

PROJECT

SeNSE

Lithium-ion battery with silicon anode, nickel-rich cathode and in-cell sensor for electric vehicles

Funding: European (Horizon 2020)

Duration: Feb 2020 - Jan 2024

Status: Ongoing

Total project cost: €10,251,679

EU contribution: €10,251,679



Call for proposal: H2020-LC-BAT-2019

[CORDIS RCN : 225991](#)

Objectives:

The SeNSE proposal aims at enabling next generation lithium-ion batteries with a silicon-graphite composite anode and a nickel-rich NMC cathode to reach 750 Wh/L. Cycling stability is the key challenge for the adoption of this cell chemistry.

The objective is to reach 2000 deep cycles by

1. reducing the surface reactivity of the active materials by a combination of novel film-forming electrolyte additives and active materials coatings,
2. compensating irreversible lithium losses during the first cycles employing pre-lithiated silicon and providing an on-demand reservoir of excess lithium in the cathode,
3. identifying and controlling critical cycling parameters with data provided from in-cell sensors.

Adaptive fast charging protocols will be integrated into the battery management system based on dynamic in-cell sensor data and by implementing thermal management concepts on materials and electrode level. To improve the sustainability of the battery and to lower production cost, the content of the critical raw materials cobalt and natural graphite will be reduced. Enabled by protective coatings, aqueous slurry processing will be developed for the cathode.

Costs will be further lowered and energy density improved by the development of thinner textured current collector foils offering enhanced adhesion. The feasibility and scalability of the SeNSE battery technology with respect to the call targets will be demonstrated through 25 Ah pouch cell prototypes and a 1 kWh module. Scalability to the gigawatt scale and cost-effectiveness of the proposed solutions, including aspects of recycling and second-life use, will be continuously monitored via regular briefings led by Northvolt, which currently undertakes one of the most ambitious efforts to establish a European cell manufacturing plant at scale.

To strengthen the European IP portfolio in the battery field, patent applications are the preferred way of dissemination of technology developed within SeNSE.

Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Other programmes: LC-BAT-5-2019 - Research and innovation for advanced Li-ion cells (generation 3b)

Lead Organisation:

Eidgenoessische Materialpruefungs- Und Forschungsanstalt

Address:

Ueberlandstrasse 129
8600 DUEBENDORF
Switzerland

Organisation Website:

<http://www.empa.ch>

EU Contribution: €2,042,375

Partner Organisations:**Westfaelische Wilhelms-Universitaet Muenster****Address:**

SCHLOSSPLATZ 2
48149 MUENSTER
Germany

Organisation Website:

<http://www.uni-muenster.de/en/>

EU Contribution: €1,222,124

Coventry University**Address:**

Priory Street
Coventry
CV1 5FB
United Kingdom

EU Contribution: €572,500

Ait Austrian Institute Of Technology Gmbh**Address:**

GIEFINGGASSE 4
1210 WIEN
Austria

Organisation Website:

<http://www.ait.ac.at/>

EU Contribution: €560,536

Solvionic**Address:**

195 RTE D'ESPAGNE SITE BIOPARC SANOFI
31100 TOULOUSE
France

Organisation Website:

<http://www.solvionic.com>

EU Contribution: €645,000

Forschungszentrum Julich Gmbh**Address:**

WILHELM JOHNNEN STRASSE
52428 JULICH
Germany

Organisation Website:

<http://www.fz-juelich.de>

EU Contribution: €712,418

Northvolt Ab**Address:**

GAMLA BROGATAN 26
111 20 STOCKHOLM
Sweden

EU Contribution: €1,418,750

Huntsman Advanced Materials**Address:**

Klybeckstrasse 200
4057 BASEL
Switzerland

Organisation Website:

<http://www.huntsman.com>

EU Contribution: €530,750

Lithops Srl**Address:**

CENTRO AZIENDALE QUERCETE SNC
81016 SAN POTITO SANNITICO
Italy

Organisation Website:

<http://www.lithops.it>

EU Contribution: €574,000

Fpt Motorenforschung Ag**Address:**

SCHLOSSGASSE 2
9320 ARBON
Switzerland

EU Contribution: €1,327,000

Enwires**Address:**

22 ALLEE DU PRE BLANC
38240 MEYLAN
France

EU Contribution: €646,226

Technologies:

Electric vehicle batteries (and energy management)
Lithium-ion batteries with novel anode/cathode materials

Development phase: Research/Invention

STRIA Roadmaps: Transport electrification, Vehicle design and manufacturing

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Environmental/Emissions aspects, Decarbonisation

Geo-spatial type: Other