



NEXTCELL Project:

Towards the Next generation of Li-Ion Batteries

Paula Mondino¹, Sabrina Trano¹, Federico Bella¹, Silvia Bodoardo¹, Carlotta Francia¹
¹Department of Applied Science and Technology, Politecnico di Torino, Corso Duca degli Abruzzi 24, 10129 –Torino, Italy
 paula.mondino@polito.it

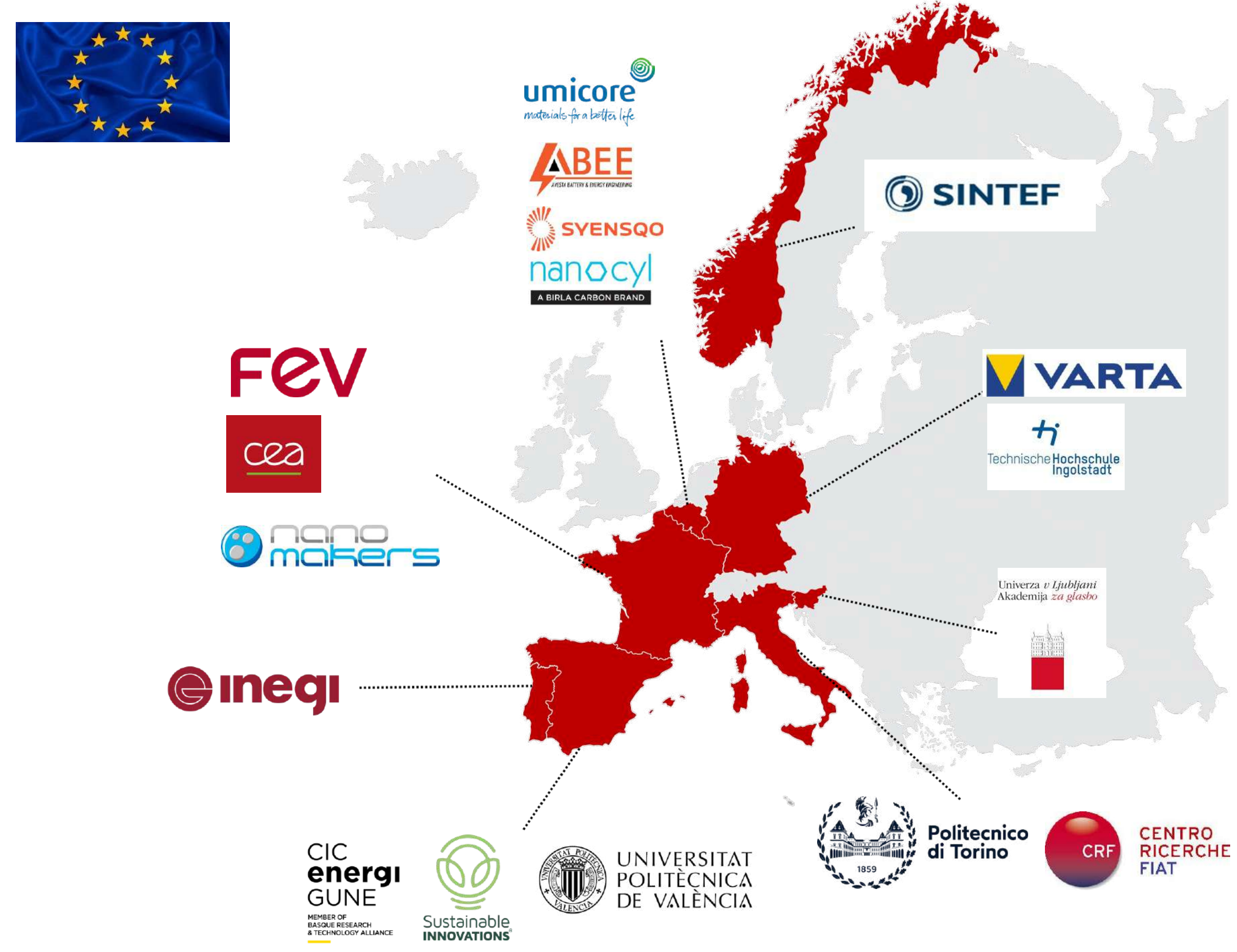


1 Towards the next generation of high performance Li-ion battery cells

NEXTCELL's aims to create a new generation of lithium-ion cells that can deliver both **high energy** and **high capacity**. The project focuses on a disruptive concept: a fully gel-based cell, where the electrodes and the separator are produced with integrated gel phases. By combining these gelled components with a high-voltage-resistant gel electrolyte, the project intends to demonstrate and validate a complete gel-cell architecture that incorporates multiple innovations at the materials level

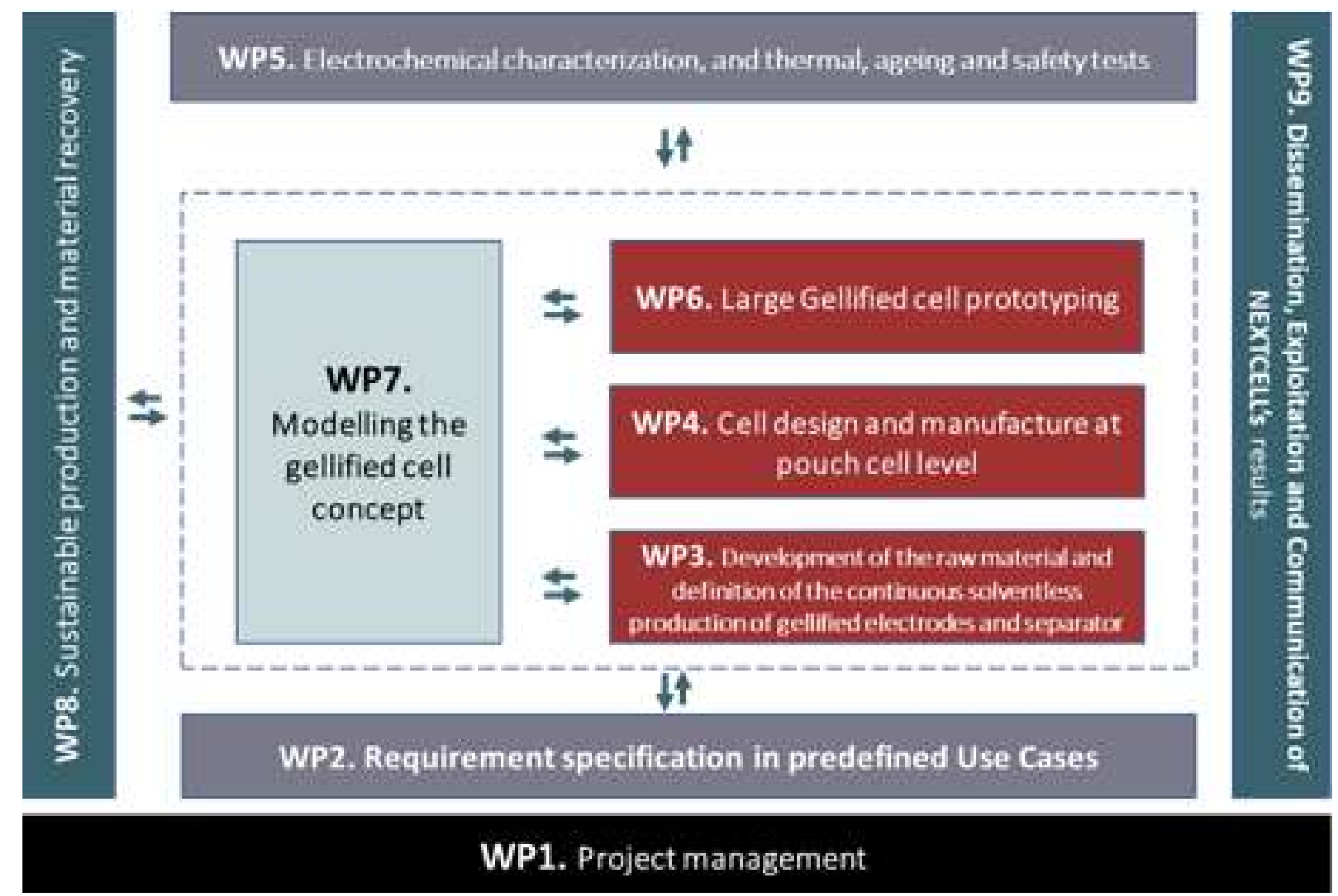
2 Partners

NEXTCELL consortium consists of 17 partners from 7 Member States (Italy, Spain, France, Belgium, Germany, Slovenia and Portugal), and an additional country(Norway). Each one, of these partners has a distinctive role in the project activities and ensure that the project results is exploited in an efficient manner.

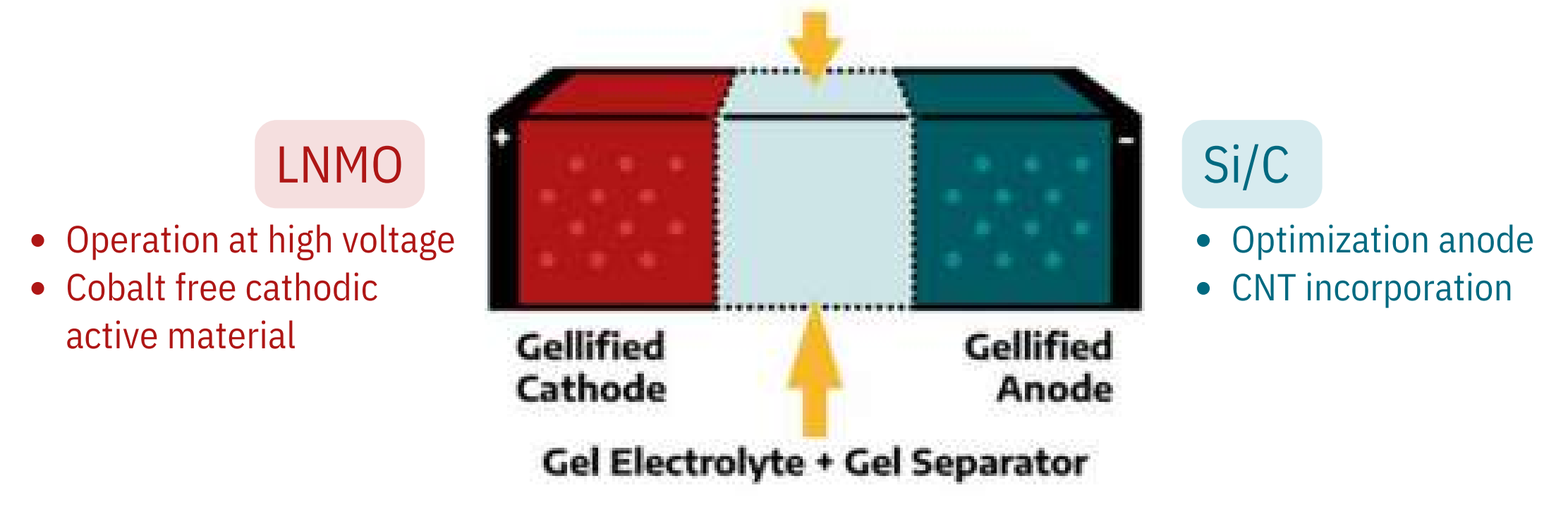


4 Overall Concept and methodology

- **Development** of the raw material and definition of the continuous solventless production of gellified electrodes and separator.
- **Cell design and manufacture** at pouch cell level.
- **Electrochemical** characterisation and thermal, ageing and safety test.
- Large gellified cell **prototyping**.
- **Modelling** the gellified cell concept.
- **Sustainable production** and material recovery.



5 Achievements so far



3 Target characteristics and main objectives

- **High energy density** with superior performance in high-capacity and high-voltage applications.
- **Sustainable manufacturing process** via production optimization and solvent-free techniques.
- **Lower manufacturing costs** through ~50% energy consumption reduction via cost-effective production optimization.
- **Intrinsically safe cells**, achieved by eliminating volatile components in key battery elements.
- **Advanced physical and mathematical models** for accelerated development of energy storage technologies.

Electrochemical testing across formats

- Characterization from coin to pouch cells, contributing parameters for modelling and scale-up
- Evaluation under varied operating and charging conditions

Ageing and operational behaviour

- Ageing protocols based on realistic usage profiles
- Fast-charge and temperature-range testing to observe degradation trends

Thermal and safety assessment

- Thermal analysis to study heat generation and distribution
- Safety-focused tests supporting validation of NEXTCELL safety models