EUROPEAN COMMISSION

HORIZON 2020 PROGRAMME - TOPIC H2020-LC-BAT-2019
Strongly improved, highly performant and safe all solid-state batteries for electric vehicles.

GRANT AGREEMENT No. 875189

SAFELiMOVE – Deliverable Demonstrator

D6.3 – 10Ah prototypes manufacturing

Publishable summary

The aim of the report is to demonstrate the effective manufacturing of large all solid-state pouch cells developed by SAFT. Following initial electrical characterizations after the manufacturing, these large pouch cells are delivered to partners for electrochemical performances, life and safety tests. In addition, 6 cells are integrated in a 24V battery demo module developed by IKERLAN.

With all the feedback from processing and assembly know-how on small-scale 1 Ah pouch cells developed by CIDETEC in WP4, SAFT developed the final 10 Ah prototype pouch cell and the related assembly process flow chart. After scale-up of the cell assembly process, the needed components for the cell assembly have been manufactured with several partners and delivered to SAFT:

- Very thin lithium metal foil (LiM 4M) manufactured by HYDRO-QUEBEC.
- High loading solid state cathode (loading 2,6 mAh/cm^2) manufactured by CIDETEC with lithium nickel manganese cobalt oxide (NMC811) from Umicore.
- Solid electrolyte membrane (thickness 70 µm) manufactured by SAFT, made from polymers provided by CICe and inorganic filler (LATP) provided by SCHOTT.

This innovative SAFELIMOVE SSB cell design required multiple manufacturability trials achieved with SAFELIMOVE materials samples at different maturity levels, allowing the definition of the right assembly protocols and parameters. During the scale-up of the assembly process, the main efforts have been brought on such specific topics related to the SAFELIMOVE SSB technology as:

- LiM and Solid Electrolyte layers handling and stacking technique.
- Tab ultrasonic welding for bonding to very thin LiM anode stack.
- Electrolytic contact between all electrodes and Solid Electrolyte membranes by smoothing operation.

Finally, these large pouch cells have been manufactured in a pre-industrial format and validated by the electrical characterizations performed at cell level (internal resistance, cell capacity). After checking that cells are in conformity with the expected electrical performances, they can be delivered to the partners for testing.

The manufacturing of these large prototype pouch cells provided an important input on all the production chain of solid-state batteries. From this experience, key issues during SSB manufacturing process have been identified and solutions for large-scale battery production are being proposed.

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Project partners:

#	Partner	Partner Full Name
1	CICe	CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS FUNDACION, CIC ENERGIGUNE FUNDAZIOA
2	SCHOTT	SCHOTT AG
3	UMICORE	UMICORE
4	HYDRO-QUEBEC	HYDRO-QUEBEC
5	SAFT	SAFT
6	RENAULT SAS	RENAULT SAS
7	TME	TOYOTA MOTOR EUROPE NV
8	IKERLAN	IKERLAN S. COOP
9	CEA	COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES
10	CIDETEC	FUNDACION CIDETEC
11	TUB	TECHNISCHE UNIVERSITAT BERLIN
12	RWTH AACHEN	RHEINISCH-WESTFAELISCHE TECHNISCHE HOCHSCHULE AACHEN
13	ABEE	AVESTA BATTERY & ENERGY ENGINEERING
14	LCE Srl	LIFE CYCLE ENGINEERING SRL
15	UNIRESEARCH BV	UNIRESEARCH BV

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