STORAGE RESEARCH INFRASTRUCTURE ECO-SYSTEM

RI Information sheet 2022

CNR, BAT-LAB

Technology(ies) of Energy Storage (electrochemical)

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Project Acronym	StoRIES
Call	H2020-LC-GD-2020
Grant Agreement No.	101036910
Project Start Date	01-11-2021
Project End Date	31-10-2025
Duration	48 months

1. Photo

2. Geographical coordinates (38°11′38″ N; 15°33′09″ E)

3. Description of the research infrastructure for the webpage

BATLAB CNR ITAE is a multidisciplinary research lab in which innovative and SoA electrochemical storage technologies are investigated by physico-chemical and engineering approaches. The research looks both to the long and short term by investigating emerging generation batteries as well as by optimizing more mature and promising technologies. The research is addressed both towards innovative storage devices such as sodium-based battery (e.g. Na-ion, Na-air, Na-metal-

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chloride), seawater batteries, organic/inorganic redox flow batteries and more consolidate technology i.e. vanadium and organic redox flow and lead-acid batteries. A fundamental aspect of the technologies R&D value chain is investigated, from materials synthesis and deposition, cell and stack engineering, prototyping up to electrochemical test. The lab offers manufacture devices for materials synthesis' i.e. electrospinning device (Linari Engineering) for nano materials synthesis, Nabertherm LHTC –C 450, Rolling press, screen printing as method deposition, ionic conductivity system for solid state electrolyte materials (25°C-1000°C) and Glove Box Lab master Lp-Mbraum for cell assembly. Furthermore, X-ray diffractometer Bruker 2D-phaser is a dedicated equipment for synthesized materials.

The lab also offers a wide choice for battery testing and characterization for different battery chemistries.

Electrical characterization evaluates the battery behaviour under different operative conditions. Customized cycle profiles can be applied to simulate both automotive and stationary applications.

All electrical and electrochemical characterizations can be performed under controlled temperature and humidity conditions. Particular ambient conditions can also be reproduced for tests like damp heat, dry heat or sub-zero where the resistance of the battery is verified under either high humidity level, dry air or extreme low-temperature.

Aging mechanisms limiting the life-time of Li-ion batteries can efficiently be characterized by physico-chemical analysis of the cells by observing the changes happening to the materials during aging.

Post-mortem analysis is a destructive method because it is required the disassembling of the cell to extract and separate the single components to be analyzed. To maintain the cell components in a very similar state as during operation and for the safety of the experimenter, the disassembly environment has to be controlled. This procedure is typically carried out inside of a glove box under dry inert atmosphere. Since some components of Li-ion cells react with O2 and H2O, their absence in the glove box avoids both the risk of fire and the alteration of the materials before of the characterization. Although, the disassembly of the cell at 0% SOC can be more safety avoiding the occurring of short circuit, for small cells and with necessary caution, it can also be carried out

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at a defined SOC different from 0%. Usually, this is performed to investigate the lithiation/delithiation state of the electrodes.

To perform these analyses, a variety of complementary methods is available in the laboratories of CNR-ITAE like:

X-Ray Powder Diffraction (XRD),

X-Ray Photoelectron Spectroscopy (XPS),

Scanning an Transmission Electron Microscopy (SEM, TEM),

Energy Dispersive X-Ray Analysis (EDX)

4. Availability of the research infrastructure

(Please indicate time periods in which infrastructure will not be available for StoRIES in the next 2 years – if already known)

N.A.

5. Special considerations (confidentiality / NDA agreements, insurance requirement, special training, HSE training)
Insurance needed
EU Digital COVID Certificate

6. Energy storage technology that can be analysed/studied by using the research infrastructure

- Electrochemical ☒
- Chemical ☐
- Thermal ☐
- Mechanical ☐
- Superconducting Magnetic ☐
- Cross-cutting ☐ (Specifically: …)

7. Key words for the webpage
RFB, sodium based battery, Post-lithium battery, electrochemical test, phyco-chemical test, thermo-climatic tests, cycling, and cold cranking tests

8. TRL level (if applicable):

- 1-3 ☒

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- 4-6 ☒
- Above ☐

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