An open innovation Test bed for Electrochemical Energy Storage MATerials

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TEESMAT: an open innovation Test bed for Electrochemical Energy Storage MATerials

- European battery market is growing very fast ~25%/year
- The development of a competitive battery value chain in Europe is a top priority:
  - Strategic independence
  - Trade balance
  - Environmental impact

Source: Avicenne Energy, 2021
• Batteries are incredibly various and complex objects

Aging mechanisms in Li-ion batteries

Schlasza et al., 2014

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• Thus progress in electrochemical storage depends on characterization and understanding of all basic processes.

• Advanced techniques are developed by EU research labs but underused by companies
• Many data are produced but insufficiently exploited
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TEESMAT is setting up a platform to provide **advanced characterization services** for companies in the domain of electrochemical energy storage materials.

- **8 Service Providers**
  - ~30 Techniques
  - (chemistry, morphology, structure, performance, modeling,...)

- **10 Service Users**
  - ~30 User Access Cases

**Database**
- samples, tests, results
- access control

**a Single Entry Point**

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Grant Agreement No 814106

Batteries Event 2021, September 30th
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TEESMAT H2020 project

Setting up a first organisation

Test Phase of the platform

TODAY

Commercial activity

SERMA TECH – single entry point

Looking for new partners
• External Service Users (future customers)
• External Service Providers (future members of the commercial consortium)
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External Service User

- Possibility to submit a user case for free
- Results have to be available for publication

External Service Provider

- Provide a complementary analysis
- Access to data of the user case
- No access to other data

Demonstrate the power of TEESMAT to future customers

Possibility to join TEESMAT consortium after the project to provide more comprehensive commercial services
Advantages for the customer:
- single standard contract with SERMA
- access to experts and techniques from the whole consortium
- in certain cases, access to other results from the database
Various levels of service

From the single measurement with a well identified technique
To the complex problem involving discussion with several experts to define the best set of techniques

Various options for collected data

No disclosure (only members involved in the user case)
Disclosure to the consortium
Anonymous disclosure
Full disclosure (open access)

- Price incentive in case of disclosure
- The more you open your data, The more you have access to others’ data
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TEESMAT database:
Structured data on sample description and history, test conditions, and results
Today the database includes

- 44 user cases
- 600 samples
- 200 tests

Why such an emphasis on the database?

• We believe in knowledge build-up across partners and across user cases
• We believe additional knowledge will come from data analytics
• Our customers will eventually benefit from this new knowledge
Zinergy develops **thin film printed batteries** for flexible circuits such as in the Internet of Things.

**The Challenge:** characterize printed film thickness and defects during printing for quick process adjustment.

**Laboratory-based study (IN-CORE Systèmes) to evaluate the feasibility of an inline quality control and measurements of the requested parameters.**

**Determine the most suitable technology at required 2D and 3D resolution.**

**Installation in the Zinergy production line to perform height measurements during the different production steps of the electrode.**

**offline 2D line-scan camera**

**offline high resolution laser or stereovision**

**next step: online installation**

**TEESMAT is also present in the production phase for Industry**
GENESINK develops nano-inks, in this case copper metallization of polymer flexible substrates to be used as current collectors in printed flexible batteries.

The Challenge:
Study the oxidation of copper and evolution of nanoparticles during the fabrication process and during storage.

- Quality of coatings and deposited layers
- Cu and Cu oxides distribution and concentration on the surface and across the bulk
- Identification of different crystalline phases in the sample

Towards process improvements

Mapping of sheet resistance
XPS+RAMAN
Hard X-ray Scattering

TEESMAT allows several levels of investigation

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Yunasko develops hybrid supercapacitors for 10x higher energy density than supercapacitors, higher power, longer cycle life and much shorter charging time than classical Li-ion batteries.

The Challenge: Relate the electrochemical performances with structural and morphological characteristics of the electrodes for various combinations of LIB and SC materials and at various life stages of the device.

TEESMAT provides a one-stop-shop solution for having access to a complete set of information.
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Come join us at
www.teesmat.eu