



ADVAGEN

DELIVERABLE REPORT



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Nature of the Deliverable		
R	Document, report (excluding the periodic and final reports)	X
DEM	Demonstrator, pilot, prototype, plan designs	
DEC	Websites, patents filing, press & media actions, videos, etc.	

Dissemination Level		
PU	Public, fully open	
SEN	Sensitive	X

Quality procedure			
Date	Version	Reviewers	Comments
12.12.2023	V1	Julia Amici (POLITO)	Minor corrections
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17.01.2024	V2	Rahmandhika Firdauzha Hary Hernandha (ABEE)	Parts, Minor Corrections, Propose for Additional Contents or Removal
23.01.2024	V3	Jessica Gerstenberg (TUBS)	Final revision and fix the document format
30.01.2024	V3	Rahmandhika Firdauzha Hary Hernandha (ABEE)	Finalisation and submission

Project summary

This report is part of the deliverables from the project "ADVAGEN" (Development of ADVAnced next GENeration Solid-State batteries for Electromobility Applications), which has received funding from the European Union's Horizon Europe research and innovation program under grant agreement No. 101069743.

To date, the battery market is dominated by lithium-ion (Li-ion) chemistries, as the energy density has more than doubled, and their costs have dropped by a factor of at least 10. However, conventional Li-ion batteries (LIB) are reaching their performance limits in terms of energy density and facing safety issues is required the development and production of new battery generations, such as Solid-State Batteries (SSBs), to create a new industry value chain in Europe towards their commercialization. Consequently, high-energy-density EU-made SSBs will ensure the supply of, among others, the automotive sector. To do so, the development and deployment of new manufacturing technologies, enabling the large-scale production of SSBs, is crucial. Indeed, among the overarching themes to develop and produce sustainable batteries in the future, the BATTERY 2030+ roadmap⁴ considers manufacturability as a cross-cutting key area. Innovative and scalable manufacturing techniques to produce SSBs will accelerate cost reduction, energy savings, and enhanced safety. ADVAGEN will develop a new lithium metal (LiM) battery cell technology based on a safe, reliable, and high-performing hybrid solid-state electrolyte (LLZO-LPS based), gaining a competitive advantage over the worldwide (mainly Asian) competition. This will sustainably strengthen the EU as a technological and manufacturing leader in batteries, as specified in the ERTRAC electrification roadmap and SET-Plan Action Point-7. ADVAGEN consortium contains key EU actors in the battery sector, from industrial materials producers (CPT, ABEE) and battery manufacturer (ABEE) to R&D centers (IKE, CEA, IREC, TUB, CICE, POLITO, INEGI, UL, FEV) and the automotive industry (TME), covering the complete knowledge and value chain. By developing high-performance, affordable and safe batteries, ADVAGEN aims to re-establish European competitiveness in battery cell production.

Objective and Executive summary

Parameters from the production process of electrodes will be correlated to the electrode properties and the resulting performance. Two main factors are identified describing the properties of intermediate products in laboratory-scale processes, that need to be taken into account within the scale-up to industrial size processing: The particle size ratio between the electrolyte and active material and the carbon black size distribution.

A recommendation for the particle size of the active material used in the pilot-scale and a suitable adjustment of the electrolyte particle size are described to increase the electrochemical performance of the catholyte. The importance of the elastic spring-back with regard to the long range conductive pathways within the cathode microstructure is outlined. This approach gives a more general view on the connection between processing and production to enable a scale-up of the production process.

List of partners

N°	Name	Short name	Country
1	AVESTA BATTERY & ENERGY ENGINEERING	ABEE	BE
2	INEGI - INSTITUTO DE CIENCIA E INOVACAO EM ENGENHARIA MECANICA E ENGENHARIA INDUSTRIAL	INEGI	PT
3	POLITECNICO DI TORINO	POLITO	IT
4	FEV EUROPE GMBH	FEV	DE
5	COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVE	CEA	FR
6	TECHNISCHE UNIVERSITAET BRAUNSCHWEIG	TUBS	DE
7	CENTRO DE INVESTIGACION COOPERATIVA DE ENERGIAS ALTERNATIVAS FUNDACION, CIC ENERGIGUNE FUNDAZIOA	CICE	ES
8	FUNDACIO INSTITUT DE RECERCA DE L'ENERGIA DE CATALUNYA	IREC-CERCA	ES
9	TOYOTA MOTOR EUROPE NV	TME	BE
10	UNIVERZA V LJUBLJANI	UL	SI
11	EUROQUALITY SARL	EQY	FR
12	TECHCONCEPTS BV	TC	NL
13	CERAMIC POWDER TECHNOLOGY AS	CERPOTECH	NO
14	IKERLAN S. COOP	IKERLAN	ES