



# The Electrochemistry Group and the big EU initiatives on Battery

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- Laboratories fully equipped for the preparation and characterization of materials and cells for electrochemical applications both at laboratory scale and at industrial level.
- International collaborations in several competitive funded projects
- Partners in EGVIA and EERA
- partner in Large Research Initiative **Battery2030+**
- Expert in ETIP-SNET and co-chair **ETIP Batterie Europe**
  
- Partner of interdepartmental laboratories:
  - Energy Center Lab
  - Car@POLITO
  - Partnership with Argentina



# Electrochemistry group: Main research activities

The **Electrochemistry group** is active in the field of electrochemistry and electrocatalysis from more than 90 years...

## Electrochemistry group

**Electrocromic  
Fuel cells**



battery/electrocromic  
devices  
materials  
polymers  
catalysts



from Lab-scale  
to  
preindustrial-scale  
assembly

**Li-ion technology**



electrode materials  
electrochemical testing  
high capacity anodes  
high voltage cathodes  
electrolyte interaction



**Post  
Li-ion batteries:  
Li-air, Li-S**

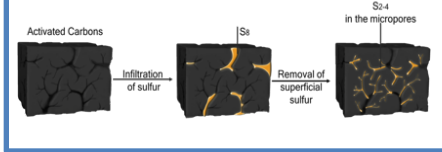
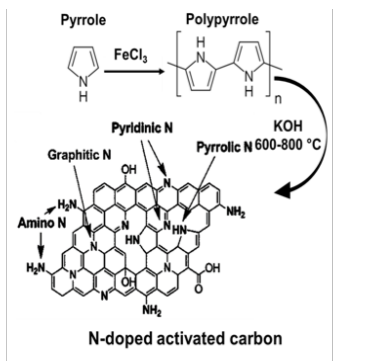


electrode materials  
electrocatalysts  
reaction mechanisms  
protective membranes  
interlayers

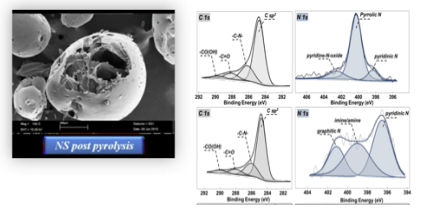
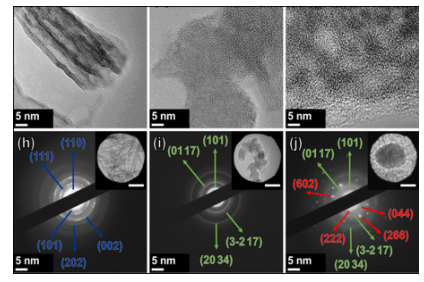




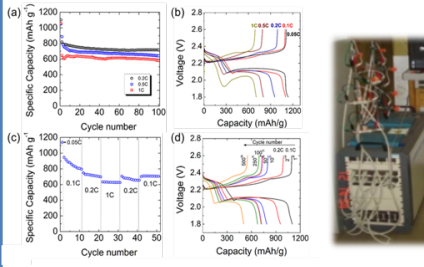
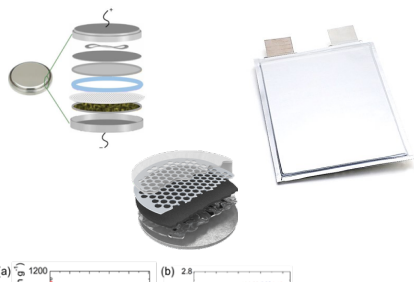
## material synthesis



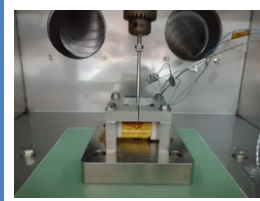
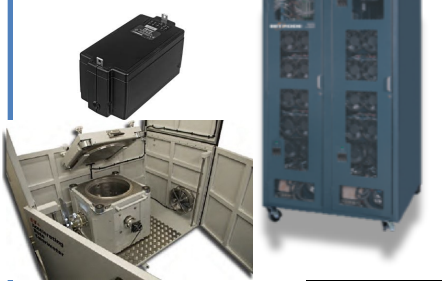
## characterization



## cell assembly & testing @ lab scale



## testing and abuse test of battery packs & modules





# partner of the main EU initiatives



## A LONG-TERM RESEARCH INITIATIVE IN THE BATTERY R&I LANDSCAPE



Regional IPCEI



INTERREG AMBP





# Full partner in Large research Initiative Battery2030+ unico partner italiano Silvia Bodoardo

## A LONG-TERM RESEARCH

TRL 1      TRL 2      TRL 3

Scope

Long-term research

**BATTERY  
2030+**

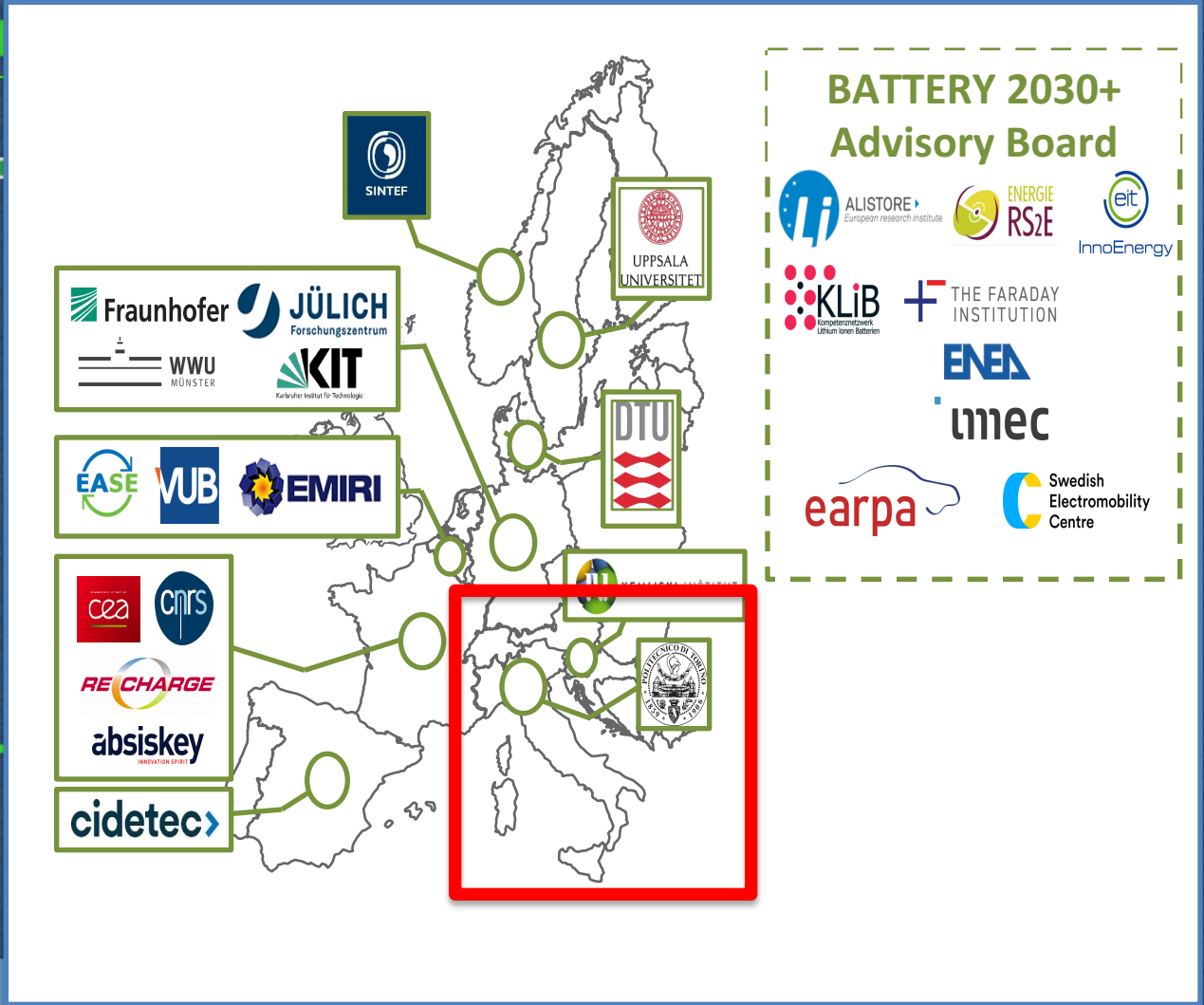
Actors

The European Battery  
Community

Roadmap

A long-term research  
roadmap  
(FETPROACT-04-2019 CSA)

Regional IPCEI





# BATTERIES EUROPE

## Status Working Group Provisional Chairs and Co-Chairs, April 11

Thematic Working Groups	WG1 New & Emerging Battery Technologies	WG2 Raw materials & recycling	WG3 Advanced Materials	WG 4 Manufacturing and Cell Design	WG5 Application and Integration-Transport	WG6 Application and Integration-Storage
Chair (Alternate )	Kristina Edström <b>Uppsala University</b>	Ilkka Kojo <b>Outotec</b> (Mari Lundström, <b>Aalto university</b> )	Fabrice Stassin, <b>Umicore</b> (Marcel Meeus, <b>EMIRI</b> )	Oscar Miguel Crespo <b>Cidetec</b> (Arno Kwade, <b>TU Münster</b> )	Simon Perraud <b>CEA</b>	Luigi Lanuzza <b>ENEL</b> (Rachele Nocera, <b>ENEA</b> )
Co Chair	Stefano Passerini <b>TU Ulm</b>	Olli Salmi <b>EIT Raw Materials</b>	<b>Silvia Bodoardo</b> <b>POLITO</b> <b>EERA ES</b>	Name TBC <b>Northvolt</b>	Franz Geyer <b>BMW</b>	Michael Belsnes TBC <b>3ES- Research Group, SINTEF</b>
Co-Chair	TBD	Alain Vassart <b>EBRA</b>	TBD	TBD	Josef Affenzeller/ Lucie Beaumel <b>EGVIA</b>	TBD

Research

Industry or Association

electrochemistry group

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# Nuova iniziativa INTERREG



## AMPB Advanced materials for batteries for electro-mobility and stationary energy storage

- Pilot 1. Innovative cell manufacturing for generation 4 (solid state) - advanced material & manufacturing & cell production (Lead Region: Bavaria)*
- Pilot 2. Sustainable raw material extraction & processing (Lead Region: Castilla y León)*
- Pilot 3. Recycling of existing Lithium Ion batteries (Lead Region: Bavaria)*
- Pilot 4. Liquid based batteries (stationary) (Lead Regions: Basque/ Valencia)*
- Pilot 5. Network of research & testing centers (Lead Region: Slovenia)***
- Pilot 6. Improved lithium-ion batteries (Generation 3b) - (Lead Region: Auvergne Rhone Alpes)*

Network Piemontese di laboratori dai materiali alla produzione di celle e pacchi batterie e testing completo -**ENERGY CENTER LAB**




**REGIONE PIEMONTE**

*Direzione Competitività del Sistema Regionale*

*Settore Sistema Universitario, Diritto allo studio, Ricerca e Innovazione*

*universita.ricercaeinnovazione@cert.regione.piemonte.it*



Politecnico di Torino – coordinamento tecnico

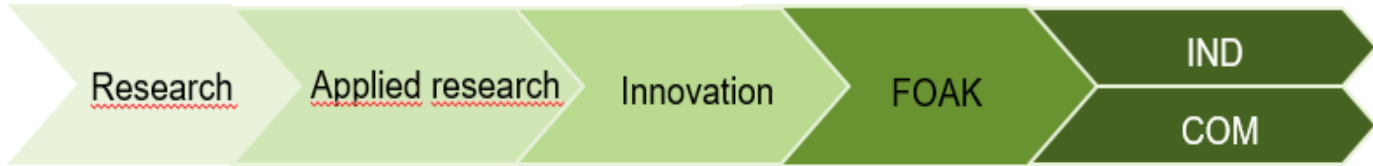


electrochemistry group

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**Proposed Battery Partnership**

**EUROPEAN BATTERY ALLIANCE** | EBA250

**BATTERIES EUROPE**  
European Technology and Innovation Platform

**ETIP Batteries Europe**  
Roadmap Short- and Medium-term

**BATTERY 2030+**

**BATTERY 2030+**  
Long-term perspective, roadmap and implementation  
LC-BAT-2020 projects  
12 13 14 15

**IPCEIs**

**Horizon Europe and Interregional (S3)**

**Innovation Fund**

**Business Investment Platform** | BIP  
EUROPEAN BATTERY ALLIANCE

**Invest EU**



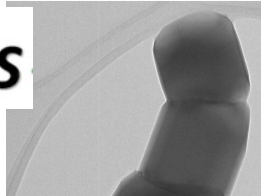
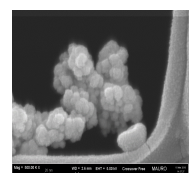
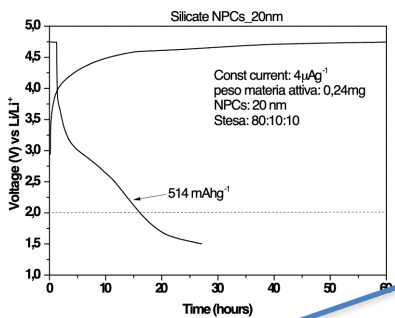
## Study of electrode materials for

## Lithium ion cells

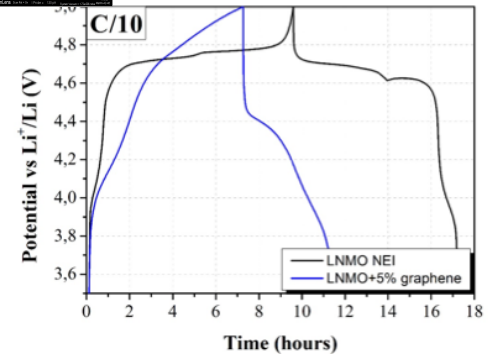
- High capacity electrodes:  
Silicon (anode)  
Silicates (cathode)

- High voltage for high power applications:  
LiNiMnOx (cathodes)

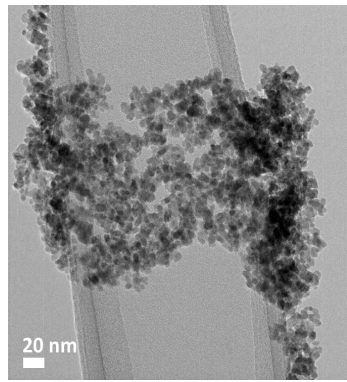
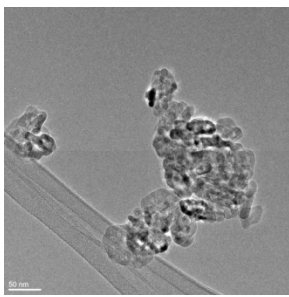
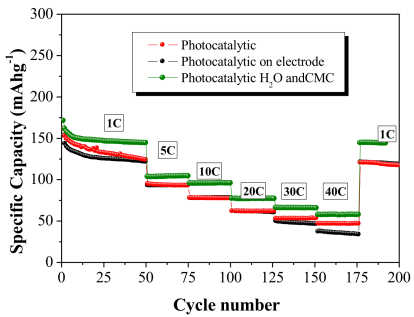
TiO<sub>2</sub>, SnO<sub>2</sub> (anodes)  
Modified carbons for aqueous binders  
New natural binders



LNMO\_comparison



silicate



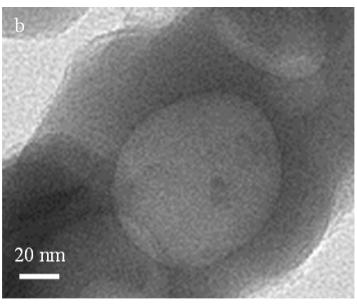
Study of electrode materials for



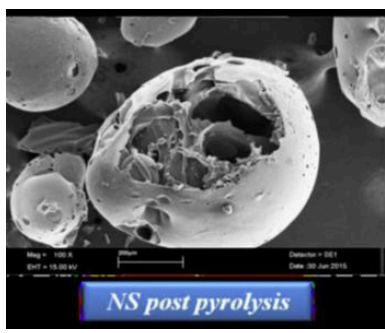
post-lithium-ion batteries :  
(high energy, high capacity)



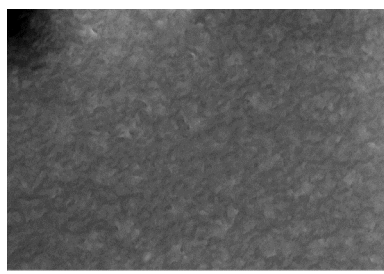
Silicon nanoparticles  
In carbon shell



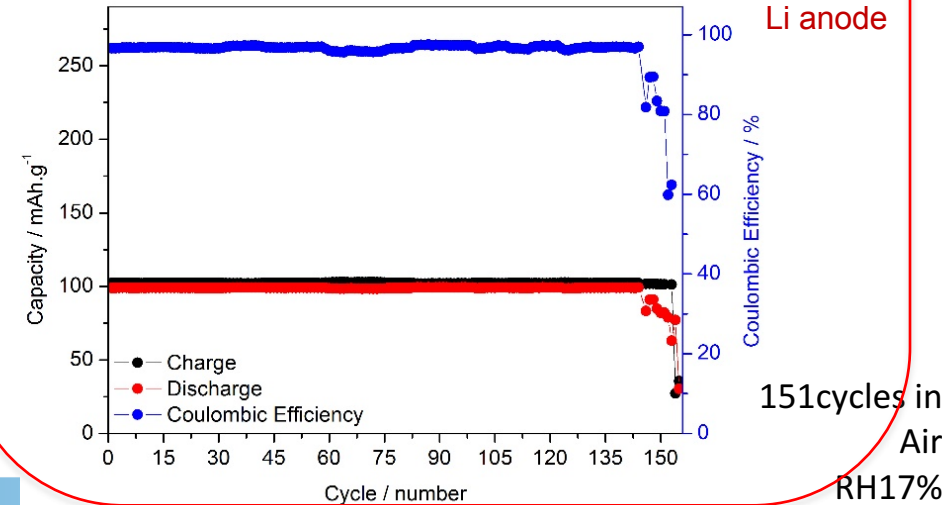
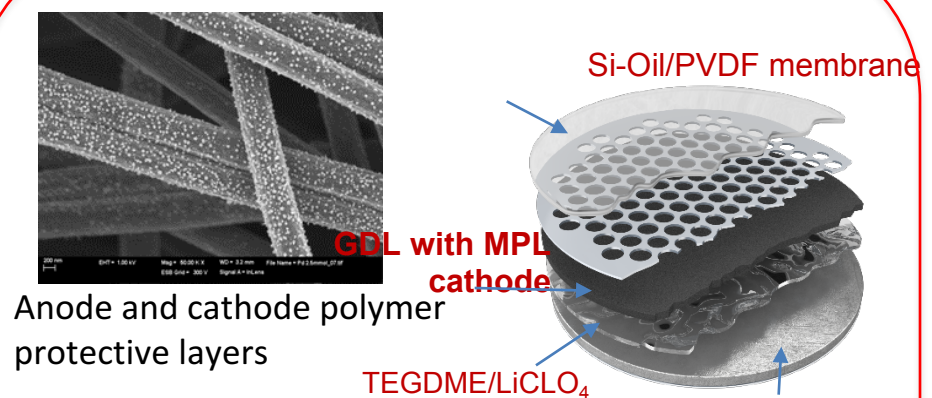
Lithium-sulfur  
Sulfur cages



Polymer/ceramic protective layer  
on Li



Lithium-air





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