

- D7.6 – Report on communication and dissemination activities –V1 -

- VERSION -

VERSION	DATE
1	29/03/2022

- PROJECT INFORMATION -

GRANT AGREEMENT NUMBER	955930
PROJECT FULL TITLE	INNOVATIVE PHYSICAL/VIRTUAL SENSOR PLATFORM FOR BATTERY CELL
PROJECT ACRONYM	INSTABAT
START DATE OF THE PROJECT	01/09/2020
DURATION	3 years
CALL TOPIC	H2020-LC-BAT-13-2020
PROJECT WEBSITE	www.instabat.eu

- DELIVERABLE INFORMATION -

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WP LEADER	CEA
CONTRIBUTING PARTNERS	CEA, CNRS, INSA, UAVR, FAURECIA, BMW, VARTA
NATURE	Report
AUTHORS	Olivier RACCURT
CONTRIBUTORS	
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- CEA – QUALITY MANAGEMENT

CEA Deliverable reference	DEHT/LV/2022-033_ D7.6 – Report on communication and dissemination activities –V1
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Deliverable Review

Reviewer #1: Magali Reytier		
Answer	Comments	Type*

1. Is the deliverable in accordance with

(i) The Description of actions?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a
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2. Is the quality of the deliverable in a status

(i) That allows it to be sent to European Commission?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a
(ii) That needs improvement of the writing by the originator of the deliverable?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a
(iii) That needs further work by the Partners responsible for the deliverable?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a

Reviewer #2: Martin Schmuck		
Answer	Comments	Type*

1. Is the deliverable in accordance with

(i) The Description of actions?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a
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(iii) That needs further work by the Partners responsible for the deliverable?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> M <input type="checkbox"/> m <input type="checkbox"/> a

* Type of comments: M = Major comment; m = minor comment; a = advice

- ABSTRACT/SHORT SUMMARY -

This deliverable reports the communication and dissemination activities of INSTABAT since the beginning of the project. The report is divided in four parts. After an introduction, the communication and dissemination objectives for the reporting period are detailed. In a third part we present the dissemination and communication tools of the project such as graphical materials and project web site. In the fourth part we detail the dissemination and communication activities.

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1. Introduction

1.1 About INSTABAT

INSTABAT project is a European project started in 2020 under the umbrella of the EU BATTEY 2030+ large-scale initiative. According to the roadmap for smart cell, INSTABAT will develop proof of concept of smart sensing technology embedded in the cells to monitor internal key parameters such as temperature and heat flow, pressure, strain, lithium-ion concentration, CO₂ concentration, absolute impedance, potential and electrode polarization. During the project, we develop a concept of “lab-on-cell” based on new embedded physical and virtual sensors to perform reliable and in operando monitoring of the key parameters and of correlating them with battery cell physico-chemical degradation processes. The Battery Management System (BMS) will receive in real-time the output data from the physical/virtual sensors of the platform, enabling the delivery of very accurate SoX cell indicators (States of Charge, Health, Power, Energy and Safety). The benefits of the improved accuracy of the SoX will be demonstrated via two critical uses cases: cycling at extreme conditions and high-power charging for EV applications. Figure 1 show the concept of the project.

MULTI-SENSOR PLATFORM

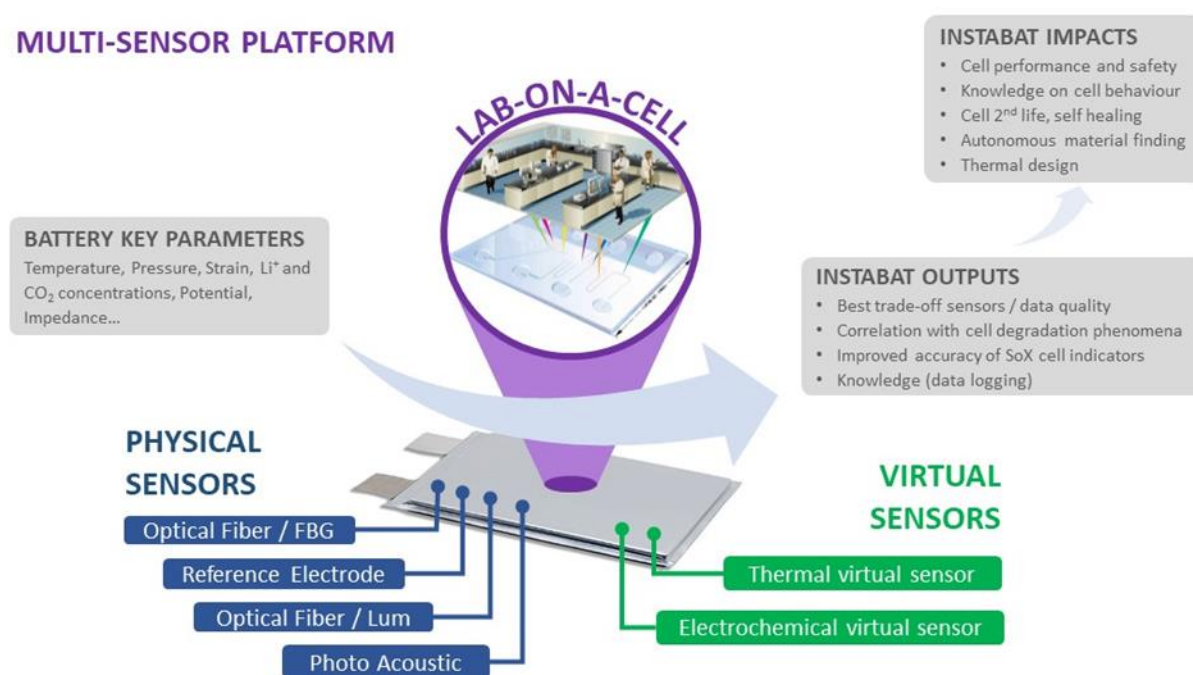


Figure 1: INSTABAT concept: Labo-on-cell

INSTABAT is coordinate by CEA and the partners are: CNRS, Universidade de Aveiro, INSA Lyon, VARTA Micro Innovation, BMW, INFINEON (see Figure 2).



Figure 2: INSTABAT Partner's map

1.2 Purpose of the deliverable

This deliverable reports the communication and dissemination activities of INSTABAT since the beginning of the project.

1.3 Structure of the deliverable

The report is divided in four parts. After an introduction, the communication and dissemination objectives for the reporting period are detailed. In a third part we present the dissemination and communication tools of the project such as graphical materials and project web site. In the fourth part we detail the dissemination and communication activities.

2. Communication and dissemination objectives for the reporting period

The communication and dissemination objectives for the reporting period was describe in the D7.1 Dissemination, Communication and Exploitation Plan.

3. Dissemination and communication tools

3.1 Graphic material

The project partners have created a graphical identity for INSTABAT which is used for all the communication and dissemination activities.

3.1.1 Logo

We developed a set of project logos. In the logo we introduce a lightning in the “B” to represent the electrical energy and a “Bat” in the “A” for fun and in reference to the diminutive of battery. The blue color was choosing because this color is generally associate to the electricity. Figure 3 shows the different version of the logo, and Figure 4 shows the colors palette for INSTABAT graphic identity. With the development of this visual identity and logo, we achieve the objective of creating a clear and unique image of INSTABAT project. This logo that helps to improve the visibility of the project and be used for all communication support.



Figure 3. INSTABAT logos



Figure 4. INSTABAT colors

3.2 Project website

The project website was described in the deliverable D7.2-“INSTABAT website”. The web site is accessible on the address: <https://www.instabat.eu/>. The website is online since the 24/05/2021

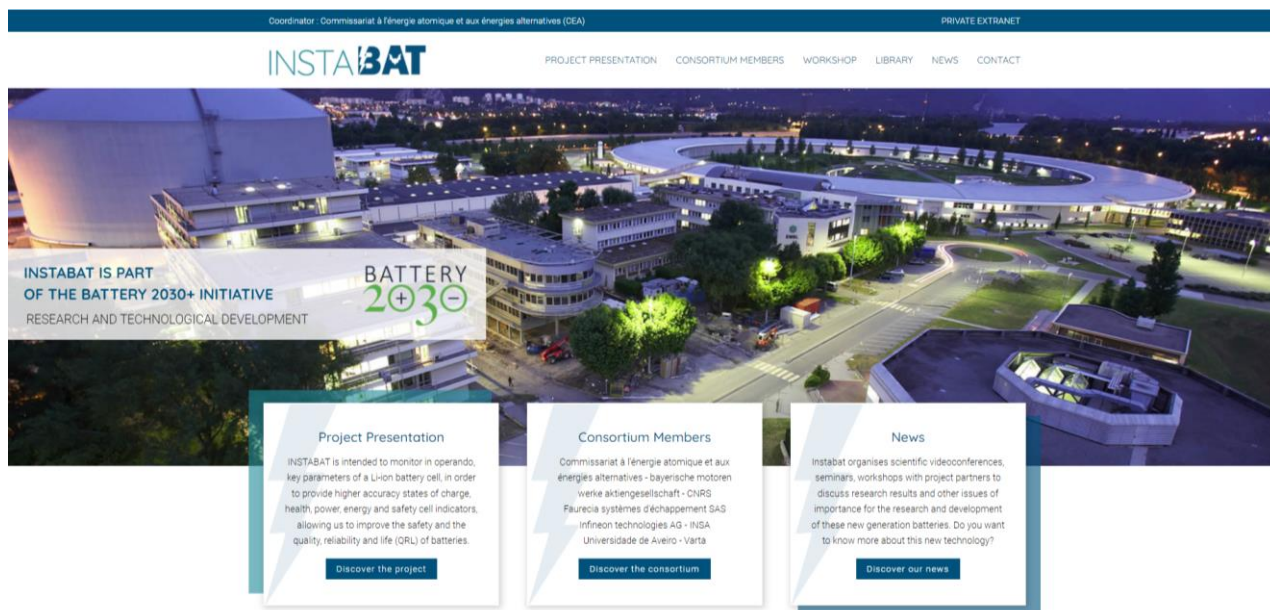


Figure 5: INSTABAT website (frontpage)

From google analytics tools we can measure the audience of the website since the starting date. All the results below were analyzed the 24/03/2022. The statistics of the site correspond to a period of 5 months. We can show that the number of visit is around 4 to 5 persons by day with some peaks above 10 persons. The maximum reaches up to 23 persons by day the 24/11/2021. This peak corresponds to the Battery Innovation Days conference¹. During this conference INSTABAT project was presented and the results were discussed during the roundtable discussion on Smart Battery Functionalization: Status and Future (see below paragraph 4). There is a total of 832 visitors since the opening date.

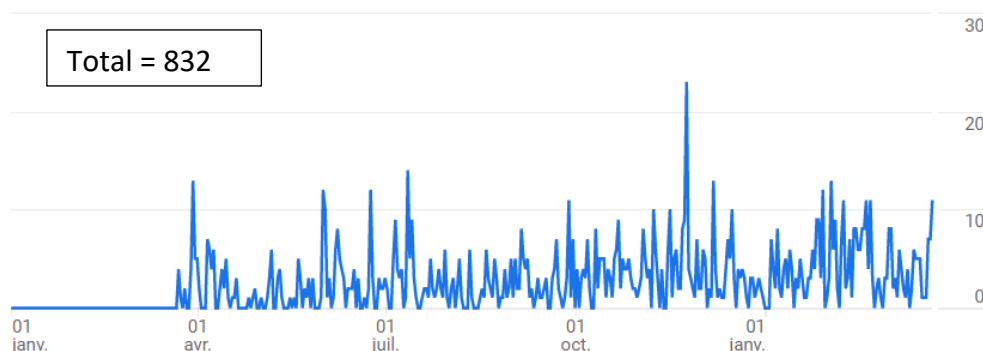


Figure 6: Number of INSTABAT website visit by days over the time

Visitors come from organic search and direct access for relatively same proportion (around 400). Few visitors come from referral and less from organic social (see Figure 7).

¹ <https://www.accelevents.com/e/the-battery-innovation-days>

Direct	406
Organic Search	395
Referral	83
Organic Social	22
Unassigned	1

Figure 7: How visitors find the website.

If we analyze the geographical impact of the web site (Figure 8) we show that the visitors come from all around the world and from all the continent. Most of visitors come from France, China, Germany, United States, Spain, Portugal and Belgium. This list is given by decreasing number. We can show the impact of the web site of INSTABAT project is worldwide with a deeper impact for European countries. If we compare the ratio of new visitors to number of visits, this figures are the same (see Figure 8). This results show that the visitors explore the site only one time.

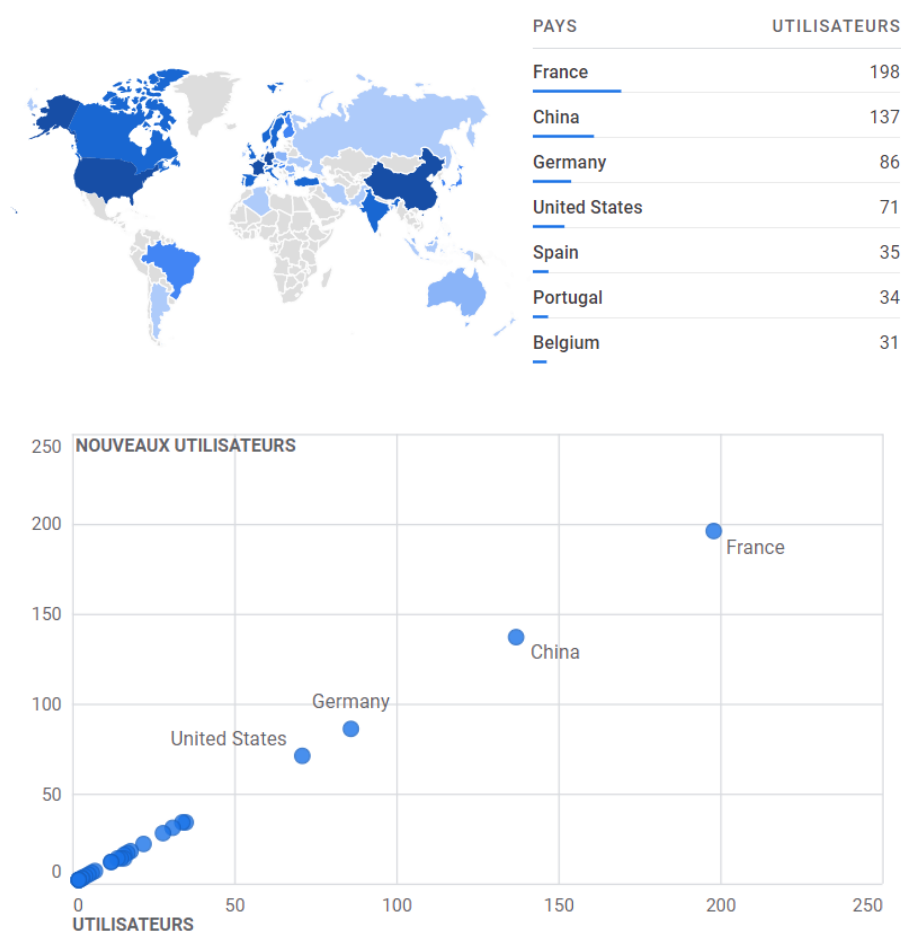


Figure 8: Map of visitors and most of visitor's country list (top). Ratio by country of first and multi visits

3.2.1 Flyer & poster

A flyer and a poster of INSTABAT were developed using the visual identity of the project (colors, logo and drawings). The message included in this support was similar to the information included in the web site. The goal of this supports is to give a rapid overview of the objectives of the project, the consortium, the link between INSTABAT and BATTERY2030+ initiative. This documents will be used all along the project for dissemination activity during conference, meetings, workshop and other opportunity to share these information. The content of this support can be updated during the project to add results and new information.

4. Dissemination and communication activities

4.1 Participation in events

4.1.1 Battery INNOVATION DAYS 2021

During the period covered by this deliverable, the presentation of INSTABAT project and results was done during the Battery INNOVATION DAYS² organized by IPCEI Batteries, Batteries Europe, Battery2030+ and BEDA³. This international conference was done between 23rd and 25th November 2021 online. All the presentation of the conference can be accessible on the YouTube channel of the conference⁴. The round table on the Smart battery functionalization: Status and future can be seen on this link⁵.

Figure 9: Smart Battery functionalization: status and Future (Battery Innovation Days 2021)

During this conference a panel discussion of the progressing in the field of sensors and self-healing in battery cells was animated by Kristina Edström (Battery2030+ coordinator) with a panel of

² <https://www.accelevents.com/e/the-battery-innovation-days>

³ Batteries European Partnership Association (<https://bepassociation.eu/>)

⁴ https://www.youtube.com/channel/UCy-g12iocerMt5qYV1f_MnQ/featured

⁵ <https://www.youtube.com/watch?v=OLrEQkDTqIE>

experts: Maitane Bericibar (BAT4EVER), Marja Vilkmann (HIDDEN), Alexis Grimmaud (CNRS), Mattin Lucu (Sensibat) and Olivier Raccurt (INSTABAT).



Figure 10: Video of the Panel discussion: Progressing in the field of sensors in battery cells⁵

4.1.2 Participation to the Bi-annual meeting Battery 2030+ March 24 2021

INSTABAT was involved in the Bi-annual meeting of BATTERY 2030+ on March 24 2021. During this meeting a presentation of INSTABAT and the progress update was done.

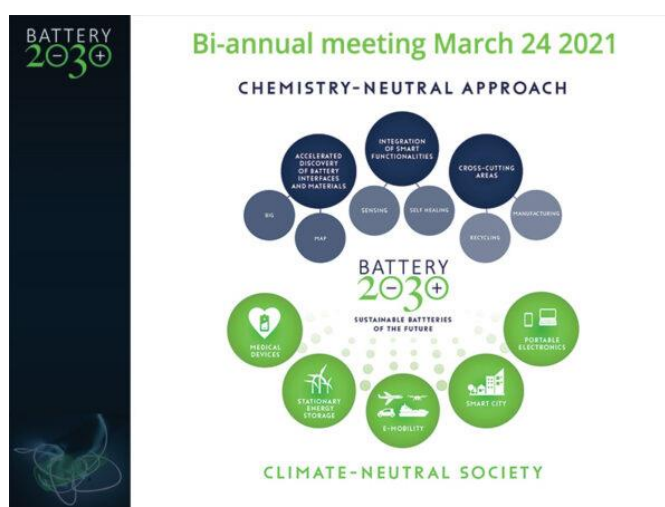


Figure 11: Frontpage of the Battery2030+ bi-annual meeting March 24 2021

4.1.3 Encontro de Ciencia'21 Conference

A poster was presented to the Encontro de Ciencia Conference (June 28-31th, 2021)⁶. The audience of this conference was: 860 persons on site and 11288 persons online.

Title: "INSTABAT: Innovative physical/virtual sensor platform for battery cell".

⁶ <https://www.encontrociencia.pt/2021/home>

Abstract: INSTABAT is intended to monitor in operando, key parameters of a Li-ion battery cell, in order to provide higher accuracy states of charge, health, power, energy and safety (SoX) cell indicators, allowing us to improve the safety and the quality, reliability and life (QRL) of batteries. INSTABAT is part of the BATTERY 2030+ Initiative.

4.1.4 International Operando Battery Days (future event: submitted abstract)

International Operando Battery Days is a conference dedicated to the characterization of batteries by means of advanced operando techniques, both in-lab and at Large Scale Facilities (synchrotron, neutron and muons). This conference will take place in Grenoble (France) on 16 to 18 May 2022. An abstract was submitted to present the INSTABAT's project, objectives and key results.

Title: "INSTABAT a multisensor smart cell platform for operando and in situ monitoring"

Abstract: INSTABAT project is a European project started in 2020 under the umbrella of the EU BATTERY 2030+ large-scale initiative. According to the roadmap for smart cell, INSTABAT will develop proof of concept of smart sensing technology embedded in the cells to monitor internal key parameters such as temperature and heat flow, pressure, strain, lithium-ion concentration, CO₂ concentration, absolute impedance, potential and electrode polarization. During the project, we develop a concept of "lab-on-cell" based on new embedded physical and virtual sensors to perform reliable and in operando monitoring of the key parameters. This monitoring is used to improve the performance and safety thanks to enhanced Battery Management Systems algorithms and real-time higher accuracy SOx determination. After an overview of INSTABAT project, the recent results of the project will be presented. We will demonstrate the insertion of two physical sensors: optical fibre and reference electrode inside a commercial pouch cell to monitor internal temperature and electrodes potential in operando condition. Results from experiments at high loading in charge and discharge will be presented. These first results will validate the feasibility of the concept of "Lab on cell" developed all along the INSTABAT project.

4.1.5 AABC Europe Conference, June 2022 (future event: submitted abstract)

Advanced Automotive Battery Conference⁷ is a major conference in Europe. This conference audience and participation cover industrial and academic community from Europe worldwide. One abstract on the development of optical fiber sensor was submitted.

Title: "Optical fiber sensors as a tool to monitor next batteries generation".

⁷ <https://www.advancedautobat.com/europe>

4.2 Communication in media

One communication to the social media was made in 14.10.2021 on the VISAQ SAPO web media.⁸ In this article a general presentation of INSTABAT project and the role of UAVR partner was highlighted.



Figure 12: Front page of the article published in the VISAQ SAPO web page.

4.3 Publications

Due to the low TRL of the project, the results are currently being consolidated. This is why the publications are currently being written. We list below publications and communication under preparation.

⁸ <https://visao.sapo.pt/volt/2021-01-14-universidade-de-aveiro-em-projeto-europeu-para-criar-sensores-para-baterias-de-veiculos-eletricos/>

<i>Partner</i>	<i>Title</i>	<i>Type</i>	<i>Journal/Book</i>	<i>Status</i>
UAVR	Tracking Li-ion Batteries Using Fiber Optic Sensors	Chapter	Intech Open Publisher	Submitted
UAVR	-	Article	Energy Storage Journal	In preparation
UAVR	-	Article	Energy Letters Journal	Expected
UAVR	-	Article	Batteries Journal	Expected
CEA	In-situ and operando internal cell temperature measurement	Article	Journal of Power Source	In preparation
CEA	Operando lithiation state characterisation of graphite electrode by spectral reflectance measurement using optical fibre	Article	Sensor & Actuator	In preparation
CEA	Thermoluminescent optical probe for battery temperature monitoring	Article	Journal of Luminescence	In Preparation

4.4 Liaison with others projects, network and initiatives

INSTABAT project is on the umbrella of BATTERY2030+ initiative, however natural link was created under the others project from this initiative such as BIGMAP⁹, HIDDEN¹⁰, BAT4EVER¹¹, SPARTACUS¹² and SENSIBAT¹³ (see Figure 13).

4.4.1 Participation to the BATTERY2030+ collaboration board meeting

Coordinator or deputy coordinator of the INSTABAT project was involved in the collaboration board BATTERY2030+ meeting. This biweekly meeting organized by the BATTERY2030+ board is the place for all the stakeholder activities and initiative between partners. During these meetings, a status of the progress of all the projects was presented. We also discussed of the results and cooperation subject between projects. Some information of workshop and others collaborative activities are presented and discussed. These information are communicated to the INSTABAT consortium after each BATTERY2030+ collaborative board meeting.

⁹ <https://www.big-map.eu/>

¹⁰ <https://www.hidden-project.eu>

¹¹ <https://www.bat4ever.eu/>

¹² <https://www.spartacus-battery.eu/>

¹³ <https://sensibat-project.eu>

LARGE-SCALE RESEARCH INITIATIVE

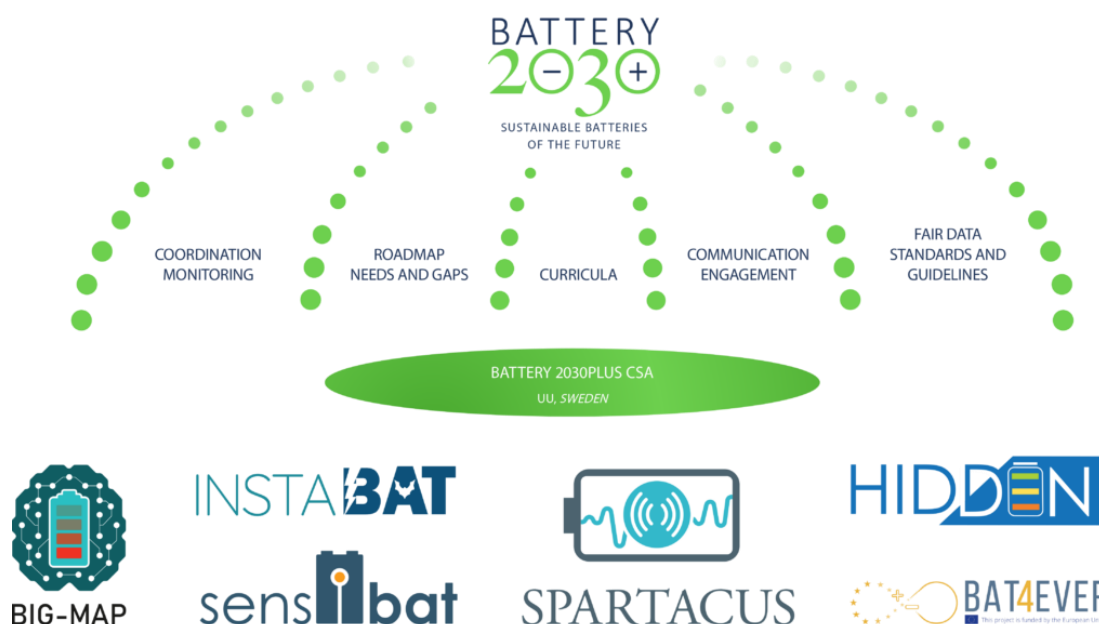


Figure 13: BATTERY2030+ largescale initiative and related projects (LCBAT13 and LCBAT14)

4.4.2 Participation to the BATTERY2030+ communication board meeting

INSTABAT coordinator participates regularly to the communication board meeting of BATTERY2030+. The objective is to disseminate the results from INSTABAT to the BATTERY2030+ initiative and participate to the joint communication activities. During the first period of INSTABAT project:

- 1- A contribution from INSTABAT to the BATTERY2030+ Poster for the Advanced Battery Power Conference (March 29-30, 2022) in Münster.
- 2- A presentation of INSTABAT key results during the internal BATTERY2030+ workshop organized by Lormann Henning the February 14th, 2022 (online).

4.4.3 Collaboration between INSTABAT and BIGMAP project

Within BIGMAP an experimental port-folio of complementary techniques is developed towards the implementation of a multimodal multiscale characterization platform. Operando synchrotron experiments realized and analyzed according to BIGMAP standards and protocols will be performed on INSTABAT pouch cells instrumented with different types of sensors. The spatially-resolved real-time structural data obtained by diffraction (phase transitions, strain, local lithiation mechanism) will be cross-correlated to the various sensing data (temperature, local electrode potential), allowing to monitor the potential perturbations of reaction mechanisms due to sensor integration and to correlate micro-to-macro scale performance-related parameter variations along cycling.

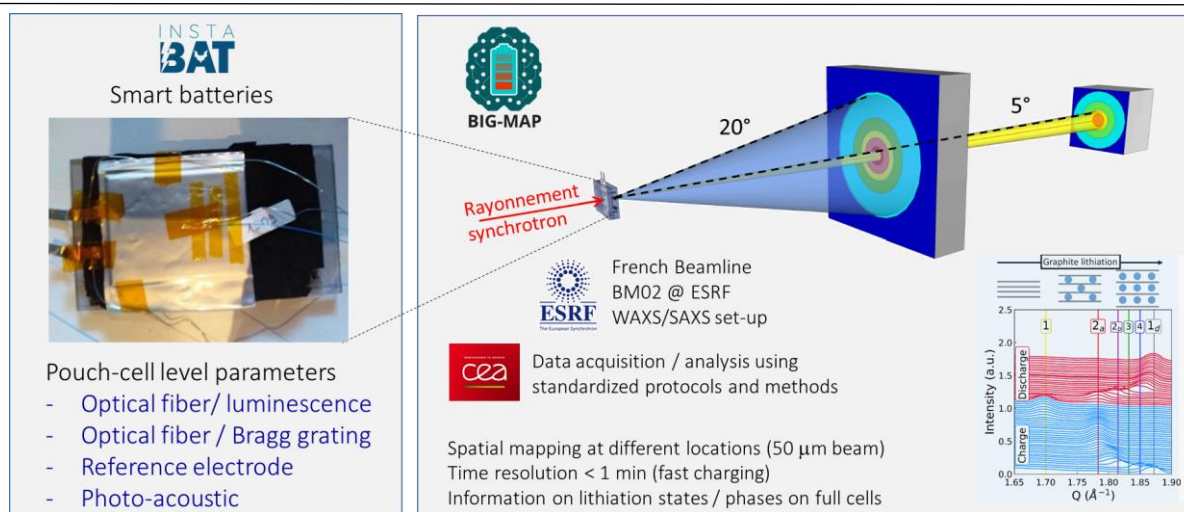


Figure 14: Joint experiment between INSTABAT and BIGMAP project

4.4.4 Participation to the revision of the BATTERY2030+ roadmap

From the beginning of INSTABAT project, Olivier RACCURT participates to the working group of BATTERY2030+ for the roadmap revision. During the years 2021 and beginning of the year 2022 several meeting driven by Jana Kumber (Battery2030+) were organized to discuss and revised the roadmap. The results of this meeting for roadmap revision were shared to the INSTABAT partners for comment and inputs.

4.5 Training activities and communication to student

From the beginning of the project dissemination activities to the students have been done through course and student formation. The list below gives the student number and level of students trained.

- 2 PhD thesis in the Physical Engineering Doctoral Program (in progress);
- 2 Master Science Thesis in the Physical Engineering Course (in progress) + 1 Master Science (expected)
- 1 Bachelor Science Thesis (in progress) + 1 Bachelor Science (expected)
- 1 postdoctoral (2 years)
- 2 Master Science work-study internship
- 1 Master Science internship