

HighSpin PARTNERS



PARTICIPATING ORGANISATIONS

- 1 AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GMBH
- 2 CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS FUNDACION, CIC ENERGIGUNE FUNDAZIOA
- 3 HALDOR TOPSOE AS
- 4 FORSCHUNGSZENTRUM JÜLICH GMBH
- 5 KARLSRUHER INSTITUT FUER TECHNOLOGIE
- 6 PIPSTREL VERTICAL SOLUTIONS DOO PODJETJE ZA NAPREDNE LETALSKE RESITVE
- 7 SAFT
- 8 CUSTOMCELLS GROUP
- 9 ARKEMA FRANCE SA
- 10 COATEX SAS
- 11 SENSICHIPS SRL
- 12 COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
- 13 LEAD TECH SRL
- 14 VIANODE AS

The HighSpin project consortium combines competences from 14 partners across 8 European countries (7 EU member states and one associated country) and is coordinated by AIT Austrian Institute of Technology.

HighSpin is scheduled to run from SEPTEMBER 1ST, 2022 TO AUGUST 31ST 2026, for a total of 48 months.

14 PARTNERS
48 MONTHS
8 COUNTRIES

VISIT OUR WEBSITE



www.highspin.eu

CONTACT

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HighSpin

Delivering High-Voltage Spinel LNMO Silicon-Graphite Cells and Modules for Automotive and Aeronautic Transport Applications



ABOUT THE PROJECT

HighSpin aims to develop high-performing, safe and sustainable generation 3b high-voltage spinel LNMO||Si/C material, cells and modules with a short industrialisation pathway and demonstrate their application for automotive and aeronautic transport applications. The project addresses in full the scope of the HORIZON-CL5-2021-D2-01-02 topic, setting its activities in the "high-voltage" line. The project objectives are:

- Further develop the LNMO||Si/C cell chemistry compared to the reference 3beLiEVe baseline, extracting its maximum performance;
- Develop and manufacture LNMO||Si/C cells fit for automotive and aeronautic applications;
- Design and demonstrate battery modules for automotive and aeronautic applications;
- Thoroughly assess the LMNO||Si/C HighSpin technology vs. performance, recyclability, cost, and TRL.

The HighSpin cell delivers 390 Wh/kg and 925 Wh/l target energy density, 790 W/kg and 1,850 W/l target power density (at 2C), 2,000 deep cycles, and 90 €/kWh target cost (pack-level). The project activities encompass stabilisation of the active materials via microstructure optimisation, the development of high-voltage electrolyte formulations containing LiPF6 and LIFSI, ultrafast laser-structuring of the electrodes, and the inclusion of operando sensors in the form of a chip-based Cell Management Unit (CMU). HighSpin will demonstrate TRL 6 at the battery module level, with a module-to-cell gravimetric energy density ratio of 85-to-90 % (depending on the application). Recyclability is demonstrated, targeting 90 % recycling efficiency at 99.9 % purity. HighSpin aims at approaching the market as a second-step generation 3b LNMO||Si/C in the year 2028 (automotive) and 2030 (aeronautics), delivering above 40 GWh/year and 4 billion/year sales volume in the reference year 2030.

HIGHSPIN TARGETS

Materials

Cathode with 3.0 g/cm³ density and anode with 20 wt. % of Si (730 mAh/g capacity). Stable electrolyte up to 5.0 V.



Processes

3D electrode multilayer coating and ultrafast laser structuring at a speed of ≥ 5 m/min against LNMO||Si/C.

Demonstrators

LNMO cells at 390 Wh/kg and 925 Wh/l at a cost target of 90 €/kWh (pack level). 300 cells/150 CMUs produced and 2 sets of module demonstrators delivered at TRL 6.



Assesment

Testing as part of the materials development, assessment of the performance in 1st and 2nd life (including LCA, costs, and TRL). Demonstrated recyclability, at 90 % recycling efficiency.

Time-to-market

TRL scale-up of the HighSpin LNMO||Si/C to enter the market as "second-step Gen. 3b" LiB in 2028 (automotive) and 2030 (aeronautics).



Our team

A team of more than 60 researchers are involved in HighSpin, with 3 Ph.D. students supervised, one each at KIT, FZJ and CICE.



TO ACHIEVE THE OBJECTIVES, THE KEY PROJECT ACTIVITIES ENCOMPASS:

- ✓ Stabilisation of the active materials via microstructure optimisation
- ✓ The development of high-voltage electrolyte formulations containing LiPF6 and LIFSI
- ✓ Ultrafast laser-structuring of the electrodes
- ✓ The inclusion of operando sensors in the form of a chip-based Cell Management Unit (CMU)