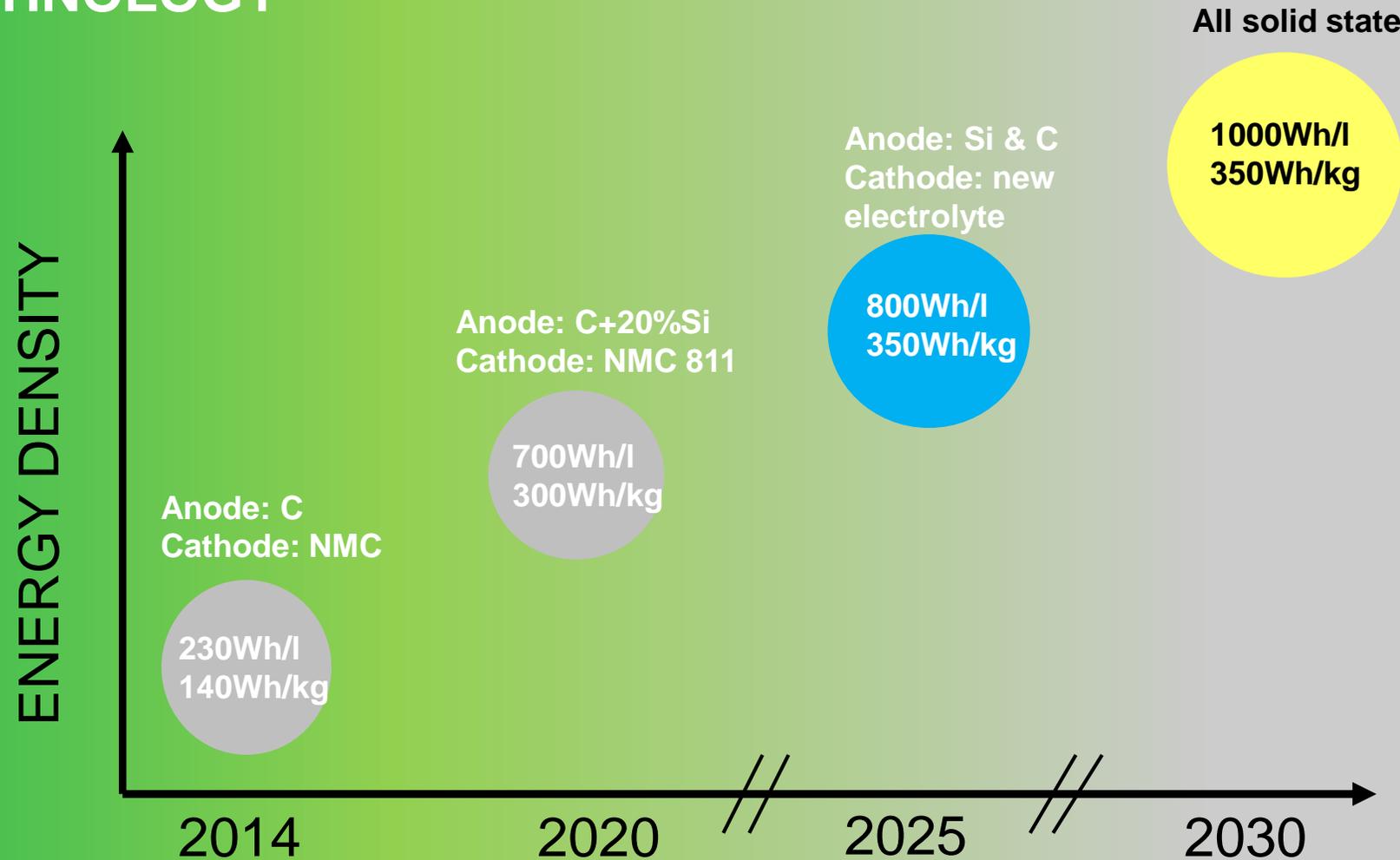
Department of Electronics, University of Barcelona, C/Martí i Franquès,1.
Barcelona,08028. Spain.



**thematic lighthouses for batteries:
mobility and stationary electrical grid
applications**

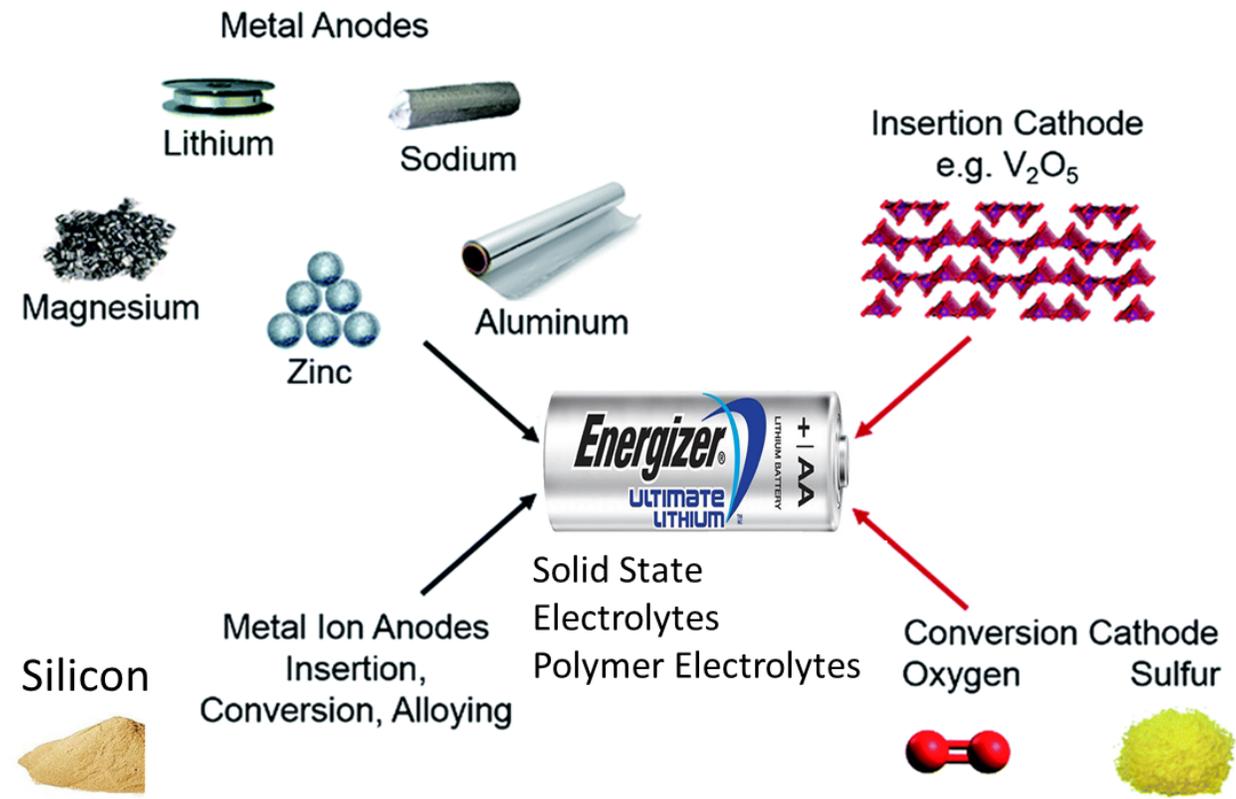
Main problem: energy density and cost's

DEVELOPMENT OF LITHIUM ION BASED BATTERY TECHNOLOGY

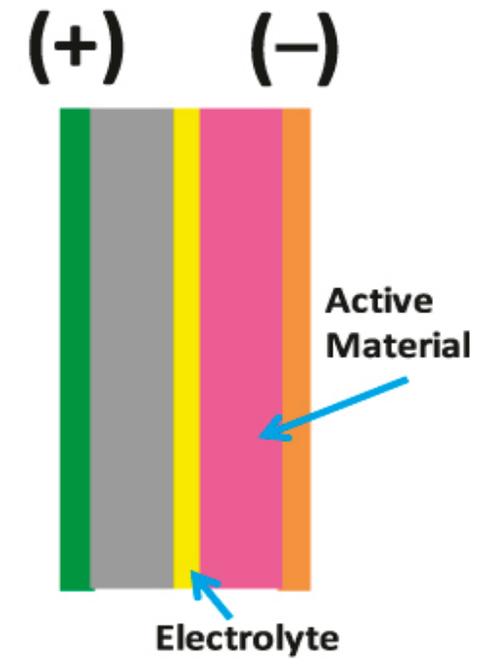


Future of batteries: ASSB

Materials road for future batteries



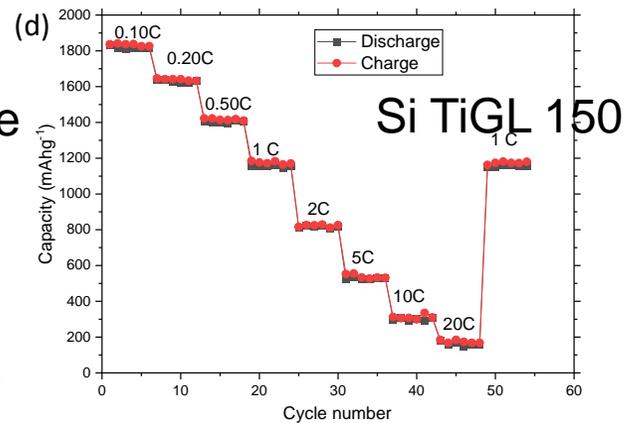
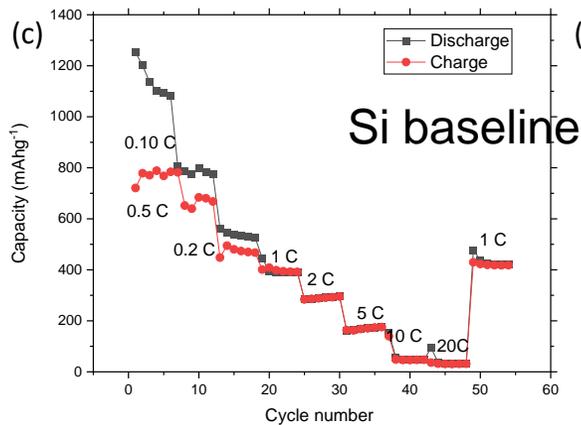
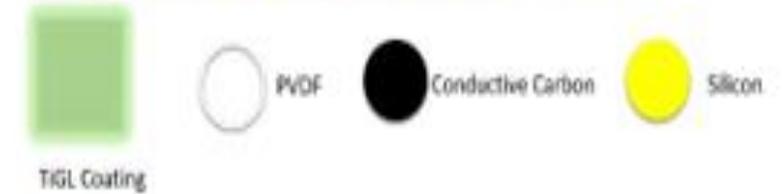
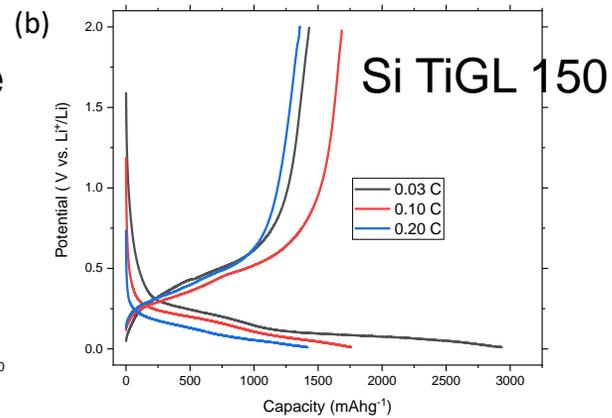
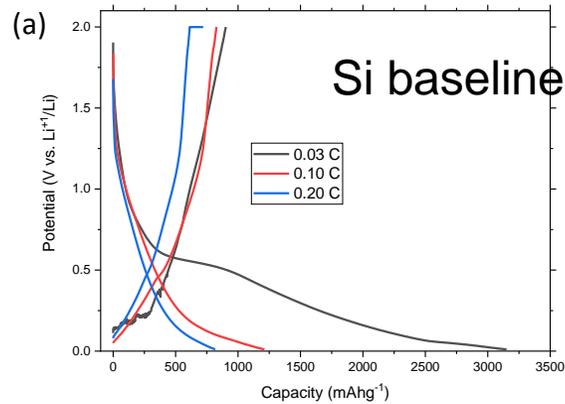
Thin-film battery



Schematic illustration of Li thin film battery

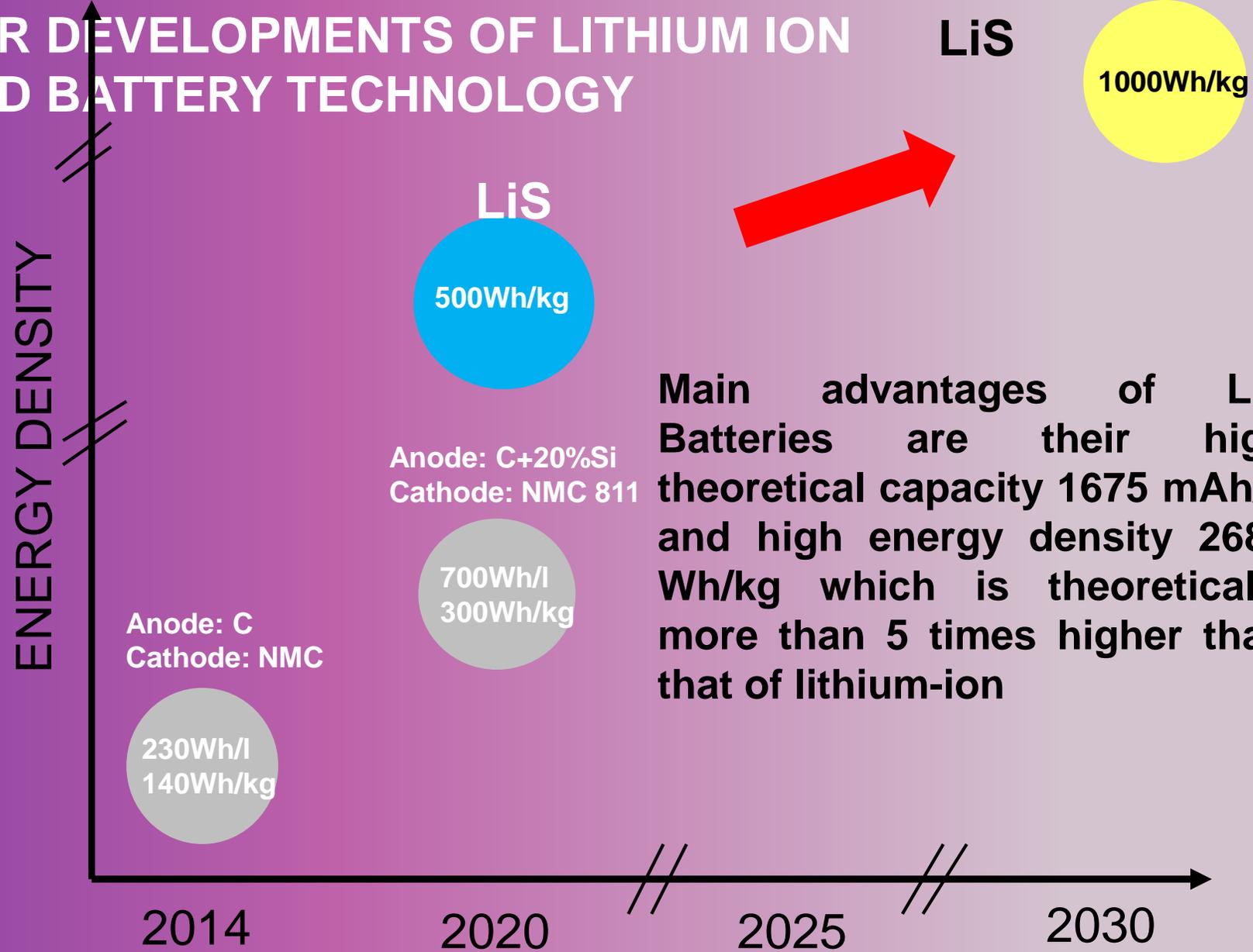
Atomic Layer Deposition (ALD) of the metal combined with the Molecular Layer Deposition (MLD) of the organic precursor are used to prepare coated electrodes. Silicon anodes coated with hybrid organic–inorganic thin films titaniconc (TiGL)

www.nature.com *Scientific Reports* **12**, 137 (2022)



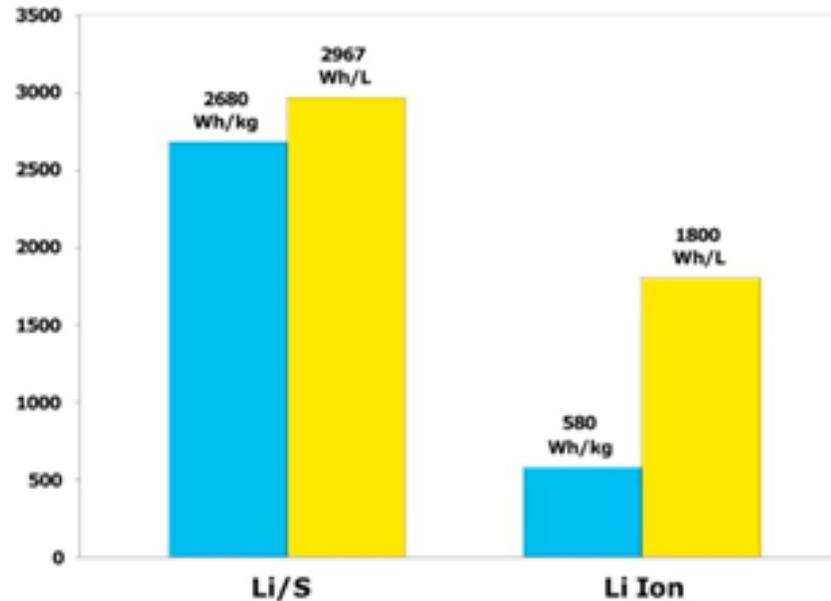
PATHWAY TOWARD THE ALL SOLID STATE BATTERIES

OTHER DEVELOPMENTS OF LITHIUM ION BASED BATTERY TECHNOLOGY



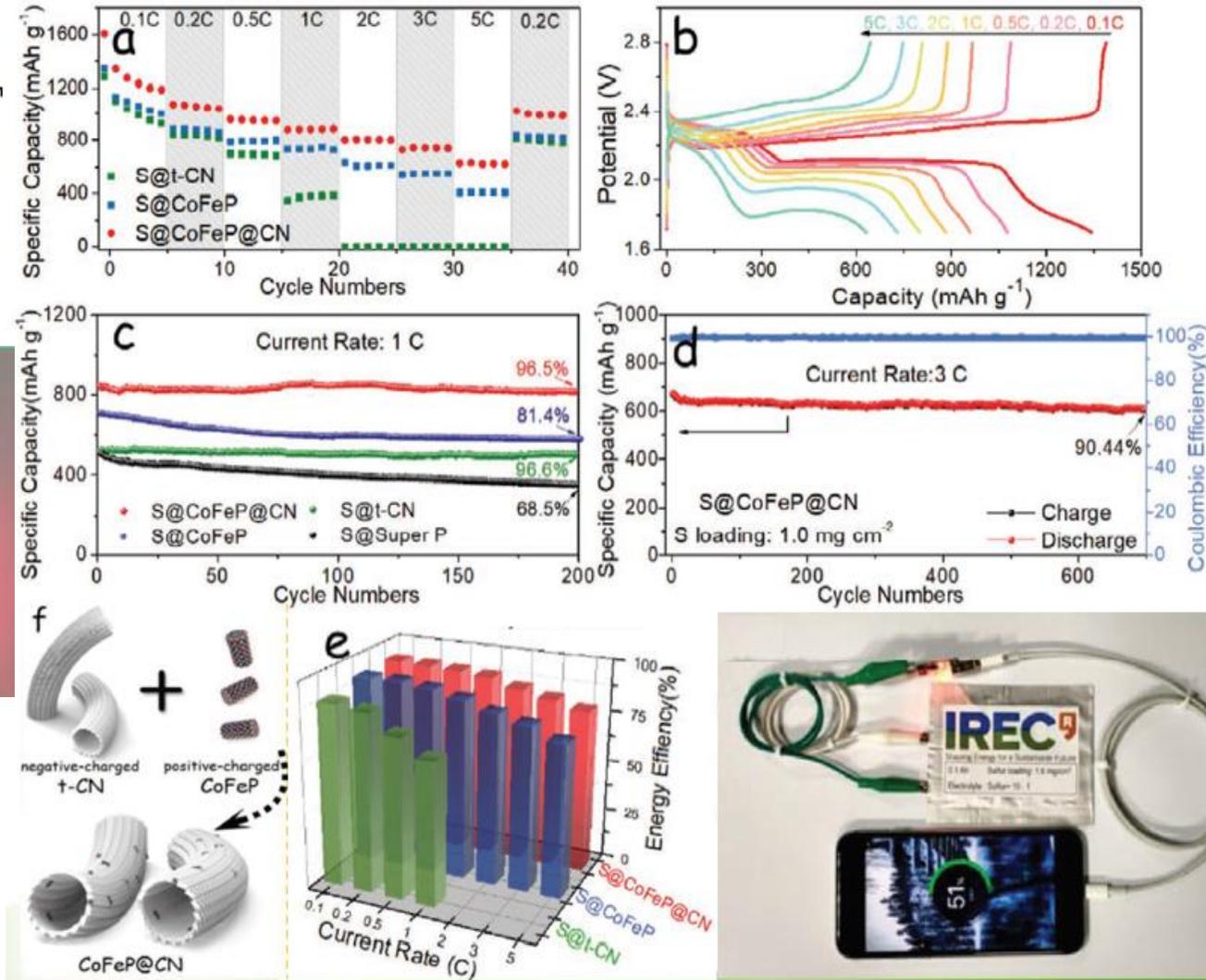
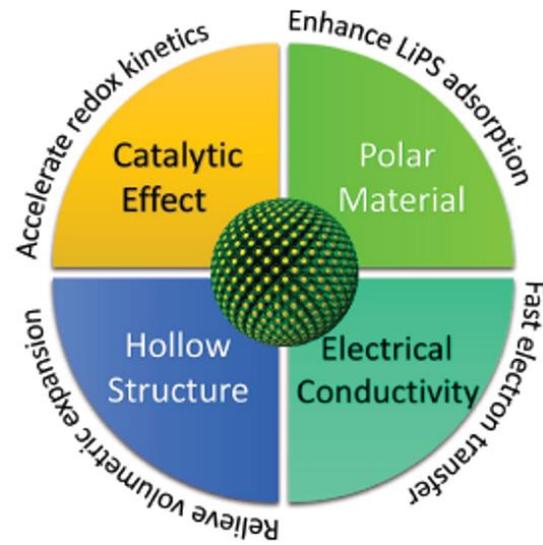
Future of batteries: LiS

- High energy density

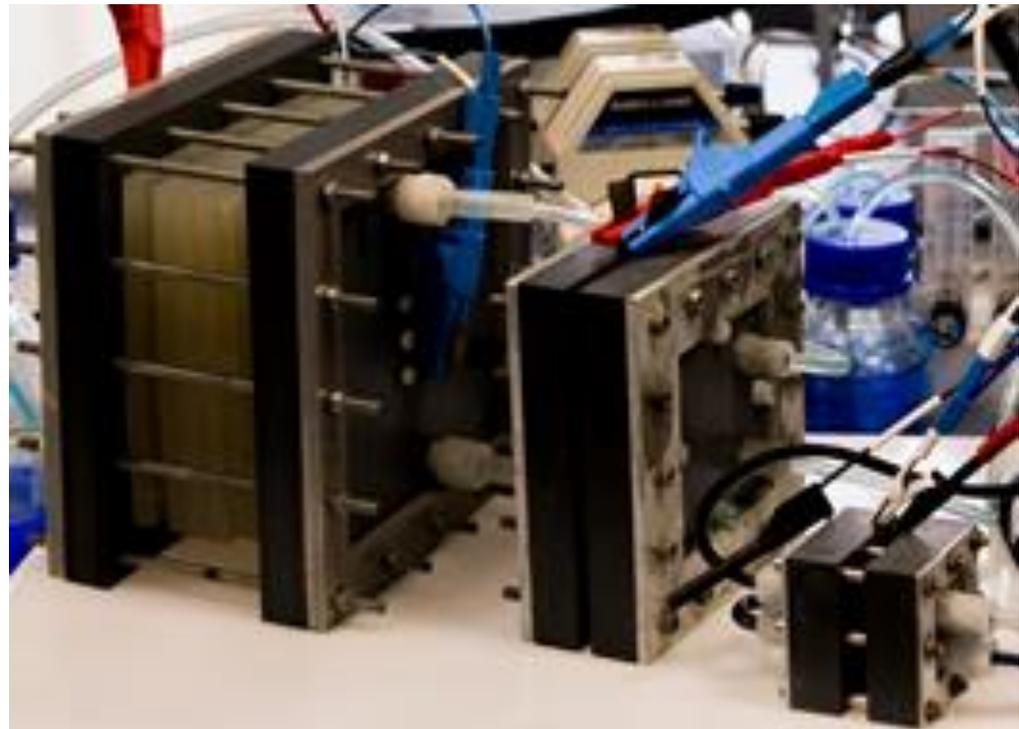


- High temperature range from -60 to 60°C, demonstrated by SION POWER
- High Stability (5000 cycles)
- Research in carbon based electrodes and corrosion of the anodes

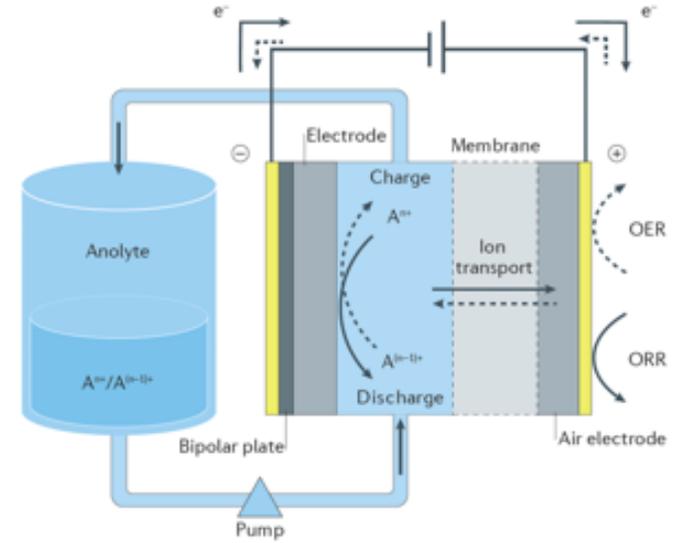
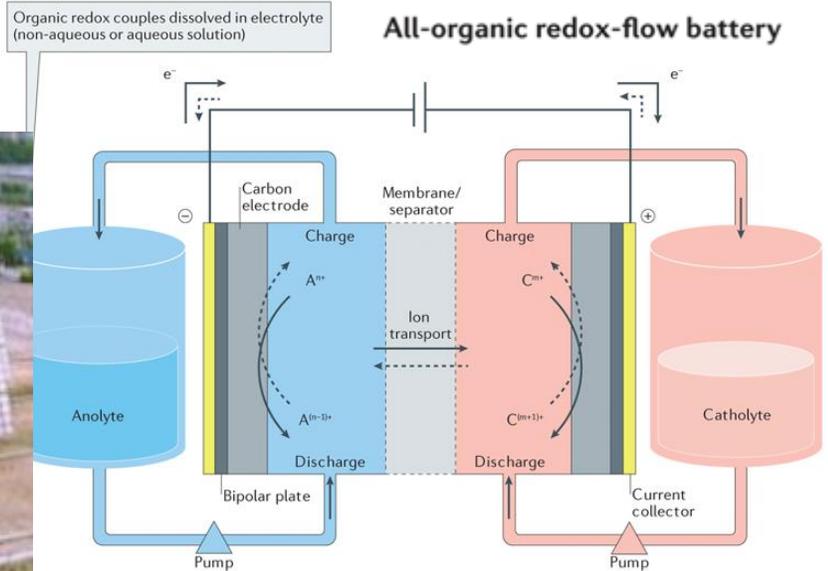
Rational design and implementation of high-performance LSB batteries.



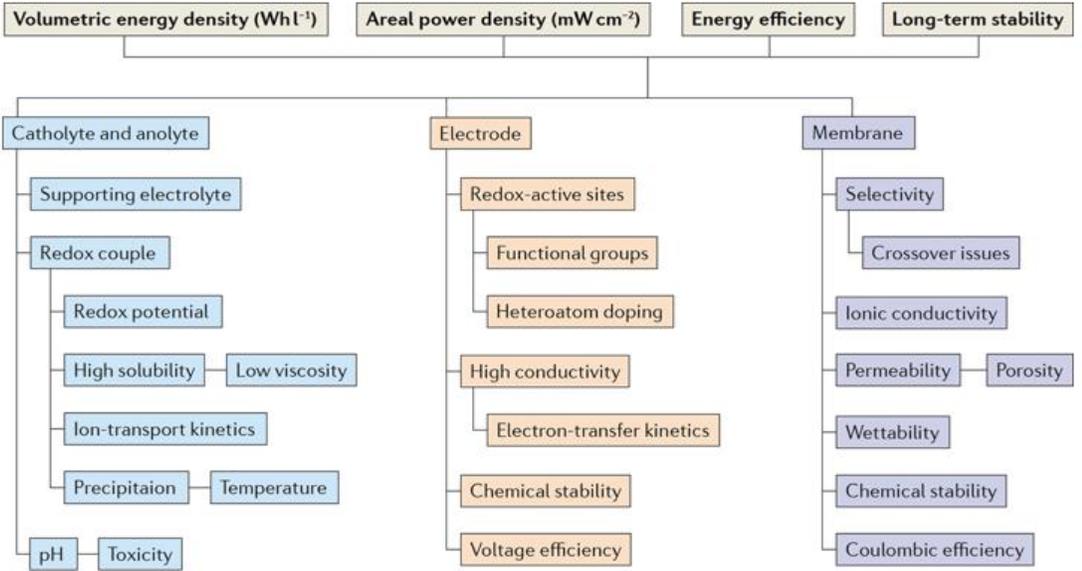
Stationary batteries



WG



next-generation flow-battery technologies

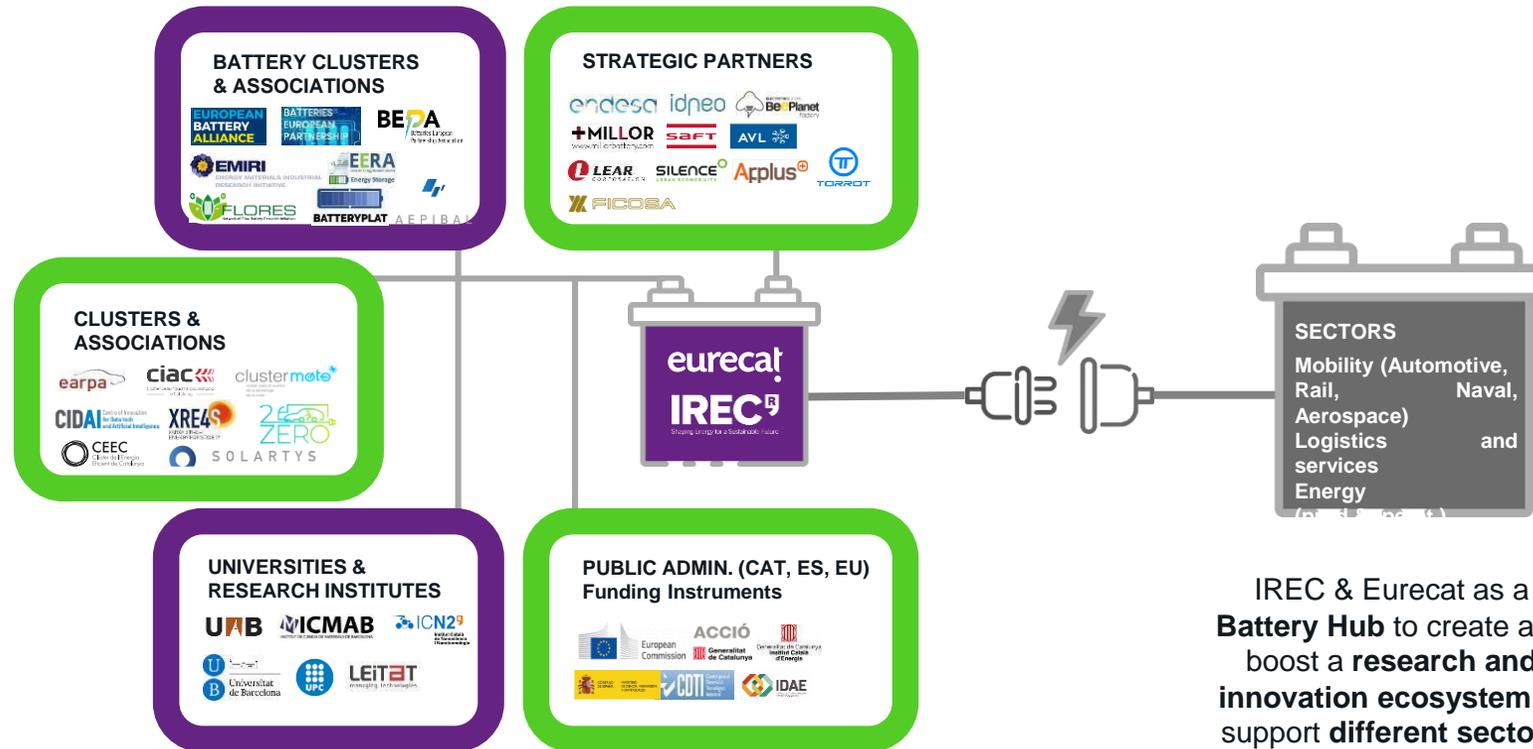




Your R+D+i
partner for batteries
and electrification

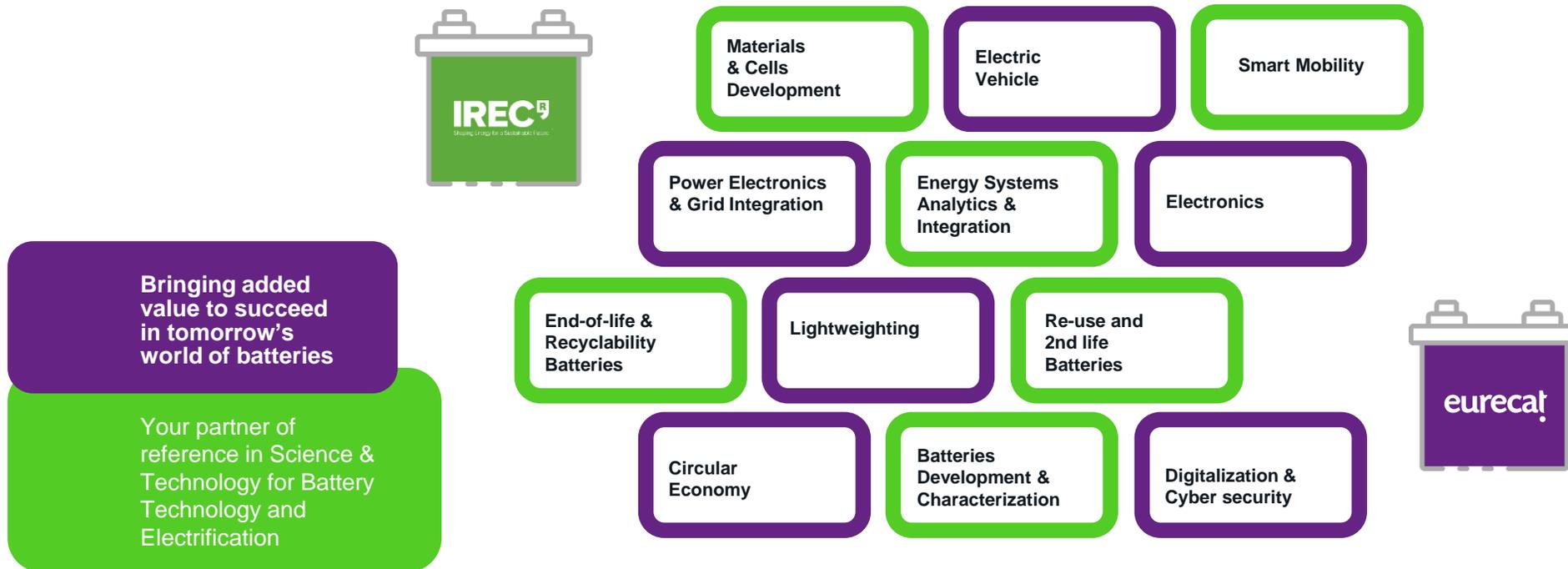


Research & Innovation Ecosystem



IREC & Eurecat as a **Battery Hub** to create and boost a **research and innovation ecosystem** to support **different sectors**

Why a Batteries Joint Research Unit?



Why a Batteries Joint Research Unit?

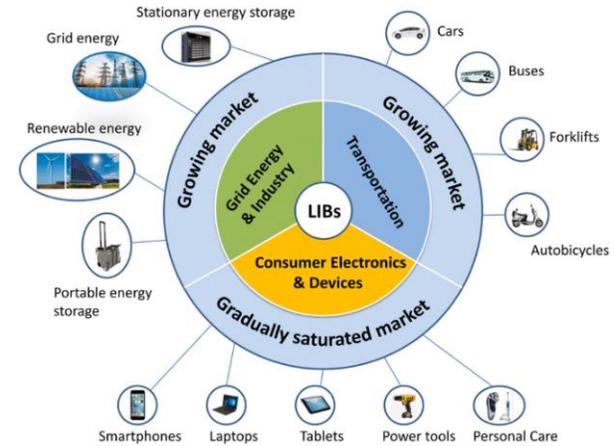
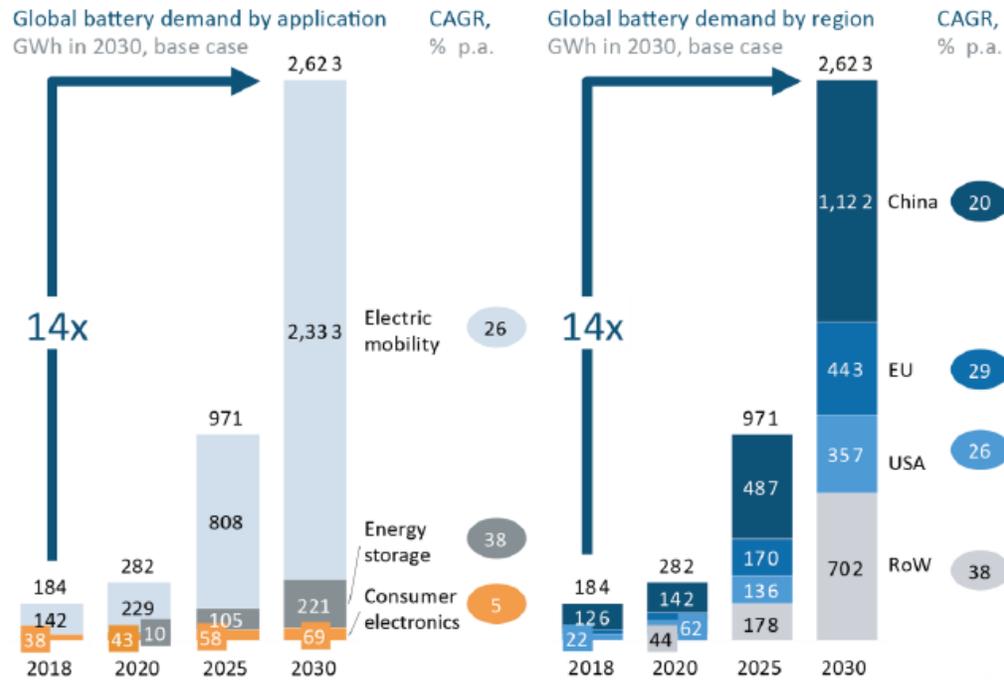
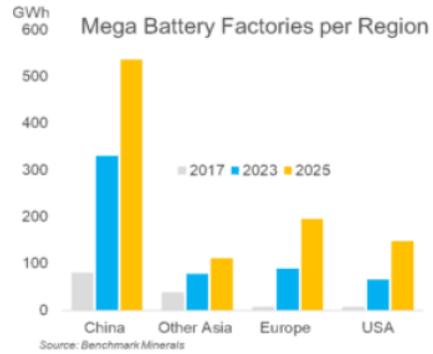


FIGURE 1: CURRENT AND PREDICTED GLOBAL BATTERY DEMAND.³

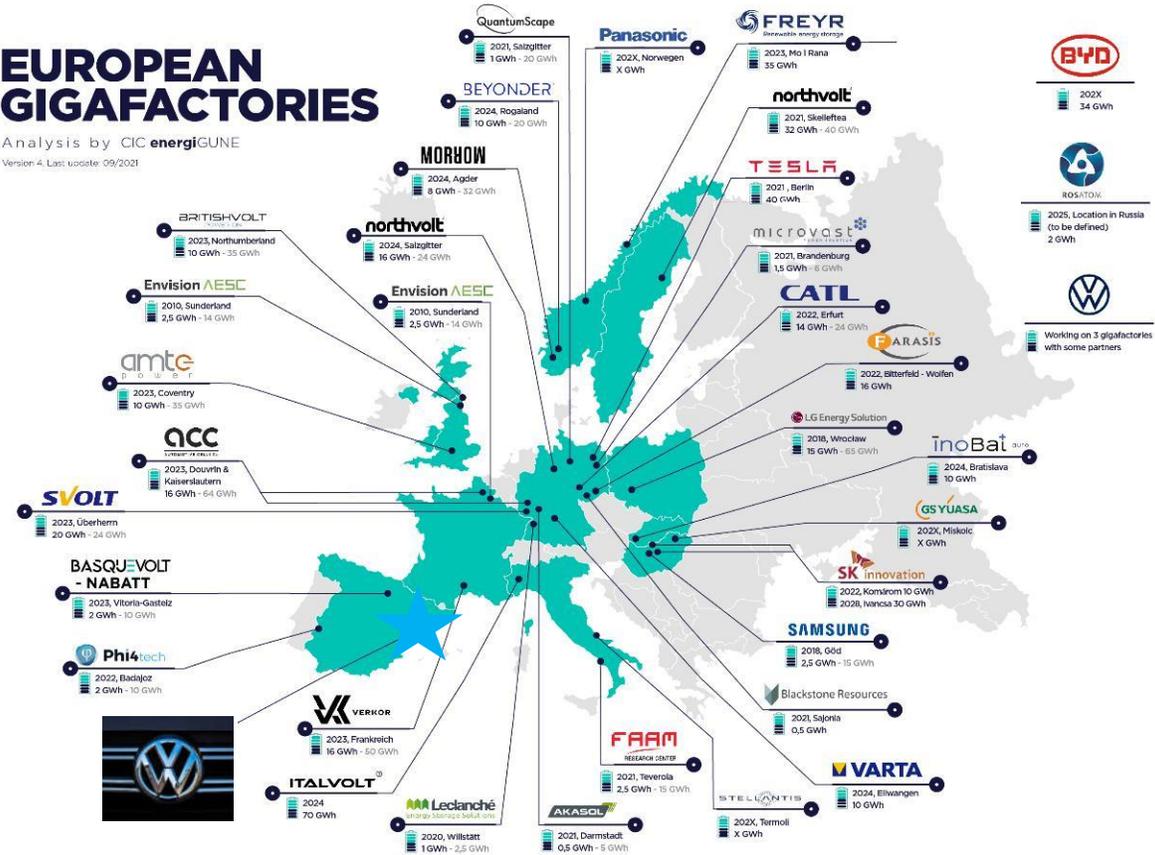
³World Economic Forum, M. analysis. A Vision for a Sustainable Battery Value Chain in 2030 Unlocking the Full Potential to Power Sustainable Development and Climate Change Mitigation.
http://www3.weforum.org/docs/WEF_A_Vision_for_a_Sustainable_Battery_Value_Chain_in_2030_Report.pdf (2019)

Why a Batteries Joint Research Unit?



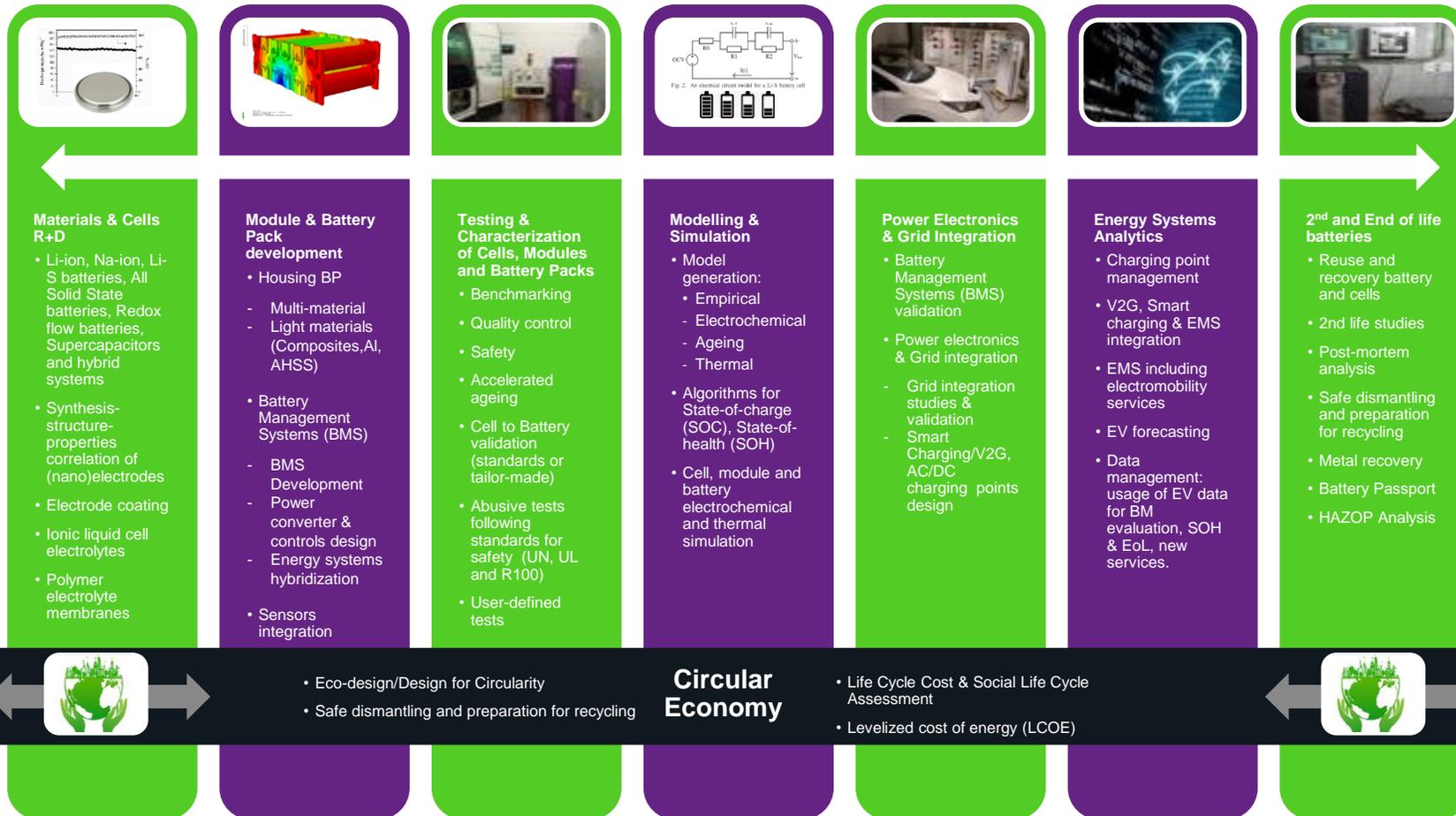
EUROPEAN GIGAFACTORIES

Analysis by CIC energigUNE
Version 4. Last update: 09/2021



Battery value Chain

Technology for cell, battery packs, and systems development

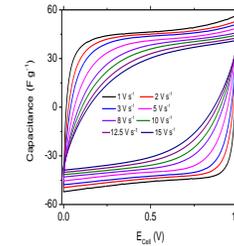
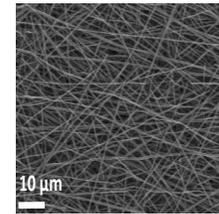
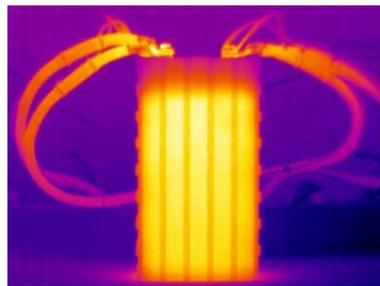
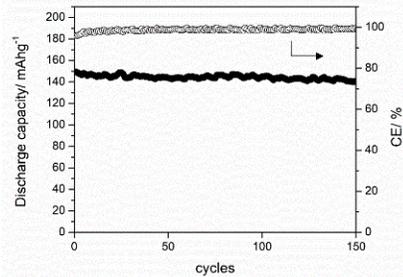
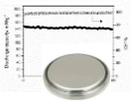


Battery value Chain

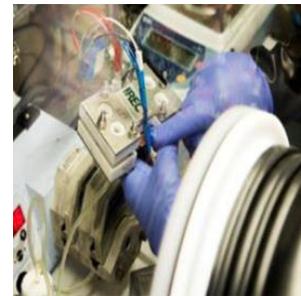
Technology for cell, battery packs, and systems development

Materials & Cells R+D

- Li-ion, Na-ion, Li-S batteries, All Solid State batteries, Redox flow batteries, Supercapacitors and hybrid systems
- Synthesis-structure-properties correlation of (nano)electrodes
- Electrode coating
- Ionic liquid cell electrolytes
- Polymer electrolyte membranes



Synthesis-structure-properties correlation of (nano)electrodes

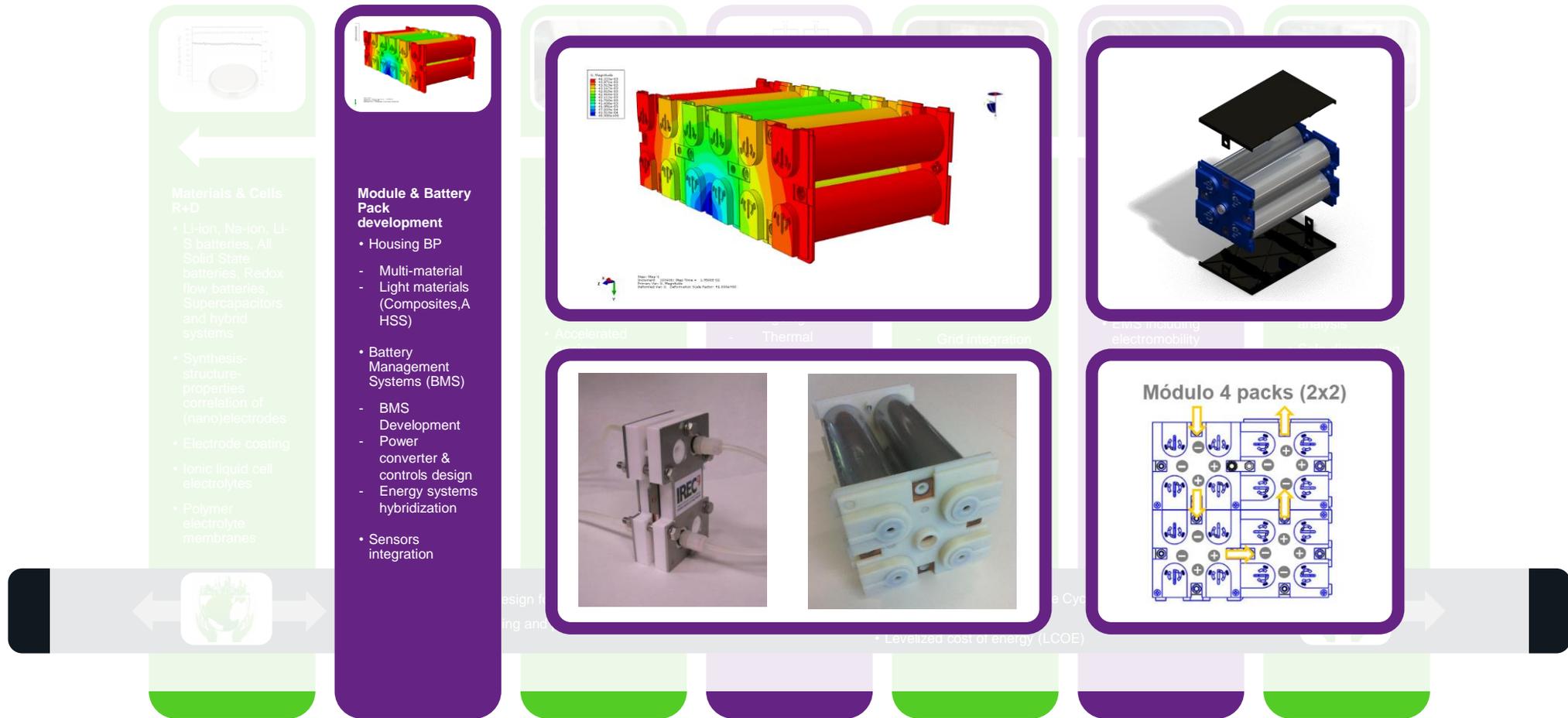


• Safe dismantling and preparation for recycling

• Levelized cost of energy (LCOE)

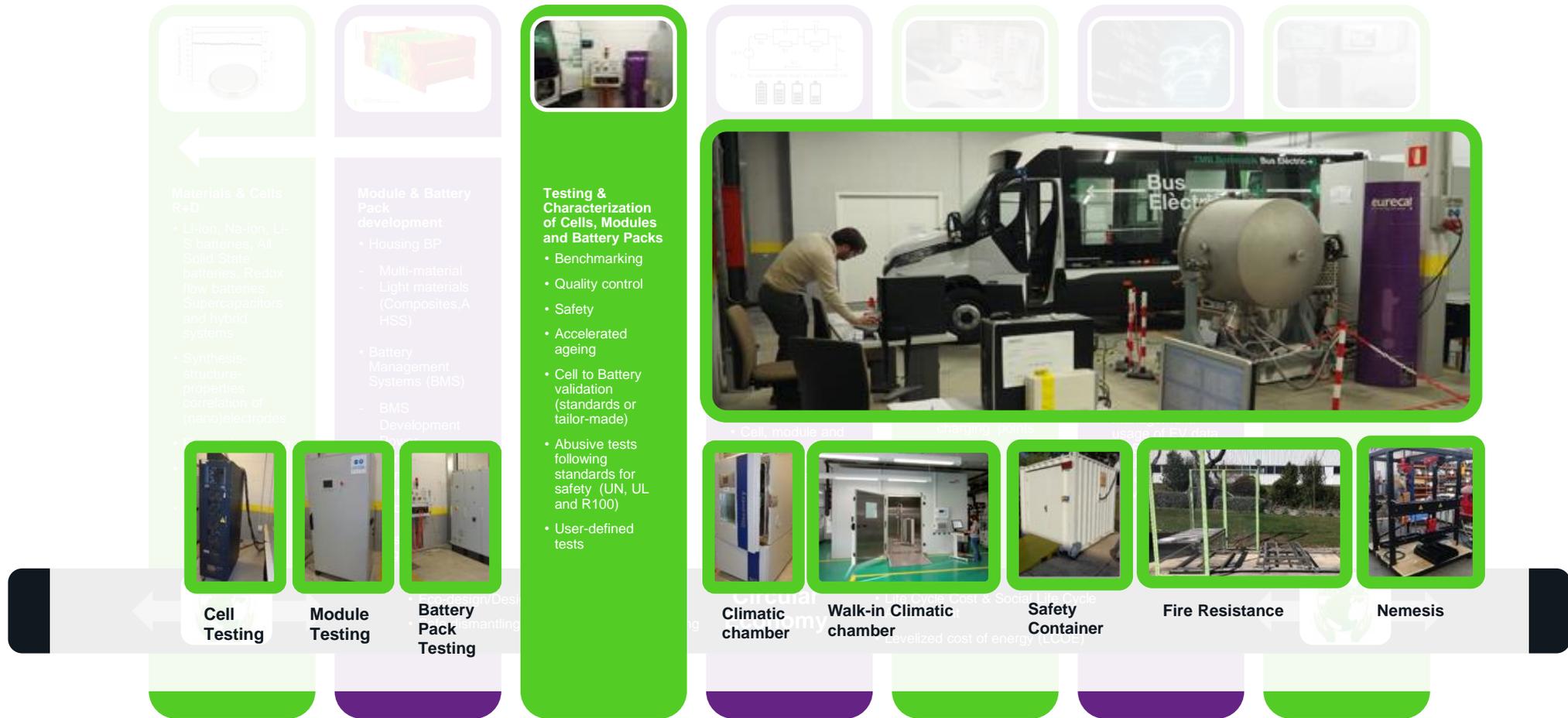
Battery value Chain

Technology for cell, battery packs, and systems development



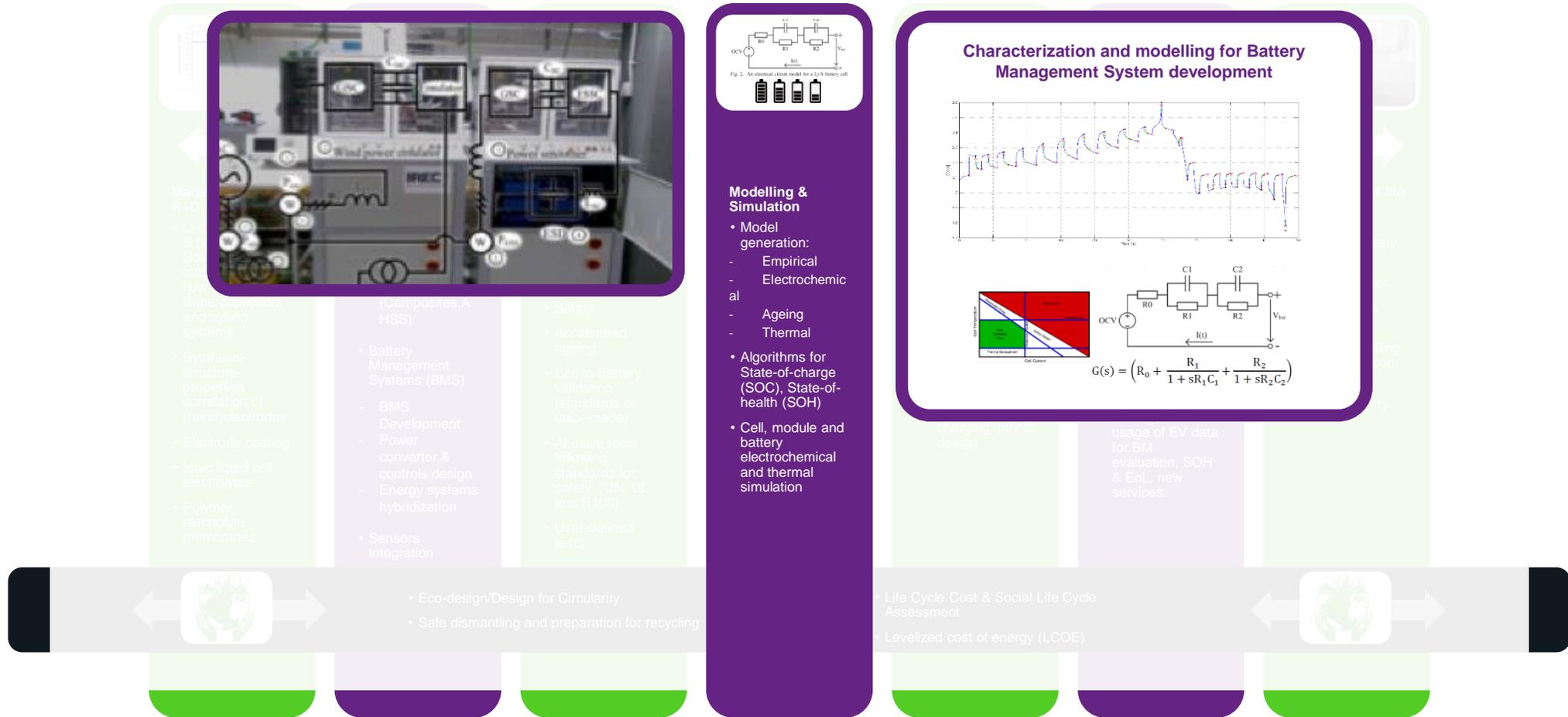
Battery value Chain

Technology for cell, battery packs, and systems development



Battery value Chain

Technology for cell, battery packs, and systems development



Battery value Chain

Technology for cell, battery packs, and systems development



• Polymer electrolyte membranes

hybridization
• Sensors integration

and R100)
• User-defined tests



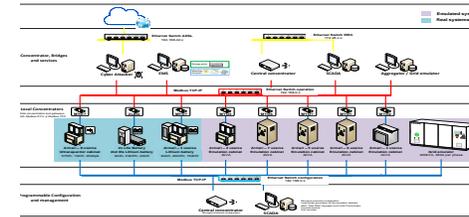
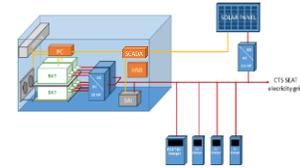
• Eco-design/Design for Circularity
• Safe dismantling and preparation for recycling

Circular Economy



Power Electronics & Grid Integration

- Battery Management Systems (BMS) validation
- Power electronics & Grid integration
- Grid integration studies & validation
- Smart Charging/V2G, AC/DC charging points design



Battery value Chain

Technology for cell, battery packs, and systems development

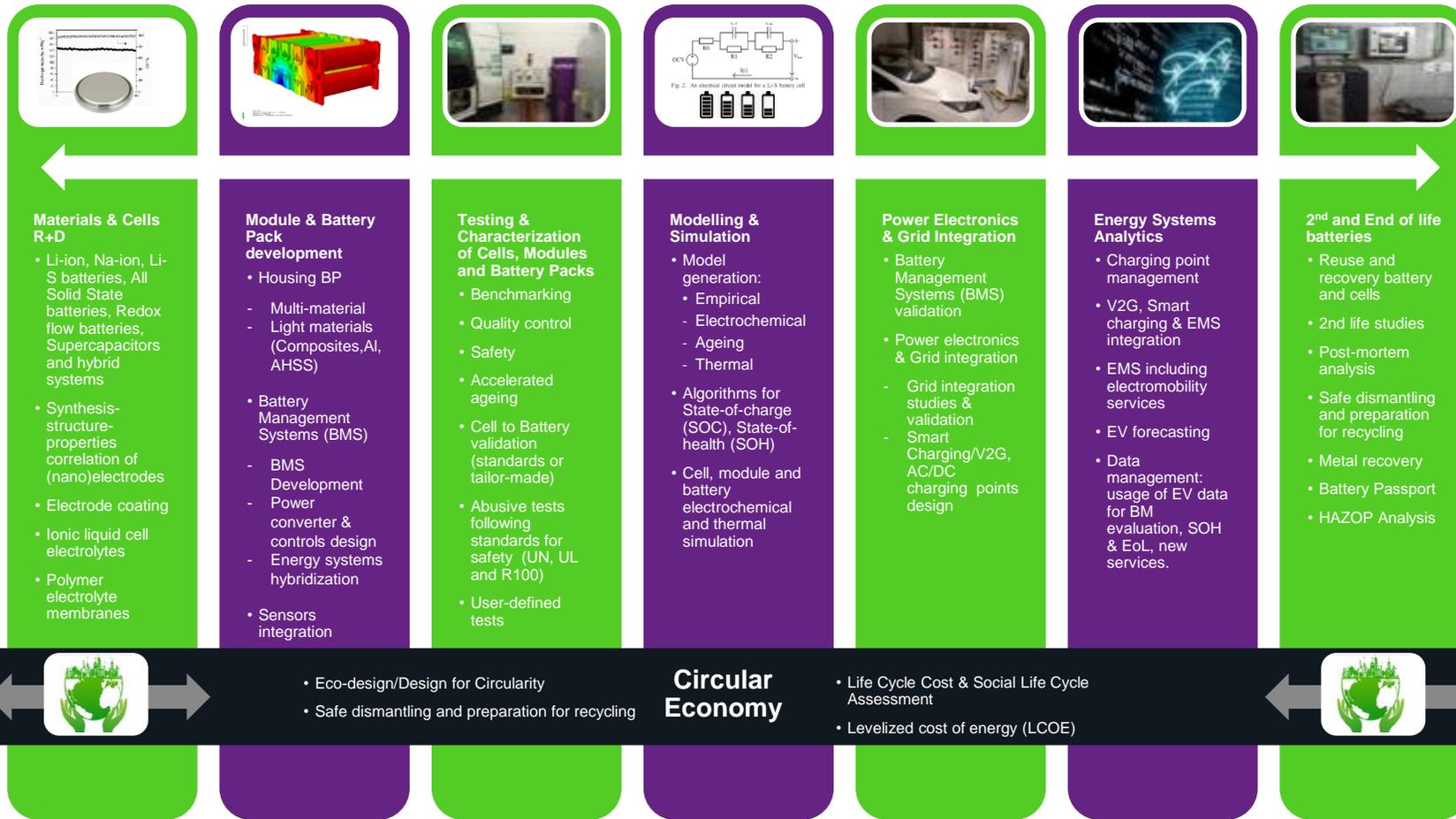


2nd and End of life batteries

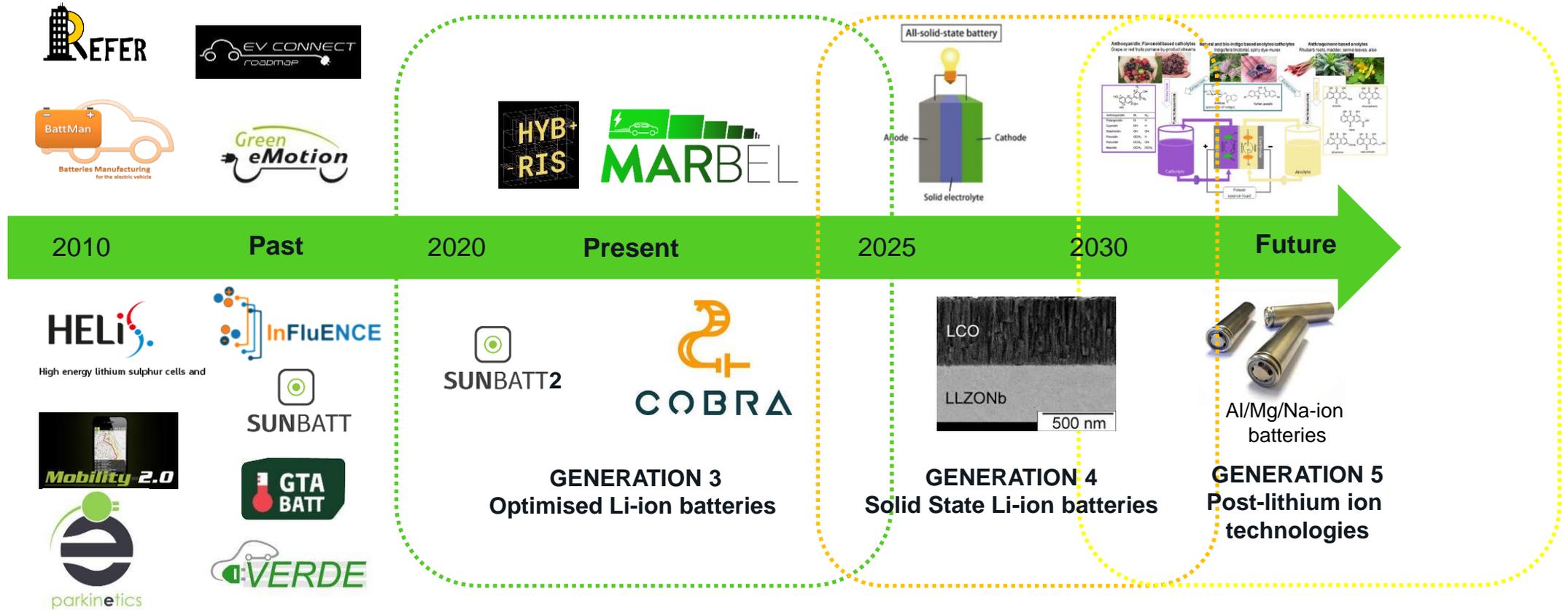
- Reuse and recovery battery and cells
- 2nd life studies
- Post-mortem analysis
- Safe dismantling and preparation for recycling
- Metal recovery
- Battery Passport
- HAZOP Analysis

Battery value Chain

Technology for cell, battery packs, and systems development



Past, Present and Future



Selected projects

Total budget ~ 12 M€

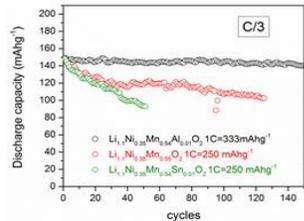


The project is coordinated by IREC.

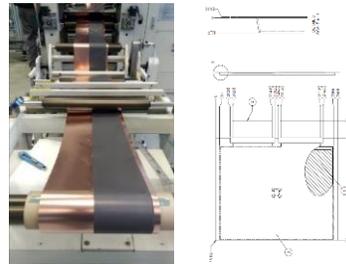


Cobalt-free batteries for future automotive applications

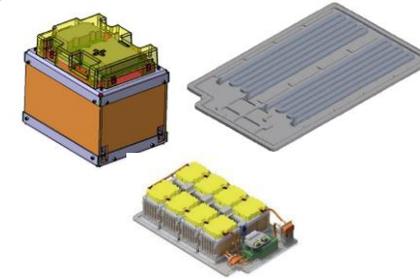
COBRA aims to develop a novel Cobalt-free Lithium-ion battery technology that overcomes many of the current shortcomings faced by **Electrical Vehicle (EV) batteries**. The proposed Li-ion technology will be **demonstrated at TRL6 (battery pack level)**.



Material testing



Cell development



Module and battery pack assembly

Selected projects



Manufacturing and Assembly of modular and Reusable EV Battery for Environment-friendly and Lightweight mobility

- > 20% weight reduction
- > 25% charging time reduction
- > 40% LCA improvement by using modularity

- Useful Battery life up to 300,000 km
- Easy & Safe (dis-)assembly automatization
- Reparability and 2nd life transition
- Adaptable to all cells and vehicles

Total budget ~ 12 M€



The project is coordinated by EURECAT.



Clients and Partnerships

OEMs



Tiers & Engineering



Cells & Batteries



Energy & Resources



Research Centers & Laboratories



Institutions & Associations



BATTECH
IREC[®] eurecat



Thank you!





Sponsors:



Financial support:



Thanks

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jrmorante@irec.cat